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Published by:
UniKL MIMET
Dataran Industri Teknologi Kejuruteraan Marin
Bandar Teknologi Maritim
Jalan Pantai Remis
32200 Lumut

Proceeding of the Marine Application & Technology Conference 2016 Lumut, Perak.
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Monitoring and analysis the lifespan of lithium ion battery through LabVIEW

M.A.M. Ali and M.R.M. Dahalan

Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

Abstract- Lithium ion batteries are one of the most commonly used batteries. Monitoring the performance parameters of the battery provides essential data useful for managing the batteries efficiently. This paper proposes a highly accurate and efficient battery monitoring system based on NI LabVIEW. As the calculations are done on computer, this system is faster than micro-controller based systems and provides highly reliable real-time data. This system will be integrated with the National Instrument device that is Compact RIO. CompactRIO (or cRIO) is a real-time embedded industrial controller made by National Instruments for industrial control systems. The CompactRIO is a combination of a real-time controller, reconfigurable IO Modules (RIO), FPGA module and an Ethernet expansion chassis. The system will observe the discharging and charging behavior of a battery depending on the number of parameters that is the voltage, current, temperature, and capacity of the battery. Furthermore, a battery is an electrochemical device in which electrical energy is converted and stored in chemical form for storage. The chemical energy can then be easily reconverted into electrical energy. As we are all aware, a significant number of the modern electronic equipment we take for granted every day, such as mobile phones, laptop computers, music players, cameras and countless others are powered from rechargeable batteries. Therefore, lithium ion battery is widely used throughout the world and this is the reasons why we need to check the life time of a lithium ion battery.

I. Introduction

Electrical energy plays an important role in our lives. Generation, transmission and distribution of electrical energy are major tasks. Batteries are used to store this energy. The energy of chemical compounds in the batteries acts as a medium of storage. Batteries are used for varied applications like power supply for portable devices, power back-up and so on. Batteries used for uninterrupted power supply require constant monitoring to ensure efficient operation. The battery monitoring system by using LabVIEW is to ensure continuous operation, optimum use of battery energy and controls the charging and discharging of the battery.

Materials and Methods

Basically, the design of this project can be divided into two parts of hardware and software. The hardware connection is more on the Data Acquisition Module including the suitable port such as analog input and digital output. For the software part, the LabVIEW code is designed based on the operation of the system and standard requirement. Software is consisting of programs that opposed to the physical components of the system (hardware) that will enable a computer to perform specific tasks. Sophisticated applications require planning and design. A good design will make the software and hardware easier to build initially and easier to modify and maintain in the future. Having started the LabVIEW application for the first time, the user is asked to provide obligatory system information, e.g., the number and sequence of the measuring units, the value of the
shunt resistor for current measurement, the time between new measurement requests and the paths for data storage. At the moment, the presented system is pre-configured to deal with up to eight measuring modules. The default time interval between measurement requests is set to four seconds, but can be augmented as well as shortened (down to one second) by the user. The National Instruments LabVIEW is a graphical development environment that helps make flexible and scalable test application, control and design. By using LabVIEW, researcher can connect with real-world signals, analyze data for some of important information and show results on displays, the Webs and reports. The benefits of LabVIEW utilizations include: graphical programming, high-level development tools, built-in measurement and analysis functions, multiplatform and embedded devices. For manufacturing test, engineers can quickly build automated test sequences with LabVIEW through instrument connectivity and analysis features. In process control and industrial automation, LabVIEW offers large numbers of I/O points, communication with networks, and control.

![Fig 1 : Design the main front panel](image1)

![Fig 2 : Design of the block diagram circuit](image2)

III. Result

For the standby mode, transmit mode and receiver mode the data have been collected since the battery fully charges until the mobile phone automatically shut down (3.26 V). The result has record by measuring the input (voltage from battery) and the output (from the front panel of LabVIEW). The longest time is standby mode compare to the receive mode and transmit mode. The result has been shown as in the Table 1

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![Figure 3 : Design the hardware prototype](image3)

IV. Conclusion

First of all, Monitoring and analysis the lifespan of lithium ion battery through LabVIEW is not limited for any particular application, it can be used anywhere especially for industries with little modification in software coding depending on the requirements. Recently, the test machine that being used in the industries is too big, need high cost maintenance and not portable to be used outside of the factory. This project purpose to use...
to use CompactRio and this device smaller compare to the previous machine that being used in the industries. Furthermore, this concept is acceptable and provides the flexibility to be adapted by users outside of the factory for personal testing.

This project focused on effect of temperature and speed due to condition of small craft engine by using engine monitoring system. This engine monitoring system can improve the quality and lifetime of the engine, also can reduce the failure engine, costly repair, especially the time and cost of removing engines prematurely. With the technology LabVIEW and CompactRIO, the monitoring system suited for engine monitoring system.

References

Abstract- The aim of this paper is to analyse design and fabrication of a mould prototype system for mild steel testing on high pressure die cast (HPDC). This paper is to prepare a design for a prototype of mould system. The mould length was 20.32cm. The process cycle for die casting involve of five steps; 1) clamping, 2) injection, 3) cooling, 4) injection and 5) trimming. The mould was designed by using Autodesk software according to specimen dimension that have been referred from ASTM E8. Autodesk Inventor have been used because it is easy to connect for the 3D printing process. Autodesk Inventor allows to convert the basic 2D sketch into a solid model using modelling options. Throughout the Autodesk Inventor, the design is fabricate using 3-D printing process. 3-D printing is a process for creating objects directly by adding material layer by layer in a variety of ways depending on the technology used.

Keywords: Mould, Mild Steel, Die Cast, HPDC

I. INTRODUCTION

Mould is a hollowed-out block that is filled with a liquid or pliable material such as plastic, glass, metal, or ceramic raw material. High pressure die casting is a manufacturing process by injected molten metal with a die casting machine under force using considerable pressure into a steel mould or die to form products. This project involved design and fabricate a mould for mild steel on high pressure die cast. This mould could be used by other students in order to test materials on high pressure die cast (HPDC).

Casting is a manufacturing process in which a liquid material is usually poured into a mold, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is also known as a casting, which is ejected or broken out of the mold to complete the process. In the high pressure die casting process, the metal was forced into a high grade steel tool at high speed and pressure. The casting temperature roughly 700°C during casting. High pressure die casting was a competitive casting method when components have requirement which cannot be achieved by other casting processes such as high volume, better tolerances and smooth surface finish. Casted parts require no machining due to the close casting tolerances. The tooling costs are generally higher than for gravity die casting or low pressure die casting.

Steel is combination of iron, carbon and others. Iron is a pure chemical element. Oxides of iron are found in nature and iron ore is abundant throughout the world. Carbon was added to iron to improve its strength and hardness for better characteristic for alloy formed, steel.
Up to that certain point, the more carbon steel contains, the stronger and harder the steel. Ductility, toughness, impact properties and machinability will be decreased [4].

Mild steel also known as low-carbon steel. It is a low-cost material that is easy to shape. While not as hard as higher-carbon steel, carburizing can increase its surface hardness. Mild steel is the composition of 0.05% - 0.25% carbon and up to 0.4% manganese. Because of its poor resistance to corrosion, it must be protected by painting or otherwise sealed to prevent it from rusting. At worst a coat of oil or grease will help seal it from exposure and help prevent rusting. Being a softer metal, it is easily welded. Its inherit properties allow electrical current to flow easily through it without upsetting its structural integrity. This is in contrast to other high carbon steel like stainless steel which require specialized welding techniques. This mild steel variant of harder steel is thus far less brittle and can therefore give and flex in its applications when a harder more brittle material would simply crack and break.

Mould design affects the shape, configuration, quality, and uniformity of a product created through the die casting procedure. Improper specifications can result in tool or material corrosion, as well as inferior product quality, while an effective design can improve efficiency and production time [1].

The mechanical properties of a part are usually little affected. Some parts can have internal stresses in them. This is one of the reasons why it is good to have uniform wall thickness when molding. One of the physical property changes is shrinkage. A permanent chemical property change is the material thermoset, which cannot be remelted to be injected again [2].

II> METHODOLOGY

To achieve the objectives, the methodology have several steps as shown in Fig.1.

![Fig. 1. Methodology of design and mould fabrication](image)

A. Autocad Design Mould System

Autodesk is a 2-D and 3-D computer-aided drafting software application used in architecture, construction and manufacturing to assist in the preparation of blueprints and other engineering plans. Professionals who use AutoCAD are often referred to as drafters. While drafters work in a number of specialties, the six most common specialization areas are mechanical drafting, architectural drafting, civil drafting, electrical drafting, electronics drafting and aeronautical drafting. DWG (drawing) is the native file format for AutoCAD and a basic standard for CAD data interoperability. The software has also provided support for Design Web Format (DWF), a format developed by Autodesk for publishing CAD data.
Autodesk Inventor

AutoCAD Inventor is a computer-aided design application for creating 3D digital prototypes used in the design, visualization and simulation of products. It uses Shape Manager, their exclusive geometric modelling kernel. This software can quickly and easily create stunning renderings, animations and presentation. It is also easily to generate and share production-ready drawings for manufacturing teams. It has a simulation environment that allows motion simulation, static and model finite element analysis (FEA) of parts, assemblies and loading-bearing frames.

C. 3D Printing

It is widely believed that 3-D printing or additive manufacturing (AM) has the vast potential to become one these technologies. 3-D printing has now been covered across many television channels, in mainstream newspaper and across online resources. In contrast, 3-D printing is a process for creating objects directly by adding material layer by layer in a variety of ways depending on the technology used. 3-D printing is an enabling technology that encourages and drives innovation with unprecedented design freedom while being a tool-less process that reduces prohibitive costs and lead time. Components can be design specifically to avoid assembly requirements with intricate geometry and complex features created at no extra cost. 3-D printing is also emerging as an energy-efficient technology that can provide environmental efficiencies in terms of both the manufacturing process itself, utilising up to 90% of standard materials and throughout the product’s operating life, through lighter and stronger design.

III. RESULT AND DISCUSSION

Design Result

Since this project is focused on design and fabricate a prototype of a mould, the parameters of the mould is depend on the specimen dimension which is refer to the ASTM E8. The design of the mould consist of three parts which is mould, mould base and mould top.

The design of the mould is exactly same with the specimen but different in dimension. The total length of the mould is 207.19 mm as shown in Fig. 2 and Fig. 3. The thickness is 12 mm and width is 23.07 mm. The mould base is pulled into the mould. The inner length of the base is 199.2 mm and the outer length is 202.2 mm. The length of the base need to be smaller than the mould so it can pull into the mould easily. The mould top is used to cover the mould after the injection of the liquid (mild steel). When the liquid is cooled, the mould top is easy to open and ready for testing. The parameter is referred to ASTM E8 which is the total length is 202.2. The thickness of the specimen 5 mm and width is 15.05 mm.

Fig. 2. (a) Base mould, (b) Top mould


**B. Fabrication of Mould**

The prototype of this mould and specimen are fabricate through the 3-D printing process as shown in Fig.4 which the material is polylactic acid (PLA). PLA is a biodegradable thermoplastic which is derived from renewable resources. This makes of PLA the most environmentally friendly solution in the domain of 3-D printing. PLA responds somewhat differently to moisture, in addition to bubbles or spurting at the nozzles, it may see the discoloration and a reduction in 3-D printed part properties as PLA can react with water at high temperature and undergo de-polymerization [3].

![3-D Printing process](image)

**C. Die Casting**

Die casting is a manufacturing process that can be produce geometrically complex metal parts through the use of reusable mould (dies). The die casting process involves the use of a furnace, metal, die casting machine and mould. The metal, typically a non-ferrous alloy such as aluminum or zinc is melted in the furnace and then injected into the mould in the die casting machine. The process cycle for die casting involve of five steps as shown in Fig.5.

![Die casting process](image)

**CONCLUSION**

This project completed all the project’s objectives. During the design process of the mould by the Autodesk Software, the calculation based on the specimen according to ASTM E8 is performed. The parameters of the all parts designed are easy and suitable for the real production in industry. In the process of mould system, the part can be done with little or no labour of production. Without lots difficulty, the material and colour of the part producing can be change. The fabrication of the prototype enables all parties to visualize the product quickly and communicate what insights they have for the final product. The prototype of the mould important since it gives a general picture of products that are still in de-
development and the error can be detected earlier. 3-D printing is showing great promise in terms of fulfilling a local manufacturing model, whereby products are produced on demand in the place where they are needed.

ACKNOWLEDGEMENT

We would like to express our profound gratitude and deep regards to our supervisor, Mrs. Roslin Bt Ramli, co-supervisor, Mrs. Syajara-tunnur Bt Yaakup for their endless support, kind and understanding spirit during complete this project. Their valuable information and guidance help us in completing this project through various stages.

REFERENCES

Determinant Factors That Influence Employee High Turnover Rate in Marine Industries. A Case Study in Marine Company at Lumut, Perak.

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Abstract

This paper represents the results of research on the “Determinant Factors That Influence Employee High Turnover Rate in Marine Industries. A Case Study in Marine Company at Lumut, Perak”. With regards to the employee turnover issues that has been tremendously become an industrial issue, thus, this research is carried out with the aim to study the main factors effects on the employee turnover rate and provide suggested solution which helps in reducing number of turnover issues. The research looks upon to the factors such as benefits and salary, career development, training and management issue. A survey was conducted and the questionnaires were distributed to the respondent which were made up of employee at marine company in Lumut, Perak. The data was analysed using Statistical Package for the Social Sciences (SPSS). Based on the result of this research, there is a positive relationship between benefit and salary, career development, training and management with employee high turnover rate. The research objective questions have also been met by the results of the analysis made on the sample of the respondents. At the end of the chapter, there are some recommendation highlighted as an improvement plan and guideline to the organization to improve their organization performance.

Keywords: Turnover, factor, salary, career development, training, management, benefits

I. INTRODUCTION

In current competitive environment, most companies and organizations are compete in order to sustain their business in the industry. They need to achieve high performance in terms of profit, productivity and low on turnover rate [12]. Therefore, it leads rate of turnover increase due to factors that influence employee to turnover. The end result of the employee turnover is shown either voluntary or involuntary term. Based on [7] says that voluntary turnover is a choices that made by employee to leave the organization while involuntary turnover is a situation where employee service is terminated through decision made by the organization. There are various types of factors that can influence employee to turnover, however in this research, researcher has focused on determining the main factors that frequently occurs in the industry that influence employee’s decision. Factors that researcher discovered are salary and benefits, career development, training and management. By studying these factors, the researcher will able to suggest the solution for the organization in order to overcome these issues in the future.

Turnover issues in Malaysia rise up in today's environment especially in Semi-government Organization and by looking through previous 2-3 years statistics shows the rate of employee turnover can be considered high in the local industries.
Employee high turnover rate has outbreak the marine industries especially oil and gas companies. The organization that selected in area of this study is Sapura Kencana Petroleum Berhad branch that located in Lumut, Perak. The reason that researcher choose this organization due to the background of organization which known as the world largest for integrated oil and gas services and solutions providers with the workforce consists of multinational that comprise of over 12,000 people. The main reason of the study is to provide information related to issues and factors of employee leaving organization and the root cause of employee voluntary and involuntarily turnover.

Based on the previous studies by [10] cited from surveys which reported by Hewitt shows that Malaysia turnover rate from 9.3% in 2009 increase to 10.1% in 2010. As stated by [13], as the industries grows bigger the turnover will follows increase. The rapidly development of oil and gas industry response to the new market opportunities and putting significant pressure in term of employee high turnover and total hiring demand [8]. Thus, aim of this research is to study on how the issues and factors effects on the employee turnover rate and provide suggested solution which helps in reducing number of turnover issues. The analysis for this research will be covered from area of middle management, first line management and others with minimum number of respondents required from staffs / employees about 200 peoples.

A. Research Objectives

To identify the factors that influence employee high turnover rate.

To discover the solution to resolve the turnover issues.

To meet the research objectives, the hypothesis are presented as below:

H1: Determinant issue and factors has a positive relationship with employee high turnover rate.

H2: Improvement of employee and organization performance may resolve the high turnover issues.

B. Significance of the Research

The purpose of this study is to identifying the actual issues and factors that might have influence on employee's view regarding to the turnover with the scenario that taken place in the workplace. The researcher may able to identify the actual factors of the turnover, analyze the information and provides a recommended for possible solution to this issue. This study will gives beneficial to both employee performance and organization improvement in reducing turnover rate issues, increase awareness toward factors within and beyond organization, consistencies in work performance and providing benefits to employee in order for them to continue work in that organization. This research also can be used as a guidelines to the oil and gas industries in order to sustain and becomes more competitive in local and international industry. It can be also used as an improvement plan to improve the quality of organization's performance through conducting training program, motivation and several others program that helps in reducing the rate of turnover.

II. LITERATURE REVIEW

Turnover

Many studies are conducted in order to understand the terms of turnover with explanation through different types of perspectives. [7] defined turnover as a term of employee leaves their current position in the organization to others for fill in vacancy. This understanding is accepted for most people in knowing about the turnover in a term of employee quitting their position in the organization. Based on statement given by [1], turnover can be describe as a worker who is under cycle in labor market between firms, job and occupational in a state of employed or unemployed. According to [9] turnover intention is explain as the conscious willfulness and deliberate to leave the organization in searching for alternative in job opportunities from other organization. Most of the researchers believe that turnover issues can gives bad impression in the industry as it involves on other firms look upon on the industry itself. As [5] stated turnover as "an indicator of organization performance and can easily be observed negatively towards the organization's efficiency and effectiveness".
Voluntary turnover
Based on [2]; [4]; [7] voluntary can be defined as the action taken by employee for leaving the organization under decision made by employee itself. This type of turnover focus on employee perspective toward decision that they made based on the factor that concerns on their needs.

Involuntary turnover
Involuntary turnover is vice versa to voluntary turnover according to [6] describe as the employee leaves the organization through decision made by organization. This turnover occurs after organization have gone through evaluation on employee performance in the organization or facing a downsizing phase. This turnover concerns about keeping a good performance for the organization and sustain their business in the industry.

III. METHODOLOGY
For this research the methodology has been constructed, to arrange step to make sure the problem statement been achieved. The objective is to identify the factors that influence employee high turnover rate. The unit of analysis is focused on the employee located on three level of management position. These three management involved are first line management, middle line management and others. All the information is collected from the data through the questionnaire which have been distributed to the respondents. The data have been gathered to analyze the factors of employee turnover such as benefit and salary, career development, training and management. The respondents were 120 employees at Sapura Kencana Petroleum Berhad, branch at Lumut, Perak. The Statistical Package for The Social Science (SPSS) Version 17 is used to analyze the data.

A. Types of Questionnaire
Researcher has determine to create questionnaire based on closed-type questions as the main concept of the question for this study. Questions are construct using Likert scale approach which is preferable to researcher in analyzing the results through rating scale based on data that collects through the survey. Likert scale that applied on these type of questions are 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree, 4 = Agree, 5 = Strongly Agree.

B. Theoretical Framework

Fig.1 above shows the theoretical framework relationship between independent variable and dependent variable which later will reveal on correlation between these variables study. In this study, researchers have determined the independent variable which focus on employee turnover factors. Several factors are highlighted in this research namely benefit and salary, training, career development and management.

IV. FINDING AND DISCUSSION
91 questionnaires were distributed and 64 questionnaires were collected from respondents at Sapura Kencana Petroleum Berhad, Lumut Perak.

I. Sample
TABLE 1, shows that the sample of the staff that selected randomly from each department in Sapura Kencana Petroleum Berhad, branch at Lumut, Perak.
Based from TABLE 1, it is scheduled that the total population are 200. Thus the sample is scheduled for 91 respondents. The percentage of sampling can be calculated by sampling: 91/200×100% = 45.5%. So, the sample will represent 45.5% of the population for Sapura Kencana Petroleum Berhad, Lumut Perak. Researcher understands that number of sample of the population selected considered small, if researcher want to perform a survey in large population requires high cost and time consuming to collect the data.

II. Mean Analysis
This section is discussed on the analysis based on the third section of the questionnaire which discussed on common factors of turnover and suggested solution to overcome the turnover. The common factors that presented in this analysis are selected based on the various articles and analysis regarding to turnover. Although there are many factors that presented as cause of turnover, the researcher discovers these 5 factors of turnover which are commonly issued from the articles and analysis like salary, carrier development, training, management and benefits.

III. Group Mean Results
Fig.1 shows the highest factor for the turnover was career development with mean value about 3.7 while the lowest factor for the turnover was salary with mean value about 3.1. Based on result from Fig.2, shows that most respondents agree that career development factor is one of the major cause of turnover in marine company. It occurs as employees unable to develop their career in the current marine company that they worked.

It is proved that this factor is the most important for the employee among 5 major factors of turnover because most organization may look upon employee’s capability in applying knowledge and skills before employ into the organization. Issue that highlighted from career development factor is employee’s previous experience. Generally most of the new employee who enter in the industry might facing difficulties in allocating job because they lack of working experience from previous organization. Although some employees are manage to enter in the industry, they need to learn and develop their career through handling task which mostly under real situation.

IV. Correlation Analysis
Correlation is the analysis of the statistics that provide an estimate of the relationship between turnover factors with turnover rate. The Pearson Correlation method is used to give the information about linear relationship between 2 variable. The value of correlation coefficients range between -1 and +1. The Pearson correlation method determined not only the strength of the relationship but also the direction of relationship. In correlation test, set of data that is used are mean results for the questions group based on each of the main factors of turnover and turnover rate. TABLE 2 below, shows the results of the relationships between turnover factors and turnover rate.
TABLE 2
Correlations between turnover factors with turnover rate

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Turnover Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary factor</td>
<td>-0.160</td>
</tr>
<tr>
<td>Career Development factor</td>
<td>0.000</td>
</tr>
<tr>
<td>Training factor</td>
<td>0.000</td>
</tr>
<tr>
<td>Management factor</td>
<td>0.000</td>
</tr>
<tr>
<td>Benefits factor</td>
<td>0.288</td>
</tr>
<tr>
<td>Turnover Rate</td>
<td>0.094</td>
</tr>
</tbody>
</table>

(Factors of turnover) and dependent variable (Turnover rate). It shows that the relationship at “strong positive relationship” from +0.5 to +1.0 in career development, training and management factor, the relationship at “weak positive relationship” from 0 to +0.5 in benefits factor while the relationship at “strong negative relationship” in salary factor. This shows that each factor have different results on the relationship which depends on how the turnover rate approach toward on each factor based on each organization in the marine sector.

V. CONCLUSION

The conclusion of this research shows that career development is considered as the main factor of the turnover in the organization. Career development is considered important for employee as it helps the individual to develop their values for their work in the industry which includes skills and knowledge that can assist them in making decision on their work. Turnover may occur as organization less providing chance for the employee to develop their career in the organization. Based on the solution that suggested by the researcher, where organization should encourage employee in developing their career in the organization. The results of the survey shows that the respondents agree with the solution suggested by researcher in order to overcome this issue. Therefore, the solution that suggested by researcher and agreed by respondents will help the organization in reviewing their current management status and overcome the turnover issue in order to improve organization performance. Finally, it is important for the organization and employees to review these turnover factors with current working system in the organization. This method will help overcome the turnover issues in the organization. Proper communication system as suggested by respondents also important to improve the relationship between manager and employee thus it also help in creating a strong team work in the organization.

VI. RECOMMENDATION

The focus on current research regarding to the factors of turnover is less deep as this research focus in general perspectives about turnover factors that occurs between organization and employee. To continue study for this research, researcher may need to study in terms of detail perspectives about the factors that caused for turnover based on employee’s characteristic and personality with organization’s business background in the industry. By studying on other turnover factors for future research, researcher may able to discover other factors that contributes to turnover either internal factors (within organization) or external factors (surrounding factors which relates to the current scenario in the industry or in the country itself).

ACKNOWLEDGEMENT

I would like to praise to Allah S.W.T. the Most Gracious and Most Merciful who give me opportunity for me to complete this research. I would like to say thank you for my parents that support me spiritually in order to complete this research. The comments, suggestion and criticisms helps me a lot in completing this research.

REFERENCES


Abstract- This paper presents the refurbishment works of fuel injector pump for teaching aids. The purpose of this project is to develop and construct the fuel injection system for teaching aids using refurbished fuel injector pump. Generally, working principle of the fuel injection pump is to pump the fuel from the tank to the fuel injector to spray the fuel that is needed to start the engine. For the teaching and learning purposes, this model is driven by motor energy by coupled the fuel injector pump with the motor. It is not only cost saving but environmentally friendly particularly for in class uses. This model is expected to provide better understanding on working principle of fuel injector pump and ease teaching and learning process.

I. INTRODUCTION

By definition, a fuel pump is the pump used to transfer fluid (fuel) for application of complex engineering for the car and also internal combustion engine. During the older days, there is no demand for the fuel pump as it only require gravity to feed fuel from the tank to the using a pipeline or hose to the engine. Then, the gravity feed principle is used for transferring fuel into the tank. Gravity feed is a use usually transferring liquid from one place to another using earth’s gravity force. Some systems that are use the gravity feed principle like a dam or reservoir for conventional water for the resident daily usage. Basically, dam or reservoir is situated on a higher place and a pipeline use to connect from the top down to the bottom of resident house which a earth’s gravity concept use for the water to flow.

But for non-gravity feed engine design, fuel must be situated from a top place for gravity force to flow into the engine or it must be pumped under high pressure to the fuel injection system. As we know, before the fuel pump was invented, the carburetor is use as a mechanical pump to drive the flow of the fuel in such way a low pressure mechanical mechanism. Normally, the carburetor is design outside of the fuel tank. There are several problems that the engine encountered such as a correct timing for fuel to be injected into the engine and also the fuel to enter the engine that require force which directly effect on the combustion. Today, there is a solution for the non-gravity feed engine design as the fuel injection pump was created by the smart and intelligent German people which give a turning point for the internal combustion engine. There give more advantages than using the older gravity feed principle. So this help for the optimization of the fuel consumption and also a precise timing delivery for the right amount of diesel volume into the combustion chamber. The example of fuel injection pump is shown in Figure 1 below:

![Fig1. Fuel Injection Pump](image-url)
As we know the fuel injection pump is the heart of diesel engine. Without this fuel injection pump, the engine cannot start and running. The rhythm and timing for the fuel is control by this powered pump. Then, the pump also control the right amount of fuel needed for combustion. Major advances in the development of the diesel engine are a direct result of better fuel injection.

II. DESIGN CRITERIA

The proposed design starts with identification of design criteria. The selection of design criteria is primary task prior to design stage. In this project, some of criteria have been made. Firstly, the proposed design must be able to resist a heavy load. This is to prevent the base table from collapse due to weight impact from electrical motor and fuel injection pump. Secondly, the copper tube selected from high pressure pipe so that it can resist with the high pressure. This material has a good rust resistance and long lasting. Thirdly, the electrical motor was selected as source of a power supply as it is environmentally friendly power particularly for in class uses.

III. PROPOSED DESIGN

Figure 2 presented the design concept for the fuel injection pump system. The design of this product is based on the concept for the teaching purpose. The fuel tank is located higher than the fuel injection pump to allow gravity force to push fuel from the tank through fuel injection pump. The fuel injection pump then coupled with electric motor.

IV. FABRICATED FUEL INJECTION PUMP

Figure 3 displays the fabricated fuel injection pump. To determine the working capability of the fuel injection system, the simple test has been carried out using diesel fuel. The inspection was done on the high pressure inside the fuel injection pump. The fuel from the tank will enter the fuel injection pump by using gravity force down through the low pressure pipe. The fuel then pumped into the fuel injector by using plunger and barrel inside the fuel injection pump via high pressure pipe. The fuel injector start atomized or spray the fuel. The remaining of the fuel will return back to the tank by through returning line pipe.
The connection between the inlet and outlet fuel injection pump should be monitored to ensure there is no oil leakage. The result obtained shows the diesel fuel can flow through the system however the fuel injector failed to spray. Investigation has been done to find out the failure. Some factors why the fuel injector was unable to spray the fuel are identified. It is found that pressure from electric motor is insufficient due to large diameter of the copper tube. The fuel injector choked because of carbon deposited, the fuel injection pump probably defect which might not been maintained properly that cause air locked/ bleeding inside the fuel injection pump. Even though it cannot function due to several factors that have been discussed previously, it still can portray the basic component of fuel injector pump. In addition it can be a platform for further study or research on fuel injector pump including modification and improvement like an automation and control system that will be easier to handle and create a new technology of fuel injection pump especially in the diesel industry.

V. CONCLUSION

The fuel injector pump for teaching aids has been successfully fabricated. Based on this product, the student can learn about the working principle of the fuel injection pump and observing a circulation flow of diesel oil in the transparent tube. In addition, it can assist the trainers to deliver the working principle of fuel injection system in better ways.

REFERENCES


Small Craft Engine Monitoring System Using Labview

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ABSTRACT- Condition monitoring is the process of monitoring a parameter of condition in machinery in order to identify a significant change which is indicative of a developing fault. The purpose of this project is to develop a monitoring system for small craft engines. This project will integrate with PAC Compact-RIO and LabVIEW software. The main objective is to monitor the temperature and speed of small craft engine. A key element in a condition monitoring program is to acquire sensor information from the engine, and use this information to assess the condition of the engine before it became failure. The system will analyze and process the signal through the LabVIEW and display the parameter value (temperature and speed) on interface of LabVIEW. When the condition of engine exceeds its limit, the system will alarm by sound and light.

I. Introduction

Monitoring and control system for ship engine room is the main automation system of the ship. It monitors important parameters of main engine, auxiliary engine, power stations, and other mechanical and electrical equipment. The development of intelligent small craft engine monitoring system providing the user with a lot of data collection, analysis and processing. The engine monitoring system are used to check the health of the small craft engine to avoid failure engine, costly repair, especially the time and cost of removing engines prematurely. For the final year project, this project enhances the technology of engine monitoring system for small craft by using a LabVIEW software. This system provides a data from the engine and use the data to assess the condition of small craft engine in order to identify a significant change which is indicative of developing fault. The alarm system is connected with monitoring system that continuously monitor them and if the engine reading is outside the preset limits we get an alarm. The monitoring system record all the data and save it for analysis of the performance of the engine in future.

II. Materials and Methods

The research methodology is a planning stage where the process of flow during the research of the project been decided. Research methodology includes research technique or tool used in the project. There are two main parts include which is hardware and software. In this project, the LabVIEW virtual instrument platform are used to develop a temperature and speed monitoring system. The compact-RIO also used as a medium between PC and I/O. LabVIEW is a platform and development environment for visual programming from National Instrument. The programming language used in LabVIEW is determined by the structure of graphical block diagram, which the programmer connects different function-nodes by drawing wires. It can execute as soon as all the input data become available. LabVIEW virtual instrument has three components, which is block diagram, a front panel and a connector panel. In this project, all the graphical source code design are located at the block diagram as shown in Figure 1. The block diagram contains structures and functions which perform operations on control and supply data to indicators. On the front panel, all the control and indicators will show the data and result based on the inputs given to the VI, as shown in Figure 2.
The compact-RIO system is a combination of real-time controller chassis, FPGA module and an Ethernet expansion chassis. The compact-RIO include a microprocessor for implementing control algorithms, and support a wide range of clock frequencies. Compact-RIO controller can be programmed with LabVIEW software. In this project, with the help of technology in LabVIEW and C Series I/O modules, the engine monitoring system can be done. The compact-RIO technology helps the user to design data acquisition with the same ease of use and flexibility of LabVIEW virtual instrument.

III. Result

In this result, the project measure the temperature before and during the engine running.

<table>
<thead>
<tr>
<th>Engine speed (rpm)</th>
<th>Head cylinder</th>
<th>Extractor exhaust</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 rpm (dead engine)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Engine start</td>
<td>70</td>
<td>160</td>
</tr>
<tr>
<td>Engine running at 1000 rpm</td>
<td>75</td>
<td>160</td>
</tr>
<tr>
<td>Engine running at 2000 rpm</td>
<td>80</td>
<td>180</td>
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<tr>
<td>Engine running at 3000 rpm</td>
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<td>200</td>
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<tr>
<td>Engine running at 4000 rpm</td>
<td>100</td>
<td>260</td>
</tr>
<tr>
<td>Engine running at 5000 rpm</td>
<td>140</td>
<td>320</td>
</tr>
</tbody>
</table>

IV. Conclusion

This project focused on effect of temperature and speed due to condition of small craft engine by using engine monitoring system. This engine monitoring system can improve the quality and lifetime of the engine, also can reduce the failure engine, costly repair, especially the time and cost of removing engines prematurely. With the technology LabVIEW and CompactRIO, the monitoring system suited for engine monitoring system.

References
Time Series Analysis on Piracy at South China Sea by using Moving Average Model

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ABSTRACT - The research aimed to examining the time series analysis of piracy occurred at South China Sea. In this research, moving average is the method used to analyze the trend of piracy occurred at South China Sea. South China Sea had been chosen due to its piracy cases that occurred the most at there. This may due to its strategic geographic and it is also an international shipping line. Many ships will cross over South China Sea during the sailing to go to their port of destination. After analyze the trend, forecasting is being done to extend this research to indicate the validation of the forecasting based on the past data. This research gets the number of data of piracy cases occurred at South China Sea at the International Maritime Organization (IMO) website. IMO is a specialized agency of the United Nations that set a standard authority for safety, security and environmental performance of international shipping. The finding of this research shows that the validation of forecasting is a reasonable forecasting. Therefore, the method is suitable to use in order to forecast the future trend of piracy cases. Moving average method has many models and one of it is Simple Moving Average. The recommendation for other researcher is to try other models of moving average in forecasting the values of piracy and compare it with the current model used.

I. INTRODUCTION

The South China Sea is a part of the Pacific Ocean that surrounding an area from Singapore and Malacca Straits to the Strait of Taiwan around 3,500,000 square kilometers. South China Sea is declared as one-third of the world’s shipping sailing through its waters. It is also believe that South China Sea holding a huge oil and gas under its seabed. The South China Sea it located at the south of main land China including island of Taiwan, the east of Vietnam and Cambodia, west of Philippines, east of the Malaysia peninsular and Sumatra and the north of Bangka-Belitung Islands and Borneo.

Time series analysis is used in this research to extract the meaning of the statistics and other characteristics of the data collected. To observe the data, we used one of the time series analysis models, which is Moving Average (MA) Model. This model is used to make a prediction of future values on piracy at South China Sea, based on the data collected.

Moving Average (MA) Model is a calculation to analyze data collected by creating a series of average of difference subsets of full data set.

The objectives of this research are:

a) To recognize the trend of piracy occurred at South China Sea.

b) To forecast the piracy cases occurred in the year 2001, then test the validation of the forecasting.
II. MATERIALS AND METHOD

Study area: South China Sea is widely used in English for the sea and most European language but differently called in China’s neighboring countries. In geographically, the South China Sea are being bordered by some states which are Republic of China (including Macau and Hong Kong), Republic of China (Taiwan), Philippines, Malaysia, Brunei, Indonesia, Singapore and Vietnam. There are also some rivers flowing into the South China Sea which are Pearl, Min, Jiulong, Red, Mekong, Rajang, Pahang, Pampanga and Pasig Rivers.

Based on Wikipedia, South China Sea contain about 250 small island, atolls, cays, shoals, reefs and sandbars that naturally located under water at high tide and some permanently submerged. The South China Sea is an extremely significant body of water in a geopolitical sense and also recognized as the second most used sea lane in the world, while in terms of world annual merchant fleet tonnage, over 50% passes through the Strait of Malacca, the Sunda Strait, and the Lombok Strait.

III. STATISTICAL ANALYSIS

Time series analysis: According to Agyemang (2012), time series brought a mean as a collection or measurements on quantity variables made sequentially or in a uniform set of time period, usually daily, weekly, monthly, quarterly or annually.

Time series analysis (TSA) is a collection of data recorded over a period of time (weekly, monthly, quarterly or yearly). Based on Wikipedia, time series analysis is use to extract the meaning of statistics and use model to predict future values based on previous observed values. Time series analysis have two main goals which are to identify the nature of phenomenon represented by the sequence of observation and forecasting or predict the future values of time series variable.

Time series analysis is suitable to use by the management department in any company to make decisions and plan based on long-term forecasting. It is also used frequently in statistics, signal processing, pattern recognition, econometrics, mathematical finance, weather forecasting, earthquake prediction and many more which involves temporal measurements.

Moving average: The moving average method not only used to smoothing the time series to see its trend, instead, it is also used to measure the seasonal fluctuation. Different with the least square method ($Y = a + bt$), the moving average method only smooth the fluctuations in the data. This can be done by “moving” the arithmetic mean values through the time series.

Forecasting: By using methodology developed by Box and Jenkins (1976), Hu followed four steps to forecast the time series in his research which are:

i. Model identification: use historical data to identify suitable Box Jenkins Model.
ii. Model estimation: historical data then used to estimate the parameters of the model when the model is identified.
iii. Model diagnose: many techniques are used to endorse the model identified.
iv. Forecasting: when final model is built, it can be used to forecast the time series

Model Result

All possible models: To start forecasting, some values are needed to identify the best model to do forecasting. The data are grouped as weekly data and it is fixed to use and compute 3, 5 and 7 weeks moving average forecast. The data is divided with sum of data from \( t_7, t_6, \) and \( t_5 \) with 3 (for 3 weeks), while divide the sum of \( t_7, t_6, t_5, t_4 \) and \( t_3 \) with 5 (for 5 weeks) and same steps goes for 7 weeks. After computing 3, 5 and 7 weeks of moving average forecast, calculate the absolute deviation for each week (actual data – forecast data), then calculate the total absolute deviation and the mean of absolute deviation for each week.

<table>
<thead>
<tr>
<th>( t )</th>
<th>Piracy</th>
<th>AP = 3 weeks</th>
<th>Absolute Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
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<tr>
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<tr>
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<td>1.3</td>
<td>17.7</td>
</tr>
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<td>9</td>
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<td>2</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>9.7</td>
<td>6.3</td>
</tr>
</tbody>
</table>

... 

| 65    | 13     | 10          | 3                  |
| 66    | 9      | 11.3        | 2.3                |
| 67    | 8      | 11.7        | 3.7                |
| 68    | 16     | 10          | 6                  |
| 69    | 21     | 11          | 10                 |
| 70    | 16     | 15          | 1                  |
| 71    | 8      | 17.7        | 97                 |
| 72    | 14     | 15          | -1                 |
| Total Absolute Deviation | 320.5 |
| Mean Absolute Deviation (MAD) | 4.9 |
Table 1.2: 5 week model

<table>
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<tr>
<th>t</th>
<th>Piracy</th>
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<th>Absolute Deviation</th>
</tr>
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<td>2.8</td>
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<td>9</td>
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<td>4</td>
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<td>10.6</td>
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<tr>
<td>72</td>
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<td>0.2</td>
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<tr>
<td>Total Absolute Deviation</td>
<td>230.7</td>
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<tr>
<td>Mean Absolute Deviation (MAD)</td>
<td>3.5</td>
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</tbody>
</table>

Table 1.3: 7 week model

<table>
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<tr>
<th>t</th>
<th>Piracy</th>
<th>AP = 5 weeks</th>
<th>Absolute Deviation</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
<td>12</td>
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<td>7</td>
<td>6</td>
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<td></td>
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<tr>
<td>8</td>
<td>8</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>8.8</td>
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<td>6</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
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<tr>
<td>13</td>
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<tr>
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<td>2.4</td>
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<td>5.8</td>
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<tr>
<td>68</td>
<td>21</td>
<td>11.8</td>
<td>9.2</td>
</tr>
<tr>
<td>69</td>
<td>16</td>
<td>13.4</td>
<td>2.6</td>
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<tr>
<td>70</td>
<td>8</td>
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</tr>
<tr>
<td>71</td>
<td>14</td>
<td>13.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Total Absolute Deviation</td>
<td>221.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Absolute Deviation (MAD)</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Selected model:** Mean Absolute Deviation (MAD) is used to measure the error in forecasting. Therefore, the lowest value of MAD will be selected as the best model to do forecasting. In the table above, the MAD for 7 weeks of forecasting is the lowest, which is 3.4, therefore, 7 weeks of forecasting is chosen as the model to do forecasting.
**Forecasting**

Forecasting is a planning tool that used by most of management departments in its attempts to cope with the uncertainty of the future, relying mainly on data from the past and present and analysis of trends. In this research, forecasting is made for the year 2001 to compare with the actual data of piracy, then, validation of the forecasting is measured.

**Table 2: Forecasting for the year 2001**

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Piracy</th>
<th>AP = 7 weeks</th>
<th>Absolute Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Jan</td>
<td>10</td>
<td>13.1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Feb</td>
<td>7</td>
<td>13.3</td>
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<td>Mar</td>
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<td>13.1</td>
<td>1.9</td>
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<tr>
<td></td>
<td>Apr</td>
<td>8</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>9</td>
<td>11.1</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>Jun</td>
<td>10</td>
<td>10.1</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Jul</td>
<td>9</td>
<td>10.1</td>
<td>1.4</td>
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<tr>
<td></td>
<td>Aug</td>
<td>11</td>
<td>9.7</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
<td>7</td>
<td>9.9</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
<td>4</td>
<td>9.9</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
<td>7</td>
<td>8.3</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>7</td>
<td>8.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**Forecasting accuracy measurement**

The mean absolute percentage error (MAPE) also used to measure the size of the error in percentage term. MAPE is chosen as the best and commonly used by many organizations and researchers to measure the validation of the forecast value. The formula of MAPE is shown below:

\[
MAPE = \frac{1}{n} \sum \left| \frac{A_t - F_t}{A_t} \right| \times 100
\]

From the formula above, \( A_t \) is the actual value and \( F_t \) is the forecast (estimated) value. The difference between \( A_t \) and \( F_t \) (absolute deviation), is divided by the actual value \( A_t \). The absolute value of this calculation is summed for each month and then divided again by the total number of data been forecast, \( n \). In this case, the \( n = 77 \).

**Table 3: Computation of MAPE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>( A_t )</th>
<th>( F_t )</th>
<th>( A_t - F_t )</th>
<th>( A_t - F_t / A_t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Jan</td>
<td>10</td>
<td>13.1</td>
<td>31</td>
<td>0.31</td>
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<td>7</td>
<td>13.3</td>
<td>6.3</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Mar</td>
<td>15</td>
<td>13.1</td>
<td>1.9</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>8</td>
<td>13</td>
<td>5</td>
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<td>11.1</td>
<td>2.1</td>
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<tr>
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<td>10.1</td>
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<tr>
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<td>0.12</td>
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<tr>
<td></td>
<td>Dec</td>
<td>7</td>
<td>8.1</td>
<td>1.1</td>
<td>0.16</td>
</tr>
</tbody>
</table>

**TOTAL**

\[
MAPE = \frac{1}{77} \sum |4.73| \times 100 = 6.1\%
\]

Lower MAPE values are better because they indicates smaller percentage error that produced by the forecasting model. The following interpretation produced by Lewis (1982):

- > 10% - highly accurate forecasting
- 10% - 20% - good forecasting
- 21% - 50% - reasonable forecasting
- < 51% - inaccurate forecasting
The final calculation of MAPE in the steps above is 6.1% therefore, the validation of the forecasting for the piracy cases happened in the year 2001 between the class of highly accurate forecasting, which below than 10%..

IV. CONCLUSION

Moving average model is one of the way to analyze the time series. Eventhough the trend of time series analysis at South China Sea is an irregular variation, but forecasting can still be made. Piracy is a worldwide issue and crisis that causing a lot of economic loss to the region. Therefore, by using this method of time series analysis, preventive measures can be taken in order to overcome the piracy problem. For example, management department can use the same method to forecast the future trend of piracy that will occur at the selected location, thus, based on the analysis, the authority can take preventive measure, like strengthen the security along the coastal region to prevent piracy from happening. For this research, validation for forecasting of time series by using moving average model has been proved. Therefore, future researcher might also continue this research to predict the future trend of piracy at South China Sea by using same method.

V. ACKNOWLEDGMENT

The research and data analysis had been helped out by reading throughout the journals and also from the supervisor. Many thanks for Madam Aminatul Hawa Yahaya, for her endless support and guidance. The authors would also like to thank anonymous reviewers for their useful comments suggestions and recommendations.

VI. REFERENCES


[27] Thuy, T. T. (2011). Recent Developments in the South China
ABSTRACT- A cost effective and efficient form of renewable energy would possibly be wind-based looking at our global slowly depleting supply of conventional fossil-based energy source. This new and renewable form of energy source is being explored and has become a common subject of research for marine applications. Wind energy finds its usefulness in areas such as providing motion to vertical axis wind turbine, the Savonius-rotor type, which has been shown to respond well at low wind speeds to generate power to turn ships’ propulsion motors. This paper attempts to focus on a study of the parametric configuration of the Savonius rotor in order to derive an optimized power output for marine applications. Parameters discussed include the aspect ratio of height and diameter of the Savonius type wind turbine. The Savonius wind turbine is designed for installation on board a 50m tanker that attempts to validate the ship’s stability. Results derived showed that the higher the aspect ratio results in better power output. Nevertheless, Savonius wind turbine may not contribute as much energy as a vessel needs, hence further studies such as on the effect of the existence of end plates or effect of overlap ratio, are needed to ensure different options are available other than relying on merely fossil-based energy to generate a ship’s power.

Keywords --- Renewable energy, Savonius-rotor, Vertical axis wind turbine (VAWT), Aspect Ratio

I. INTRODUCTION

Energy that is naturally renewable is derived from natural sources such as wind, sunlight, geothermal energy, water and various forms of biomass. These sources have been coined ‘renewable’ due to their continuous natural replenishment and indefinite availability. The popularity of renewable energy has experienced a significant upsurge in recent times due to the exhaustion of conventional power generation methods and increasing realization of its adverse effects on the environment. This popularity has been bolstered by cutting edge research and ground breaking technology that has been introduced so far to aid in the effective tapping of these natural resources and it is estimated that renewable sources might contribute about 20% - 50% to energy consumption in the latter part of the 21st century. Facts from the World Wind Energy Association estimates that by 2010, 160GW of wind power capacity is expected to be installed worldwide which implies an anticipated net growth rate of more than 21% per year [1]. It would be a very good initiative to apply renewable energy in marine application or on board ship. The study is about the possibility of using wind to contribute power for the shipping industry. Wind energy is the movement of air across the world. Studies have shown that wind blows faster over the sea than over land. So this gives the advantage to the vessels voyaging across the oceans [2].
Nowadays, almost all of the vessels are using conventional energy such as diesels and other hydro carbon fuels. Whenever a vessel starts to make a journey, massive amount of fuel bunkered in the tank would cost the marine company millions or thousands of Ringgit. Imagine if the usage of fuel is no longer needed for power supply on board ship, more profits can be garnered.

The main investigation is on parameters configuration of wind turbine to achieve best power output for marine application. When turbine blades are attached on a ship, air resistance will occur, so proper design and stability of a ship plays a big role in making positive changes to the shipping industry [3].

11. LITERATURE REVIEW

The literatures that were reviewed for this study cover the concept and applications of wind energy, its origins, operating principles, possible challenges and expected possible future advancements. The reviews provided findings on which relevant theoretical methodologies were formulated, gathered and their relationships observed for applications.

111. PROBLEM STATEMENT

There seem to be a general lack of awareness on the applications of renewable energy in the marine industry. Thus, without the necessary knowledge on the ability to cost-effectively tap alternative sources of energy the marine industry is faced with implementation issues whenever the subject of application of renewable energy is brought up. Issues on cost savings arise with regards to implementing of related wind energy system designs for ships. Hence, in general the issue of readiness of the marine industry to accept change with regards to renewable energy technology need to be resolved. This research would try to fill the gaps that may ultimately help address issues affecting the big picture in optimizing power output using renewable energy sources in marine application.

IV. SIGNIFICANCE OF RESEARCH

It is crucially important to embark on the possibility of utilizing improved technology to increase our shipping industry’s competitiveness, thus improving our national economy. Development of the shipping sector, such as in the field of improved wind turbine parameters for optimized power output in marine shipboard application, is an area that needs special focus especially in an era of uncertainties in the availability of conventional energy sources.

V. RESEARCH OBJECTIVES

This research is aimed to investigate how wind turbine parameters configuration affect the production of optimized power output, to develop the means for marine applications and to study the stability of a vessel upon installation of wind turbine on board.

VI. THEORETICAL METHODOLOGY

Savonius Wind Turbine [4]

Efficiency

Previous studies showed that Savonius wind turbine can only achieve 30% out of 59.3% Betz Limit. Savonius has low efficiency, thus more input should be sought on its parameter and component as a good initiative to gain the best power output.

Air Density

Normal air density is 1.225kg/m³. The value might vary, though not much, according to where the wind turbine is installed.
Wind Speed

Wind speed is dependent on where the wind turbine is being installed, the wind speed at sea is higher than over land. This is due to the space of sea that has no turbulence caused by infrastructures or high buildings. Average wind speed around Malaysian waters is 3.8m/s as reported by Malaysian Meteorologist Department.

Expected RPM from Wind Speed.

From the speed of wind and diameter of wind turbine, Speed RPM from different wind speed are gathered.

\[
speed\ RPM = \frac{wind\ speed}{diameter} \times 3.142 \times 60
\]

Swept Area

As the rotor turns, blades generate an imaginary surface whose projection on a vertical plane to wind direction is called the swept area. The amount of energy produced by a wind turbine primarily depends on the rotor area, also referred to a cross-sectional area, swept area, or intercept area. The swept area for Savonius wind turbine can be calculated from the dimensions of the rotors.

\[savanious\ area = \text{the swept area} = As = \frac{1}{2} \pi d^2\]

Tip Speed ratio

The tip speed ratio is the ratio of the product of blade radius and angular speed of the rotor to the wind velocity. The tip peripheral velocity of the rotor \(V_{rotor}\) is defined as:

\[\text{tip speed ratio (TSR)} = \lambda = \frac{V_{rotor}}{V} = \frac{\omega \times d}{V}\]

Where:
- \(V_{rotor}\) = the tip speed (peripheral velocity of Savonius rotor) (m/s)
- \(\omega\) = angular velocity of Savonius rotor (rad/sec)
- \(d\) = diameter of the semi-cylindrical rotor (m)

Torque Coefficient

It is defined as the ratio between the actual torque developed by the rotor (T) and the theoretical torque available in the wind (Tw), thus the torque coefficient (Ct) is given by:

\[Ct = \frac{rotor\ torque}{wind\ torque} = \frac{T}{Tw} = \frac{1}{4} \times p \times As \times d \times V^2\]

Where:
- \(Ct\) = torque coefficient
- \(T\) = rotor torque (Nm)
- \(Tw\) = wind available torque (Nm)
- \(p\) = air density (kg/m^3)
Another concept that can be used to measure the wind turbine performance is the static torque ($T_s$), which measures the self starting capability of the turbine. Static torque is defined as a maximum value of the torque when rotor is blocked i.e. without ability to rotate. So the static torque coefficient is given by;

$$C_{ts} = \frac{T_s}{T_w} = \frac{T_s}{\frac{1}{4} \cdot \rho \cdot A_s \cdot d \cdot v^2}$$

Where,
- $C_{ts}$ = static torque coefficient
- $T_s$ = rotor static torque (Nm)
- $T_w$ = total wind torque

The torque is defined as the force acting tangentially over the rotor blade, operating at a distance of radius of rotor ($d$) from the centre.

$$T = I \cdot \alpha$$

Where,
- $I$ = moment of inertia of rotor
- $\alpha$ = angular acceleration

The moment of inertia tells us how much energy is stored in rotating shaft or about how much energy it will take to accelerate the shaft to a particular speed.

**Power of Wind**

Power of wind is how much power can the wind turbine capture.

$$power \ of \ wind = 0.5 \cdot 1.225 \cdot swept \ area \cdot windspeed^5$$

(8)

**Turbine Power**

It is the power that can be made by the turbine.

$$turbine \ power = power \ of \ wind \cdot \left(\frac{\text{efficiency}}{100}\right)$$

(9)

**Generated Power**

The generated power is the power that can be generated by generator

$$generator \ power = \text{no. of generator} \cdot power$$

(10)

**Generated Energy**

Generated energy from wind can be measured using the following formula;

$$generated \ energy = power \ output \cdot \left(\frac{\text{wind \ %}}{100}\right)$$

(11)

$$generator \ speed \ RPM = Speed \ RPM \cdot \text{gearing}$$

(7)
Extracted Energy

The energy that can be extracted due to wind turbine efficiency

\[
\text{extracted energy} = \text{generated energy} \times \left(\frac{1000}{\text{efficiency}}\right)
\]

Ship Stability

Creating hull form

A secondary objective of this study is to determine the stability criteria of a 50m tanker model with the wind turbine; the 50m tanker dimension is referred from other source. The basic parameters of the tanker is referred in order to prepare the hull form using the Maxsurf modeler. The following table is the basic parameters of the 50m tanker that has been referred to prepare the hull form, structural design and weight calculation.

**TABLE VI-1 BASIC PARAMETERS OF THE VESSEL**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship length</td>
<td>50m</td>
</tr>
<tr>
<td>Ship beam</td>
<td>9m</td>
</tr>
<tr>
<td>Ship depth</td>
<td>3.65</td>
</tr>
<tr>
<td>Main engine weight</td>
<td>3 tonnes</td>
</tr>
<tr>
<td>Outfitting weight</td>
<td>1 tonne</td>
</tr>
<tr>
<td>Rudder and propeller weight</td>
<td>1 tonne</td>
</tr>
<tr>
<td>Design margin 10%</td>
<td>0.95 tonne</td>
</tr>
</tbody>
</table>

Stability Analysis

50m tanker model is opened in Maxsurf stability advanced application, or referred to as Maxsurf hydromax. This is where several simulations are run and the results obtained are used in the interpretation and analysis. It is a stability analysis of the 50m tanker model with tank, compartment and the wind turbine load as well. In the room definition column, the wind turbine and components are added. Since machinery in a ship is located in specific compartment, for this case the wind turbine and its components will be referred to as the tank.

Wind Turbine Installation

The wind turbine and its component of weight 1.278 tonnes (Vertical wind turbine) is added to the ship. The location, vertical and horizontal distance of the tank and compartment, is not disturbed except for the void space compartment is slightly reduced so that there will be a spot for the placement of the wind turbine. The wind turbine is placed forward of the ship, after the void space compartment.

Total Weight

After the installation of wind turbine onboard the ship, the weight increased to about 666.2 tonnes.

V11. RESULTS

Aspect Ratio

Inputs are gathered in Microsoft Excel Programming as shown below.
Summarizing from the parameters in the table below, it is obvious that the aspect ratio becomes higher when the diameter is decreased while height is maintained, or when the height is increased and diameter is maintained.

\[ \text{aspect ratio} = \frac{\text{height}}{\text{diameter}} = \frac{3}{1.5} = 2 \]

For the generator speed RPM, the higher the aspect ratio, the speed will be higher as well, but different for power of wind and turbine power. Even though when aspect ratio is low, the power is high, and this is attributable to the fact that more wind can be captured when the turbine is larger. Even though the power of wind and turbine power is high when aspect ratio is low, the power that can be extracted from them is not as much as the aspect ratio of 2 with the height of 3 meter and diameter of 1.5 meter. Even the generator power is higher when aspect ratio is high. Table below shows the power output that can be extracted from the wind turbine with different aspect ratio.

<table>
<thead>
<tr>
<th>ASPECT RATIO</th>
<th>HEIGHT</th>
<th>DIAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Proceeding of the Marine Application & Technology Conference 2016 Lumut, Perak.
A lot more power can actually be extracted from wind turbine with bigger diameter and height if the size of generator and gearing is bigger. However, the bigger the wind turbine leads to heavier weight. The weight of the Savonius wind turbine plays a big role on the stability of the ship that plans on installing the Savonius wind turbine on board.

- Ship Stability

The results gained from the simulation of the 50m tanker model with wind turbine is as showed and explained. Comparing to previous tank calibration, the current calibration is adjusted by decreasing the void space and inserting the wind turbine which signifies a tank. The results of the calibration can be observed in the figures below.

**Figure V11-11 Plan View**

It shows that ship is in stable condition when heeled at 20 deg, or the GZ is 0.387m. There are slight changes for the GZ after the wind turbine load is added but the ship remains at stable condition when heeled by an external force in still water and when heeled to a small angle of inclination it returned to the upright when the force is removed. The vessel’s ability to return to upright after having been heeled to large angles of heel is better.

**Figure V11-11 Graph of GZ Curve**

**Figure V11-1 Perspective View**

---

### TABLE V11-11 RESULT OF POWER OUTPUT

<table>
<thead>
<tr>
<th>ASPECT RATIO (H/D)</th>
<th>HEIGHT (H) (meter)</th>
<th>DIAMETER (D) (meter)</th>
<th>POWER OUTPUT (kWh/month)</th>
<th>POWER OUTPUT (kWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
<td>156.0832</td>
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</tr>
<tr>
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<td>4228.0044</td>
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<tr>
<td>2</td>
<td>3</td>
<td>1.5</td>
<td>532.0828</td>
<td>6304.9941</td>
</tr>
</tbody>
</table>
Conclusion

The study had managed to achieve its objectives namely, in investigating how wind turbine parameters configuration affects the production of power output for marine application. The parameters that were discussed in this study were wind turbine aspect ratio involving the turbine’s height and diameter. Another objective was investigating the ship’s stability after wind turbine was installed.

It was found that a lot more power can actually be extracted from wind turbine with bigger diameter and height if the size of generator and gearing is bigger. This finding is in line with prior experimental studies done [5] . However, the bigger the wind turbine leads to heavier weight. The weight of the Savonius wind turbine influences the stability of the ship that plans on installing the wind turbine on board. It was also found that the vessel’s ability to return to upright after having been heeled to large angles of heel is acceptable.

The mathematical formulas used were gathered from relevant books and journals. These formulas were selected to enable the development of an effective programme for the modelling of the wind turbine system. Relevant tables and charts were produced and further elaborated to support the results obtained. The outputs of the overall results and comparisons made were analyzed and presented quantitatively. The analysis showed that the objectives of the study were successfully achieved.

REFERENCES


Abstract
This study aims to develop a Star-Delta motor starter teaching aid that is able to measure current and voltage for AC 3 phase motor ranging from 3hp to 10hp that needs Star-Delta starter. This teaching aid is intended to clearly layout the flow of star-delta connection to help students achieve a higher understanding on Star-Delta motor starter. The motor is connected to the circuit which can show the direction of motor rotation. It is found that the reading of current and voltage during Star is lower compared to Delta. Based on the measurement that was taken from a 3-phase motor, it is proven that star-delta motor starter can reduce voltage and overcome the problem of too high starting current during starting of motor.

Index Terms—Induction Motor, 3 Phase Motor, Star-Delta, Teaching Aid.

I. INTRODUCTION
According to [1], a blend of single-stage lighting loads and a three-stage induction motor is a typical necessity in distribution system. The induction motor will be overheating when the voltage is unbalanced. The uneven line of primary and secondary conductors spacing, the ratings and connection of the transformer and sum of relation between load in single-phase and three-phase is the sources of voltage unbalanced. One lighting and two power of transformers is the components for ungrounded connection of Star– Delta. Ordinarily the rating of lighting transformer is higher kVA than two power transformers. Open Star-Delta connection also comprises of two power transformer and one lighting transformer. The connection of lagging implies that the voltage over the lighting transformer lags the voltage over the power transformer.

The contrast between various types of motor starter such as Star-Delta, Direct-On-Line (D.O.L.), and Auto-transformer induction motor starting technique about power quality is done by [2], to discover the mainly dependable and handy preliminary technique which has the less power quality issues. For D.O.L Starting technique, the disadvantage is that it gives the most peak achievable beginning current. The starting torque is high at D.O.L start, and it is normally too high compared to requirement for generally applications. D.O.L had high inrush current, severe voltage sags but less harmonics. For star-delta starter, this strategy lessens the beginning current and torque. One third times less voltage is taken by motor during star connection. Once Delta connection achieved, the engine will increase until its necessary rate of speed.

Star delta had low inrush current, less severe voltage sags, severe transients and fewer harmonic. Other motor starter which reduced the initial current and torque is Autotransformer. Motor is joined to the taps of the Autotransformer during starting. During the normally closed contactor of the Star and Autotransformer, the motor is under reduced voltage.
During starting (closed transition), the power supply is still connected to the motor. Autotransformer had low inrush current, less severe voltage sags, severe transients but severe harmonics during starting. Without a doubt, the least problem of power quality is Star-Delta starting method compared to D.O.L. and Autotransformer starting.

In view of study by [3], so as to permit polarizing flux direction and constraint of beginning current, Star–Delta three-stage windings are utilized for induction motor which driving high-inertia loads. Other than that, Star-Delta additionally been connected for terminal-voltage modification in the variable-speed-driven synchronous lasting magnet generators. To enhance the execution of the synchronous generators or three-phase induction motor, mix of Star–Delta winding was utilized. Combined star–delta winding is suggested in order to regulate the air-gap flux density at even line voltage to have the flux and power factor manage of the three phase induction motor. It is demonstrated that, interfacing Delta in clockwise or counter-clockwise bearing prompts different amplitudes of the controlled air-gap flux.

Researcher [4] stated that combined Star-Delta connection is used to increase the winding factor (output torque) and decrease the Magneto-Motive Force (MMF) harmonic content for machines with distributed windings. This shows the advantage of the combined Star-Delta connection by comparing with a Star connection for Axial-Flux Permanent-Magnet Synchronous Machine (AFPMSM) with concentrated windings. The delta-connected coils are supposed to have 3 times the number of the Star-connected. It is in order to have the similar output voltage for both Star and Star-Delta connection. Nevertheless, the combined connections also have an influence on the losses in the machine such as an effect on the eddy current losses in the permanent magnets when the air-gap magnetic field harmonic content is changing.

Contrasted with Star connection, when sinusoidal current is impose and has only minor influence on losses in the machine which makes its efficiency increase, the output torque is higher for the same current density. Along these lines, the winding element can be increase by using a combined Star-Delta connection instead of a typical Star connection. Thus, the efficiency of the machine increase because the losses in the combined connection were the same with the typical Star connected machine which cause the power increase without supplementary losses.

As indicated by [5] research, more than 90% of the modern electric driven motor utilized the three-stage Squirrel-Cage Induction Motor (SCIM). The six terminal Star-Delta connection windings with Delta as the initial connection is utilized to begin a motor with evaluated power upper than 4kW. A motor need a changeless three-terminal Delta-or Star-connected winding to be begun with a delicate starter. Subsequent to beginning, the delicate starter will be bypassed, and the motor worked straightforwardly from the network. For engines with appraised power lower or equivalent than 4 kW, the winding can be either connected in Delta or Star. The motor demonstration or resistance to voltage unbalance (VU) is clearly distinctive for Star and Delta connections. Chiefly in terms of temperature unbalance and stator misfortunes. Especially that VU can manual for an expansion in both beginning time (for the same engine load) and consistent state torque motions which bring about additional noise creation and motor vibration.

The significant issues of impelling machines researched by [6] were named stator deficiencies. Wound Rotor Induction Motor (WRIM) is especially viable in applications when utilizing a squirrel cage machine may cause high beginning current contrasted with power framework capacity besides, high inertia loads having a long quickening rate. Deficiency discovery in WRIM had been explored and a few diagnostic systems were found for stator and rotor flaws utilizing the present mark investigation, vibration examination, and the flux signature investigation. Hence, winding uneven deficiencies is one of the real blames in electrical machines particularly in WRIM. Accordingly, time of accomplishing enduring state condition, term time of steady state oscillation and span time of sub transient oscillation have been expanded in stator winding blame and diminished in rotor winding issue condition.
Researcher [7] mentions three phase induction motors are the most main motor used due to their plain outline, solid act and basic maintenance. It is normal that around 40% of the induction motor deficiencies are brought about by bearing unfunction, 38% by stator winding shortcomings, 10% by rotor issues, and 12% by mixed problems. Precise monitoring and judgment of energy usage condition of motor systems enable suitable actions at different levels to be taken to develop the overall system efficiency for energy savings. Motor problems diagnostics incorporate the identification of eccentricity and misalignment, bearing deficiencies, stator protection issues, rotor issues, winding warm security, and other related issues.

II. STAR-DELTA MOTOR STARTING
Star-Delta starting can reduce starting torque and current. Generally, in order to fabricate the circuit, an thermal overload relay, miniature circuit breaker, four contactors and timer relay for the time setting to change from Star connection to Delta is needed. During normal run, motor is Delta connected. The load should be light during the starting of the motor. It is because, the torque is not enough to increase the speed of motor before changing to the Delta connection when the motor are heavy loaded.

III. EXPERIMENTAL WORK
The Star-Delta type of starting system was done using 3-phase power supply. To start the circuit, the circuit breaker, timer relay and thermal overload relay have to be initiated. When the forward push button is pressed, main contactor forward and star contactor will energized. After 8 seconds, the delta contactor will energized while star contactor will de-energized. Then, the process is decided to start in forward or reverse as the pressed of push button is done. If forward push button is chosen, motor will run forward. If the push button reverse is pushed, the motor will run reverse.

The star contactor will energize together with the main contactor forward or reverse. The current will flow to the thermal overload relay. Within 8 seconds, delta contactor began to energize and at the same time, star contactor will stop energizing. The current flow is then channeled to the motor and stop with the pressing of the stop button. When emergency stop push button is being pressed, the stop light indicator will light on and the motor stopped. If the emergency stop button is been pressed, the current that flows in the circuit will be terminated.

If the thermal overload relay tripped, the trip light indicator and stop light indicator will light on and the motor will stop running forward or reverse. The flow of the circuit is shown in Figure 1.0. The Star-Delta Forward Reverse Motor Starter consist of 240V contactor, auxiliary contactor, miniature circuit breaker, push button, 12-18A thermal overload relay, timer relay and couple connector.

IV. PRELIMINARY RESULTS AND DATA ANALYSIS
During Star-Delta motor starting method, the supply of power source connected to motor is from Star connection to Delta connection. During the running of motor, the motor achieve maximum torque output due to full voltage applied. At first, the motor started in the connection of Star. Within 8 seconds, the connection of motor will change to Delta. During connection of Star, one-third less voltage than normal starting is taken by the motor. However, the starting torque reduces as the torque is proportional to square of the voltage. Figure 2.0 shows the change of voltage during the shift from connection of Star to the Delta. For starting, Star and Delta input voltage is the same. The shift of contactor causes the voltage to breakdown in 8 seconds. Therefore, the voltage during Star will reduced about one third of the input and began to increase back to normal voltage during Delta.

Figure 3.0 shows the current change during Star and Delta starting. Once the motor starts running, the current decreases to steady-state value. Therefore, the input and output current during Star is lower compared to Delta. When the connection change to Delta, the motor speed will increases until it reach nominal speed. Both current and voltage increase until stable state.
Figure 1.0: Flow of Star-Delta Forward Reverse Motor Starter

Figure 2.0: Voltage Reading During Motor Starting

Figure 3.0: Current Reading During Motor Starting

V. CONCLUSION
This paper has presented a development of Star-Delta motor Starter teaching aid which the reading of current and voltage during Star and Delta connections taken using clamp meter. Results are given to prove that Star-Delta motor starter is needed to start motor within range of 3hp to 10hp. This is due to Star-Delta Motor Starter is able to overcome high current and voltage during starting of motor.

ACKNOWLEDGMENT
The authors appreciatively recognized the staffs in the Electric Laboratory and Marine Workshop for their significant commitments in order to accomplish this project. Authors of this paper are very thankful to Research and Innovation Centre for monetarily support this project.

References


Development Of Solar Grass Cutting Control System

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Abstract- A solar grass cutting control system is a machine that uses linear blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter using remote control is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, schools, house etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look. In our project, “Solar grass cutting control system” is used to cut the different grasses for the different application.

I. INTRODUCTION

Moving the grass cutters with a standard motor powered grass cutters is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, grass cutter moving with engine create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric solar grass are environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all. Also, if the electric grass cutter is corded, mowing could prove to be problematic and dangerous. The prototype will also be will be charged from sun by using solar panels.

II. MATERIALS AND METHODS

The cutting blade, the force required to cut the lawn as well as the force acting on the blade was considered. The force required for effective mowing should be greater than 10 Newton.

It is also dependent on the height, density and the area covered by the object. Therefore, in designing the blade of the solar powered lawn mower, the force required for effective mowing should be greater than 10 Newton. A stainless steel was used in the construction of the cutting blade because of its strength and weight which can transmit same speed as that of the DC motor or a little less cause of friction.
III. RESULT

The solar powered grass cutter was manufactured and developed. The solar energy is generated due to solar panel and the energy is stored in battery, which converts the solar energy into the electrical energy. The blade with dc motor connected to the battery. This solar grass cutter cut all types of grass. The Test was carried out using four species of grass and the result obtained is summarized as presented in Table 1.

<table>
<thead>
<tr>
<th>Sample plot</th>
<th>Average height of the grass before mowing (mm)</th>
<th>Average height of the grass after mowing (mm)</th>
<th>Expected height of the grass after mowing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermudagrass</td>
<td>22</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Seashoregrass</td>
<td>54</td>
<td>12</td>
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<tr>
<td>Squaregrass</td>
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<td>80</td>
</tr>
<tr>
<td>Carpetgrass</td>
<td>70</td>
<td>16.5</td>
<td>50</td>
</tr>
</tbody>
</table>

IV. CONCLUSION

This solar powered grass cutter mower will meet the challenge of environmental production and low cost of operation since there is no cost for fueling. A solar powered lawn mower has been developed for the use of residences and establishments that have lawns where tractors driven mowers could not be used. The machine’s capacity is adequate for it purpose. The machine has proved to be a possible replacement for the gasoline powered grass cutter.

References


Central Building Fire Exit Locking System using PLC

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Abstract - Emergency situation can be happening in any place without any earlier notice that can makes people in a panic situation. The people in a stress condition need a clear way to escape from the situation by using the emergency exit route. The exit route need to be control the opening on closing of the door because sometimes people might put unauthorized material that might block the escaping route. This paper proposed a central building fire exit locking system by using magnetic lock and controlled by programmable logic controller (PLC). The magnetic locking or unlocking system depends on the input sensor connected to the PLC system. This project is developed to solve the problem stated.

Keyword: PLC, magnetic lock, monitoring, temperature

I. INTRODUCTION

In emergency situation for example the fire happened on a building, people sometimes cannot think properly and cannot make the right decision to escape from the situation [1]. Their action might have affected by their emotional state because of stress and frighten of the situation [2]. The escape process depends on the complex and psychological interactions which people attempt to understand the situation to make the decisions based on their personal interests [3]. To understand the situation, the people need to know the information at the location for example the fire exit route information, but the information is not the only important point during the escape process. The condition of the exit route itself can be the most important point during this escape process.

The normal condition of exit route is the route is clear from any blocking part at the area. There are possible that the exit route is blocking by anything because the escape door is in unlocking condition that anyone can put anything that might blocking the escape route. Maybe they put the blocking part temporarily, but the emergency situation can happen any time unpredictable and it might cause a problem for people during escape process. This paper proposed an improvement system from currently used system existed that is just a normal safety door system. This paper also highlighted the literature review on previously studied of fire exit system and technique.

Jinn-Kwei Guo, in 2010 proposed a zigbee network application in emergency exit guiding. This system highlight that the emergency exit light is an important device for fire alarm system. He proposed a wireless alarm system with multifunctional power-saving energy exit indicating light [4]. All the emergency exit indicating lights are flashed synchronously in the emergency mode in order to distinguish from the normal illumination lights. The synchronously flashed emergency exit lights are helpful to identify the direction for people during the escape process.

Da-chuan Wei in 2011 designed and implemented a virtual simulation system of fire escape
This simulation system was designed to fetch up the deficiency of fire escape education and exercise in our country. The simulation use the modelling technology based on graphics and image to make up an approximately real fire scene. The simulation results showed that the system has more interactivity and its ability to participate in experience makes the simulation training system become an innovative disaster prevention and relief methods.

The improvement system that proposed in this paper is additional of a lock and unlock system at the safety door of the exit route. The lock system connected to a safety circuit can make it become a more effective for the safety system. Furthermore, the circuit is fully controlled by PLC and it will be a control room for monitoring and control of the system.

II. MATERIAL AND METHODS

A. Device/Equipment

The main improvement of the system is by using the magnetic lock on the door of emergency exit route and using the controller system. The controller system is using a PLC system to lock or unlock the magnetic lock automatically or manually. The magnetic lock, alarm and warning light act as output device for the system. Heat sensor and smoke detection sensor is being used as the input devices that detect when fire occurred at the location. All the devices will be connected to PLC module to enable it to be operated. This system used a CJ2M PLC module. The equipment also connected to 12VDC battery as a backup system when main power trip.


B. Simulation software

PLC is a programming language that been used in the system because its capable to handle complex tasks such as positioning control, process control and others difficult applications. PLC is a medium of connection for input and output device and can run as programmed in the system. The simulation of a controlling system has been design to control the output device by using the input sensor.

Figure 1 shows the ladder diagram that used in this project. The ladder diagram consists of start button, stop button, temperature sensor, smoke detector, alarm, magnetic lock and led indicator. Both sensor will detect the signal and send it to the PLC. The alarm, magnetic lock and led will function based on signal received at the sensor.
C. Operational process

The operational process of the system as shown in Figure 2 is consisting of 3 stages; input section, process section and output section. In stage 1, comprises of the cable and connector which is connect to all the cable between PLC source and prototype design. This is very important part because cable and connectors need to be connected-ready before the PLC operate. Stage 2 is when the PLC is run, all sensors must be function and run the system. In stage 3 is when the information sent to PLC from the input sensor. The PLC will run and the system will disconnect the circuit at electromagnet lock device. When no current supplied to the electromagnetic lock, the alarm and warning light will turn ON.

Figure 3 shows the block diagram of this project. The first one is constant power source as main power supply. For the emergency battery circuit, this project used lead acid battery to the system when main system stops working in fire as a backup power supply. The main control is at control panel, active and operational system by PLC. The input and output connect directly to the PLC. The item for input is temperature sensor and smoke detector which will detect and send signal. Then for the output is led, siren and magnetic lock which function based on input signal.

Temperature sensor device to senses high temperature and smoke detector device to sense the smoke. This both sensor work as input. Other than that is, led as lighting indicator, siren as sound warning and magnetic lock used to lock and unlock the exit door by control the current.

III. RESULT AND DISCUSSION

Figure 4 shows the completed operated Fire Exit Locking system. To start the system, the green button or start button need to be push, the system will start running. This system consists 2 sensors, smoke detector and temperature sensor. Each sensor uses different sense, so it will make this system more reliable to be use as safety fire exit. Both sensor is used to sense and send signal to the PLC, and the door will be unlocked, siren and alarm will turn ON to enable the people escape from the emergency situation happened.
IV. CONCLUSION AND FUTURE PLANS

With the minimum cost, this project can design and fabricate the functional safety system from fire hazard. This system will ensure the door will always lock, to make sure there are nothing block the emergency exit route door. Once the system detects high temperature or smoke, the door will automatically unlock. So, people can go through this door as emergency exit route in clear and smoothly condition. People also no need to break the door since the door automatically controlled by the system with those sensor, temperature sensor to be operated.

For future research, the system can be connected to password device system to enable to open the door at the location by only enter the password.

REFERENCES


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Abstract- The system consists of temperature sensor that are used to measure the temperature of underwater and the data can be gathered and display using the monitoring system. When the temperature sensor is attached to the water, it will sense the water temperature according to the condition of water. With the appearance of Arduino UNO and GSM Shield that being attached together and specific coding being uploaded into the Arduino according to the requirements needed. Temperature are measure in three units; Celsius (C), Kelvin (K) and Fahrenheit (F). Three condition of water will be sense which is cold, normal and hot with specific range. Then the data will be display on the LCD and mobile phone through GSM Shield via Telco line.

Keyword: temperature sensor monitoring system, Arduino UNO, GSM Shield

I. INTRODUCTION

Mariners always have a difficulty to measure the condition of water; for example, the temperature of underwater because of several problems that might occur. The underwater temperature sensor monitoring system will be an advantages for the mariners to make their daily work easier. For the final year project, this project enhances the mariners to use the temperature by only received the data through mobile phone with the appearance of the GSM Shield. The system is based on Sim card being inserted in the GSM Shield and the data massage will appear through mobile phone via Telco Line. This system provides ideal solution to the problems faced by mariners. The system is more adaptable and cost-effective because the system only functions from the send of data massage to a mobile phone.

II. MATERIALS AND METHODS

The underwater temperature sensor monitoring system project is an improved of high quality of mariner’s life. Besides that, with Arduino UNO and GSM Shield, it is added the automatic function to the system and can be portably used without needed of divers. A deep research has been made to by writer to underwater temperature sensor monitoring build the system.

Firstly, is to design and creates the circuit of the system with the program code to carry the automatic function of the system. To be able the temperature sensor reacts within the system, the temperature sensor is connected with Arduino UNO and GSM Shield as shown in the Figure 1 Circuit Design. To make the system more effective, the Arduino UNO and GSM Shield are attached together and the program code being created using Arduino IDE. After the coding being created, it will be uploaded into the Arduino UNO and GSM Shield.

The program code for this project basically written in C language by Arduino IDE program. Next is to design a casing to place this circuit. The casing box is design using the SolidWorks software as shown in Figure 2 Casing Design and the material used for the actual is waterproof plastic box. After that, troubleshoot of this circuit keep been made to avoid any dysfunction or faulty occur during the installation process. Last-
-ly, the prototype will be decorating and clean up as a finishing.

![Fig. 1. Circuit Design](image1)

**III. RESULT**

The underwater temperature sensor monitoring system will start when being plugged to 12V adapter power supply. The system will initialize to get ready and on the LCD display will show welcome massage. After a few minutes, mobile phone will receive a massage stated that the device is ready. Besides that, three conditions of water are ready to be tested which the water are in three state condition; Cold in range <25°C, Normal in range 25°C-50°C and Hot >50°C. When the temperature sensor is deep into the water, the temperature start to read the data and being display on the LCD with three units of temperature; Celsius, Kelvin and Fahrenheit. Each range of the temperature represent three colors of LED; Green (Cold), Yellow (Normal) and Red (Hot). The present of GSM Shield is to connect the device and mobile phone through Telco Line which a massage will be sent after the sensor read the temperature of water. The result been recorded in the table 1.

### IV. CONCLUSION

This project focused on functioning of the underwater temperature sensor monitoring system by using Arduino UNO and GSM Shield to make the system easily being implement. This temperature sensor is suitable for mariners to measure the temperature of underwater without a need of divers to dive and take the results of underwater. The performance of this temperature sensor is effective with commercial device control. The cost is less, the device is portable and the application use is simple.

### REFERENCES


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http://www.instructables.com/id/Arduino-UNO-as-AtMega328P-Programmer/


Abstract - Today, the industries of aquaculture product very slowly, maybe has control the system by manual operation. So, will our project fabricate of system Monitoring and Support System for Acidic and Alkaline for fish farmer, it is an innovative of pH water sensor for students and fish farmer to understand on the function of the monitoring and support system for fish farmer achieve the aquaculture products. This project a monitoring and support system for acidic and alkaline for fish farmer comprised with a high-quality and easily accessible part and its following a syllabus that give a basic engineering and underwater marine science concept.

Keywords: Monitoring and support system for acidic and alkaline for fish farmer.

I. INTRODUCTION

Efficiently and quality service in the aquaculture industry today has become a growing attraction, especially with the increasing innovation in the electrical and electronic system. Final year project gives the opportunity to student to create and build a project based on the ability and should include all aspects and requirements has been prescribed earlier. Today, the latest technology component for the aquaculture product. Such as prawn, fish and moreover very slowly product because the application of system has control by manual operation. This project is going to develop a monitor system that capable detects the change of pH value of water based on ARDUINO PROGRAMME. This system to fabricate the support system to maintain the pH value of water of 24 hours of real-time monitoring and support system. This project aims to provide a technology of ARDUINO are used to help fish farmer better understand the properties of water as they affect fish culture, its cover maintain a salts balance. Example, it’s is water of affect to aquaculture because they include all element such as bacteria, acidic, alkaline and neutral water. So this technology can be apply in industries of aquaculture for help fish farmer to increase productivity. Finally, this project can be test and check the performance of the system that able to maintain the quality of aquaculture product.

II. MATERIALS AND METHODS

The smart monitoring and support system project is to improve of high quality of living. Besides that, with ARDUINO and pH water sensor, it’s added the automatic function to the system and can be access by user anywhere. A deep research has been made to by writer to build the smart monitoring and support system project Firstly, is to design and creates the circuit of the ARDUINO with the programming to carry the automatic function of the system. To be able the ARDUINO reacts with pH water, ARDUINO kit also created together with LCD screen circuit as shown in the Figure 1. For the option of task can be done by system, a relay circuit also been construct and connect with the ARDUINO kit as shown in Figure 2.

The program code for this project basically written in ARDUINO programming and the circuit being simulates by using PSIM to find any error or fault connection. Next is to design a casing to place this circuit. The casing box is design using the auto CAD software as shown in Figure 3 and the material used for the actual is soft board.
After that, troubleshoot of this circuit keep been made to avoid any short circuit or faulty occur during the installation process. Lastly, the prototype will be decorate and clean up as a finishing.

![Fig. 1. Design the main ARDUINO programming](image1)

![Fig. 2. Design the voltage regulator circuit](image2)

![Fig. 3. Design the project prototype](image3)
III. RESULTS

To maintain a salts balance which is the main factor to control aquaculture condition. The physical and chemical qualities of water are critical for successful aquaculture. It’s follow the term of basic engineering and aquaculture engineering science concept and provides basic reading for pH water principles. The result been recorded in the Table 1.

<table>
<thead>
<tr>
<th>No of trial</th>
<th>Reading of Acidic (Value pH water)</th>
<th>Reading of Neutral (Value pH water)</th>
<th>Reading of Alkaline (Value pH water)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First trial</td>
<td>3.47</td>
<td>6.90</td>
<td>11.23</td>
</tr>
<tr>
<td>Second trial</td>
<td>3.54</td>
<td>7.03</td>
<td>11.26</td>
</tr>
<tr>
<td>Third trial</td>
<td>3.56</td>
<td>7.20</td>
<td>11.25</td>
</tr>
</tbody>
</table>

Table 1: Result of system trial

IV. CONCLUSION

With the monitoring and support system for acidic and alkaline for fish farmer, this project can is going to develop a monitor system that capable detects the change of pH value of water the functional of collect data from water which is suitable for aquaculture product. The performance of the system to be done to create better project for inspection which is can beneficial for aquaculture industries.

REFERENCE

Smart Security Control System

W.M.W.M Ezhar Syahir, I.M Adib Ifwat, A.A Makarimi, G.M Fadli

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Abstract - Security system has been a major issue when the warehouse living styles have improve and the technology have overcome to control security system of the warehouse, house and business premise Crime rates can be avoided or at least reduced the probability for crime attempt to be happened by creating an effective safety support system. The readily owned or available security system to society and user-friendly tools or devices to protect the personal interests is not so effective. This security control system works like a switch and comes with the easy access. This system can only be accessed and activated by the owner through a phone call by using a mobile phone to turn on or turn off the system. After making the call, the system will automatically answer and the owner will choose the button for the owner choose. For example, the owner pressing the ' 1 ' to switch on the alarm alternate a few moments time release system, attached to the alarm can be activated selectively. In this project not only the alarm or security appliance as the main operation, but the air conditional and socket are included or can any of output to control. Thus, with this security control system the residential area seem to have residents impose only done from a phone call only. This security system also giving a message to the user.

Keywords: smart security control system, mobile phone, DTMF, GSM

I. INTRODUCTION

Nowadays, the security systems were very expensive and surprisingly ineffective. The smart security control system will be advantages for the user to own their security control system. For the final year project, this project enhances the security control for warehouse and business premise when owners are not in the warehouse or premise leave or going for out for a while by active or deactivate the security and appliance inside the warehouse or premise just by using a phone call. The system is based on voice call technology to revolutionize the standards of living. This security system also give warning signal connected with GSM modem to giving a vulnerable message. This system provides ideal solution to the problems faced by owners in a daily life. The system is more adaptable and cost-effective because the system functions from a voice call and get a message using a mobile phone.

II. Materials and Methods

The smart security control system project is an improve of high quality of living. Besides that, with microcontroller and mobile phone (Hp), it is added the automatic function to the system and can be access by user anywhere. A deep research has been made to by writer to build the smart security control system.

Firstly, is to design and creates the circuit of the microcontroller with the programming to carry the automatic function of the system. To be able the microcontroller reacts with DTMF Module, PIC16F876A circuit also created together with microcontroller circuit as shown in the Figure 1. For the option of task can be done by system, a relay circuit also been construct and connect with the microcontroller circuit as shown in Figure2.

The program code for this project basically written in C language by MicroC program and the circuit being simulates by using Proteus to find...
any error or fault connection. Next is to design a casing to place this circuit. The casing box is design using the SolidWorks software as shown in Figure 3 and the material used for the actual is soft board. After that, troubleshoot of this circuit keep been made to avoid any dysfunction or faulty occur during the installation process. Last-ly, the prototype will be decorate and clean up as a finishing.

Figure 1 : Design the main microcontroller circuit

Figure 2 : Design the voltage regulator circuit
III. RESULT

The smart security control system will start when being plugged to power supply. The system will initialize the microcontroller circuit and DTMF to get ready. Besides that, the green LED will turn on to show there is power supply. When system initialized, make a call to mobile phone and have connection with DTMF and mobile must be set to auto answer. The signal will be sent by DTMF to microcontroller then will processed and perform the task given by activated he relay needed by user. The output of this relay will conduct the task given. After the output successfully activate, a beat sound will be produce a sound to let the user knows system have been active. The result been recorded in the Table 1.

<table>
<thead>
<tr>
<th>Instruction code/system</th>
<th>Result</th>
<th>Instruction code/system</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Button 1</td>
<td>Alarm and Sensor active</td>
<td>LED light up</td>
<td>Button 1</td>
</tr>
<tr>
<td>Button 2</td>
<td>Other output turn on</td>
<td>LED light up</td>
<td>Button 2</td>
</tr>
<tr>
<td>Button 3</td>
<td>Door will be close</td>
<td>LED light up</td>
<td>-</td>
</tr>
<tr>
<td>Button 4</td>
<td>Door will be open</td>
<td>LED light up</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 1 : Result of system function
Once the hardware is build and fabricated, the most important part is to test the power supply. AC adapter power supply is needed to ensure the power from 230Vac will converted to 12Vdc supply. On my microcontroller, there will be needed 12Vdc to activate the PIC microcontroller as the output will be 5Vdc when there is a voltage regulator 7805 on it. GSM and movement sensor device are included for the sensor signal detection and notification feedback to mobile phone.

Figure 4: Result of system function

IV. CONCLUSION

This project focused on functioning of the smart security control system by using DTMF and GSM modem to access the system easily. This smart security system is suitable for user that usually goes for leave and difficult to control their warehouse or business premise appliance or to those who love the high house living style. The performance of smart security control is effective with commercial warehouse or appliance control. The fabrication cost is less and the application use is simple.

REFERENCES


Model Design Of Mini Hull Crawler

Z.Z Hakim, W.L.W.A.F Hakim, G.M Fadli and A.A Makarimi

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Abstract - Ship’s hull needed to be inspected to observe if irregularities, corrosion or any wreckage is attached. This ROV is to be the inspection machine. Traditionally, underwater inspections are conducted by the divers, which pose dangerous risk to the divers. This ROV is an advanced technology to replace the divers. So the divers don’t have to stay underwater in a long period of time whereas ROV has unlimited time to stay underwater as long as sufficient power supply is connected.

Keywords: Remotely Operated Vehicle (ROV), mini hull crawler, controller based system

I. INTRODUCTION

Remotely Operated Vehicle (ROV) is tethered underwater vehicle which is commonly used in deep water industries. This vehicle normally used for offshore industries, underwater search and rescue purpose. ROV is unoccupied highly manoeuvrable, and operated be a crew on board of a vessel. It is linked to the ship by either a neutrally buoyancy tethered or working in rough condition or in deeper water, which is attached by a cable that contains a group of electrical conductor and fibre optic that transfer power, video and data signal between control panel and operator. This ROV is remotely controlled using standard 9-channel controller for diving and flying. It is operated through cable or line connecting the vehicle to the operate location. Since ROV is controlled by human, visualization is important so that it can be easily monitored when operating underwater. It is attached with video camera and crawler to make inspection.

II. Materials and Method

The mini hull crawler project is improved of high quality of inspection. A deep research has been to design and construct the mini hull crawler.

Firstly, to design and construct a model of mini hull crawler with the suitable software (AutoCAD 2013-English) as shown in Figure 1. Several studies and changes are made to complete the final design. The study is based on the stability, buoyancy and the body design itself. The finalized design crawler was made to suit with the suitable materials for durable with the sea water to achieve the project objective.

Next is to design the circuit of mini hull crawler to carry the function of the system. So the hull crawler able to reacts with the controller as shown in figure 2. Part by part of the circuit has been design to make the circuit complete. Figure 3 shows the design of Electronic Speed Controller (ESC) to be able to control the speed of the motor.

Troubleshoot of the circuit have been made to avoid any disfunction or faulty occur during the installation process. Prototype will be final touch up to prevent water leakage during sea trial. Lastly, the prototype will be decorating and clean up as a finishing as shown in Figure 1.
Figure 1: The design of body of the mini hull crawler

Figure 2: The Design of the project circuit
III. RESULT

The design was finished by using AutoCAD 2013 -English and fully constructed. The hull crawler will fully functioned when connected to the power supply. The sea trial for buoyancy test at initial stage is positive buoyancy. Weights are added to get neutral buoyancy for underwater sea trial.

IV. CONCLUSION

The aim of this project was to design and construct a model of mini hull crawler that can be integrated with ROV. It was able to move as much as 5 degrees of freedom by using 3 motors and a servo as a redder. This model also can freely move throughout the water surface and inside of the water. The performance of the mini hull crawler is effective with commercial or industrial use. The fabrication the mini hull crawler cost is less and the application use is simple.

REFERENCES

Development of Forward Reverse Star Delta Three Phase Motor Control Trainer.

Mohd Sofian Mohd Zahari, Muhammad Aziq Amir Shah, Khairul Akmar Othman and Azhar Othman

University Kuala Lumpur, Malaysian Institute of Marine Engineering Technology, Lumut Perak, MALAYSIA

Abstract - “Development of Forward Reverse Star Delta Three Phase Motor Control Trainer” in general is a portable motor control trainer. Star delta motor starter are used to make three phase motor start and run efficiently. They are used in an attempt to reduce the start current applied to the motor during startup as a means of reducing the disturbances and interference on the electrical supply. The star delta starter is manufactured from four contactor, a timer and a thermal overload. Normally, students need to install component manually. So, a compact trainer is built to solve their problem. There are four types of wiring in the exercise module. Firstly, direct on line forward, secondly, direct on line forward reverse, next is star delta forward and lastly is the star delta forward reverse. The simple application for this system or method traditionally used such as compressor, fans, mini water pump and conveyor belts which is providing forward and backward directions. So, a trainer is to create as the exercise module to improve wiring skills during practice.

Keywords: three phase, motor control and contactor

I. INTRODUCTION

Three phase electric power is a common method of alternating current electric power generation, transmission, and distribution. It is a type of polyphase system and is the most commonly method used by electrical grids worldwide to transfer power. It is also used to power large motors and other heavy loads. A three-phase system is usually more economical than an equivalent single phase or two phase system at the same line to ground voltage because it uses less conductor material to transmit electrical power.

The simplest form of motor starter for the induction motor is the direct on line starter. The Direct On Line (DOL) motor starter consist a circuit breaker, contactor and an overload relay for protection. Electromagnetic contactor which can be opened by the thermal overload relay under fault conditions. There are four types of wiring module.

Firstly, Direct On Line forward starter. In DOL forward starter, the three phase motor will rotate in forward direction which is consist of forward contactor. It use only 1 contactor.

Secondly, Direct On Line forward reverse. In DOL forward reverse starter, the three phase motor will rotates in two directions, forward and reverse rotation which are consists of forward and reverse contactor. It consist of 2 contactor.

Next, the Star Delta forward starter. The motor will rotate forward in star then change to delta connection. The Star and Delta connection consists of star, delta, and forward contactor. It consist of 3 contactor and a timer.

Finally, the Star Delta forward reverse starter.
The motor will rotate forward or reverse in star then change to delta connection. Star and Delta connection which are consists of four contactors, star, delta, forward and reverse and a timer.

Direct On Line starter are used for motors with a capacity of less than 3 Horse power (Hp). Star Delta starter are used for motors with a capacity between 3 Horse power to 10 Horse power.

II. MATERIALS AND METHODS

The Three phase Star Delta trainer can be used to do all FOUR motor control exercise. It uses normal motor control component. This project undergo a deep research before building the wiring trainer. The materials used are from normal electrical product and follow real wiring regulation standards. This trainer are able to carry out 4 types of motor control such as Direct On Line Forward, Direct On Line Forward Reverse, Star Delta Forward and Star Delta Forward Reverse.

AutoCAD software are used for the product drawing as shown in Figure 1 and Figure 2. Reusable cable with connector are used. The wiring connection for the Direct On Line Forward motor control and the wiring terminal are shown as in Figure 3 and Figure 4.

Figure 1. Proposed Product (Front view).

Figure 3. Direct On Line Forward connector wiring

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The wiring connection for the Direct On Line Forward Reverse motor control and the wiring terminal are shown as in Figure 5 and Figure 6.

The wiring connection for the Star Delta Forward motor control and the wiring terminal are shown as in Figure 7 and Figure 8.
The wiring connection for the Star Delta Forward Reverse motor control and the wiring terminal are shown as in Figure 9 and Figure 10.

IIII. RESULTS

Continuity and Insulation Test are carried out for the cabling and connector of the trainer. Test result are shown in Table 1, Table 2 and Table 3.

TABLE 1

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONTINUITY</th>
<th>INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABLE</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>CONNECTOR</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>CONTACTOR</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>

TABLE 2

<table>
<thead>
<tr>
<th>TASK</th>
<th>FUNCTIONALITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT ON LINE FORWARD</td>
<td>OK</td>
</tr>
<tr>
<td>DIRECT ON LINE FORWARD REVERSE</td>
<td>OK</td>
</tr>
<tr>
<td>STAR DELTA FORWARD</td>
<td>OK</td>
</tr>
<tr>
<td>STAR DELTA FORWARD REVERSE</td>
<td>OK</td>
</tr>
</tbody>
</table>
IV. CONCLUSION

Three phase Star Delta contactor trainer will very useful in education sector. It is a low cost and adequate to give a basic knowledge of motor control. Later the trainee are able to implement this knowledge towards real wiring situation.

ACKNOWLEDGMENT

This project has been approved by Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET). Deepest thanks to lecturers and technician for excellent guidance, caring, patience, and providing us with an excellent atmosphere for doing our final year project.

REFERENCES

Development of Single Phase Wiring System Trainer Using 3X3 Plastic Casing with Built In Fault.

Mohd Harith Muslim, Efizal Aizad Shahrol Hisham, Khairul Akmar Othman, Mohd Zailfuirul Zainol and Azhar Othman

University Kuala Lumpur, Malaysian Institute of Marine Engineering Technology,

Abstract - “Development Single Phase Domestic Electrical Wiring System Trainer using 3x3 Plastic Box Casing with Build in Fault” in general is a portable wiring trainer. Single-phase electric power is the distribution of alternating current electric power using a system in which all the voltages of the supply vary in unison. Single-phase distribution is used when loads are mostly lighting and heating, with few large electric motors. A single-phase supply connected to an alternating current electric motor does not produce a revolving magnetic field. Single-phase motors need additional circuits for starting, and such motors are uncommon above 10 kW in rating. The trainer is able to do all types of domestic wiring. Standard frequencies of single-phase power systems are either 50 or 60 Hz.

Keywords: single phase, magnetic and delay in phase.

I. INTRODUCTION

This trainer is used to impart practical knowledge to the students about the different wiring schemes, familiarization of insulation meter, Main Circuit Breaker (MCB) and Earth Leakage Circuit Breaker (ELCB). It is established with the basic tools, trainer kits and accessories. The trainer is very imperative not only for the students of Electrical Engineering branch but also for the students of other engineering branches.

Electrical Wiring Training System is a product which is helpful for students to get familiar with home wiring circuits. This product provides a realistic training environment which is essential for every electrical engineering student and also for apprentice electrician. It consists of Single Phase Energy Meter, MCB, Controlling Switches, Tube Light with Choke, Regulated Switch, Ceiling Fan, etc. Good quality safe terminals and sockets are provided at appropriate places on board for power supply and load connections.

With an increase proportion of technology, a low cost simple electrical trainer are needed. This electrical trainer is designed using teel environment and excellent quality components. It is also checked on several quality parameters to assure its flawlessness.

II. MATERIALS AND METHODS

The single phase wiring trainer using 3x3 plastic casing with built in fault are to improve and give a chance to all people that don’t have any basic on single phase wiring system to learn about domestic electrical wiring. This project undergo a deep research before building the wiring trainer. The materials used are from normal electrical wiring product and follow the real wiring regulation standards. This trainer are able to carry out all types of single phase wiring circuit. For examples one way switch with one lamp, one way switch with two lamp, 2 way switch
with one lamp, 2 way switch with intermediate with one lamp, ring socket, radial socket and distribution part.

Google Sketch and AutoCAD software are used for the product wiring and drawing are shown in Figure 1.

The drawing of product produced are shown as in Figure 2. Some of the product able to insert fault. The fault is only open circuit. Short circuit is considered as dangerous.

1 way switch with one lamp circuit are shown Figure 3.

2 way switch with one lamp circuit are shown Figure 4.

2 way and intermediate switch with one lamp circuit are shown Figure 5.

Ring socket circuit are shown Figure 6.
III. RESULTS

Continuity and Insulation Test are carried out after all types of wiring are made. Examples of test result are shown in Table 1, Table 2 and Table 3.

### TABLE 1
1 WAY SWITCH 1 LAMP CONTINUITY AND INSULATION RESULT

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>CONTINUITY</th>
<th>INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>N-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-L</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>N-N</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>E-E</td>
<td>OK</td>
<td>-</td>
</tr>
</tbody>
</table>

### TABLE 2
2 WAY SWITCH 1 LAMP CONTINUITY AND INSULATION RESULT

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>CONTINUITY</th>
<th>INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>N-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-L</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>N-N</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>E-E</td>
<td>OK</td>
<td>-</td>
</tr>
</tbody>
</table>

### TABLE 4
2 WAY SWITCH WITH INTERMEDIATE 1 LAMP CONTINUITY AND INSULATION RESULT

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>CONTINUITY</th>
<th>INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>N-E</td>
<td>-</td>
<td>OK</td>
</tr>
<tr>
<td>L-L</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>N-N</td>
<td>OK</td>
<td>-</td>
</tr>
<tr>
<td>E-E</td>
<td>OK</td>
<td>-</td>
</tr>
</tbody>
</table>
IV. CONCLUSION

Single phase wiring trainer using 3x3 will very useful. It is a low cost and adequate to give a basic knowledge of wiring. Later the trainee are able to implement this knowledge towards real wiring situation.

ACKNOWLEDGMENT

This project has been approved by Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET). Deepest thanks to lecturers and technician for excellent guidance, caring, patience, and providing us with an excellent atmosphere for doing our final year project.

REFERENCES


Muhamad Arif Zainudin, Syaza Mohd Ali Jaafar, Mohd Zaifulrizal Zainol and Azhar Othman
University Kuala Lumpur, Malaysian Institute of Marine Engineering Technology,
Lumut, Perak, MALAYSIA

Abstract - Currently, the control traffic at the road construction has done purely by human effort in Malaysia. So the aim of the development of portable construction traffic light is to play a significant role in controlling traffic at the construction road. The method start by developing a traffic light that can be control by radio frequency and microcontroller. Thus, transmitter, receiver and Arduino will be used in this project. The traffic light will be design that can be operating at minimum 10 meters apart. This will minimize workers to control the traffic. Only one worker needed to control traffic light by using remote control. With this project, we can create more effective way to control the traffic in addition to create safe work place.

Keywords: portable, radio frequency, microcontroller.

I. INTRODUCTION

The development of portable construction traffic light using radio frequency signal with microcontroller is create and help the construction worker in controlling the traffic while doing repair work on the road.

The system is designed not to eliminate, but to supplement flag person crews, and to improve safety around work sites. With this product, there will be only need one traffic person with a remote control for control construction traffic lights at a safe distance from traffic. The light signal will communicate wirelessly and battery operated.

This portable construction traffic light will have 3 colored lights such as red, yellow and green. In a typical cycle, turning on of a green light allows traffic to continue in the way indicated. Similarly, lighting of the yellow light for a short time of transition represents a signal to prepare for a stop, and the illumination of the red signal disallows any traffic from going on.

The idea behind this project is to use radio frequency signal with microcontroller to control traffic light. We will use transmitter and receiver for radio frequency. Remote control which contain switch to control sequence of the light signal will be transmitter while the traffic light will be receiver. For the microcontroller, we will use Arduino Nano.

II. MATERIALS AND METHODS

The portable construction traffic lights are made to improve traffic at the construction road. We use Arduino Nano to control the sequence of light at the traffic light. Transmitter and receiver had been use in this project to enable the instruction can be transmit by push the button only. A deep research has been made to build portable construction traffic light. Firstly, design of automatic function for the system using Arduino.
Nano circuit. The connection as in Figure 1.

Figure 1. Connection of Arduino Nano

The program code for this project basically written and simulated in Arduino programming software. The casing box and stand are design using the AutoCAD software as shown in Figure 2.

Figure 2. Project prototype drawing

After that, installation process begin. Lastly, the prototype will be decorated and cleaned ready for testing and data collection.

To get the correct reading, time taken needed for the vehicle to pass between two traffic with constant speed in different distance are calculated. Formula: Time = Distance / Speed. The result been calculated as shown in the Table 1.

<table>
<thead>
<tr>
<th>Speed (km/h)</th>
<th>Distance (m)</th>
<th>Time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>10</td>
<td>1.2</td>
</tr>
<tr>
<td>30</td>
<td>20</td>
<td>2.4</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>3.6</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>4.8</td>
</tr>
</tbody>
</table>

The following data in Table 2 were obtained when the remote button A was pressed.

<table>
<thead>
<tr>
<th>Traffic Light</th>
<th>Red</th>
<th>Yellow</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON</td>
<td>ON (DELAY)</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

When button A are pressed at the remote control, the GREEN light at traffic light 1 will turn OFF, the YELLOW light will turn ON for delay about 5 second. The delay are to aware the road user to prepare to stop the vehicles. Then the RED light will turn ON.

At the traffic light 2, when the button A are pressed, it will wait for the delay about 5 second and the GREEN light will turn ON, at this time the RED and YELLOW light will turn OFF.

The following data in Table 3 were obtained when the remote button B was pressed.

III. RESULTS

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When the pushbutton B are pressed at the remote control, the GREEN light at traffic light 2 will turn OFF, the YELLOW light will turn ON for delay about 5 second. The delay are to aware the road user to prepare to stop the vehicles. Then the RED light will turn ON.

At the traffic light 1, when the button B are pressed, it will wait for the delay about 5 second and the GREEN light will turn ON, at this time the RED and YELLOW light will turn OFF.

The operation of this traffic light has been tested at 10m, 20m, 30m and 40m apart. The project functioned successfully. The result tested as shown the Table 4.

<table>
<thead>
<tr>
<th>Traffic</th>
<th>Red</th>
<th>Yellow</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

When the pushbutton B are pressed at the remote control, the GREEN light at traffic light 2 will turn OFF, the YELLOW light will turn ON for delay about 5 second. The delay are to aware the road user to prepare to stop the vehicles. Then the RED light will turn ON.

At the traffic light 1, when the button B are pressed, it will wait for the delay about 5 second and the GREEN light will turn ON, at this time the RED and YELLOW light will turn OFF.

The operation of this traffic light has been tested at 10m, 20m, 30m and 40m apart. The project functioned successfully. The result tested as shown the Table 4.

<table>
<thead>
<tr>
<th>Transmitter (Tx)</th>
<th>Rx (Traffic)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>10 meter</td>
<td>Tested good</td>
</tr>
<tr>
<td>Remote</td>
<td>20 meter</td>
<td>Tested good</td>
</tr>
<tr>
<td>Remote</td>
<td>30 meter</td>
<td>Tested good</td>
</tr>
<tr>
<td>Remote</td>
<td>40 meter</td>
<td>Tested good</td>
</tr>
</tbody>
</table>

This project is an advantage to control traffic at road side during road repair. It takes 1 person to control the traffic. This is a cost saving. It will increase the productivity in road repair and the company revenue. This project also will create safe work environment at construc-
Development of Mini Weather Station Indicating Rainfall, Relative Humidity and Barometric Pressure Using Raspberry Pi Micro Processor

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Lumut, Perak, MALAYSIA

Abstract- Sensing the weather has been important to human over the centuries. Today, weather affects a wide range of human’s activities, including agriculture, transportation and development, our project is to design a weather monitoring station that can take measurements of the temperature, air pressure, humidity. The Raspberry Pi is a low cost, credit card sized, single board computer that has the ability to interact with the outside world by interfacing with various types of sensors.

Keywords: weather station, monitoring and precise reading.

I. INTRODUCTION

Automatic weather observation refers to the activities involved in converting measurements of meteorological elements into electrical signals through sensors, processing and transforming these signals into meteorological data, and transmitting the resulting information by wire or radio or automatically storing it on a recording medium.

Weather affects a wide range of human’s activities, including agriculture, transportation and development. Weather station is a facility on land or sea, which has instruments and devices for observing and measuring atmospheric parameters to provide the information for weather forecasts.

Modern weather monitoring systems and networks are designed to make the measurements necessary to track these movements in a cost effective manner.

Our project are able to get more precise measurement compare from other devices. The aim of this project is to design a weather monitoring station that can take measurements of the temperature, air pressure, and humidity.

The Raspberry Pi is a low cost, credit card sized single board computer that has the ability to interact with the outside world by interfacing with various types of sensors. Raspberry Pi has a number of features such as an ARMv7 processor, GPU, RAM, SD card slot, USB port etc. It’s cheap, small and rugged, and it needs a small power supply.

The data obtained from this system can then be used for various purposes such as automated irrigation systems, automated temperature control for homes, offices, warehouses and factories, green house climate control, for tracking hazardous materials released into the air is the Biological Identification and Detection System (BIDS), pollution monitoring and many more such applications.
II. MATERIALS AND METHODS

The smart monitoring automatic weather station are to improve the operation of existing weather station. Besides that, with Raspberry Pi, the data from humidity, barometric pressure and rain sensor, can be read and accessed by user anywhere via internet connection.

A deep research has been made to build the smart monitoring weather station. Firstly, design and creates the circuit of the Raspberry Pi with the programming to carry the automatic function of the system. To ensure the ability of the Raspberry Pi indicating atmospheric condition, LCD screen is connected for display as shown in Figure 1.

Figure 1. Connection of Raspberry Pi 2 with sensors

The program code for this project basically written in Python programming code and the circuit being simulates by using Python software to find any error or fault.

Next is to design an enclosure for the computer. The casing box, rain gauge and sensor are drawn using the AutoCAD software as shown in Figure 2.

Figure 2. Project prototype drawing

After that, installation process begin. Lastly, the prototype will be decorated and cleaned ready for testing and data retrieving.

III. RESULTS

To get the correct reading, comparison are made during testing of the Raspberry Pi at Meteorology Perak located at Sitiawan Perak. Comparison are made between the Meteorology Station, Android Online Telephone System and Raspberry Pi. The result are recorded in the Table 1.

TABLE 1
COMPARISON OF HUMIDITY, TEMPERATURE, PRESSURE MEASUREMENT

<table>
<thead>
<tr>
<th>measure</th>
<th>Raspberry Pi 2</th>
<th>Online system</th>
<th>Meteorology</th>
</tr>
</thead>
<tbody>
<tr>
<td>humidity</td>
<td>74%</td>
<td>72%</td>
<td>76%</td>
</tr>
<tr>
<td>temperature</td>
<td>30°C</td>
<td>31°C</td>
<td>29°C</td>
</tr>
<tr>
<td>pressure</td>
<td>1009.80hPa</td>
<td>1009.35hPa</td>
<td>1011.05hPa</td>
</tr>
<tr>
<td>rainfall</td>
<td>0mm</td>
<td>0mm</td>
<td>0mm</td>
</tr>
</tbody>
</table>
Later, the result are gathered and compared for at least 6 hours. In Figure 3, the change in humidity occurs every hour. At 1:00 pm, the online system has recorded a reading of 66% humidity. This is the lowest state in all the reading. The readings of humidity for online system increase gradually every hour were recorded from 66% to 71% at 6 pm. For the android system, the humidity of 70% was recorded at 1:00 pm and rise just 1% at the end of this experiment. On raspberry pi system, the reading at 1:00 pm was 71% and the final reading at 6:00 pm is at 75%. This reading is the highest reading in three readings. The absolute accuracy of humidity measurement from the other device is about ±1.5%.

Based on the figure 4, this experiment has been recorded for 6 hours on the same day. The pressure varies according to temperature and time. As we can see, the online system record 1009.01 hPa starting at 1:00 pm has been changed to 1007.00 hPa at 6:00 pm. It decline for 2 hPa. From android system, the reading was recorded at 1:00 pm is 1009.00 and ended at 1006.00 hPa at 6:00 pm. This is different for raspberry pi system, reading of 1007.50 hPa was recorded at 1:00 pm and is decreased to 1003.85 hPa at the end of this experiment. There are no significant difference among these three readings. The absolute accuracy of pressure measurement from the other device is about ±3 hPa.

Based on the Figure 5, it can be said that in a week only 4 days of rain occurred on Sunday, Tuesday, Wednesday and Friday and 2 days did not rain, that is on Monday and Thursday. On Sunday, android system has recorded a rainfall of 2mm. Online system was recorded rainfall of 5mm. There are 3mm differences between them. It is different from Raspberry Pi, this device has recorded rainfall of 6mm on that day. The difference of 1 mm and 4mm of the online system of android system. All system cannot record any readings on Monday and Thursday because there is no presence of rain. The absolute accuracy of pressure measurement from the other device is about ±1mm.

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**Figure 3. Humidity Graph for 6 Hour**

**Figure 4. Pressure Graph for 6 Hour**

**Figure 5. Rainfall Graph for 6 Day**
From the Figure 6, the highest reading was recorded at 34 C at 2 pm and the lowest reading was 31 C at 6:00 pm where both readings were recorded using the same system that is raspberry pi system. A different reading was recorded with an online system and android system. Both have the same reading and constant in reading until 6:00 pm. The only difference occurs at the start reading it was at 1:00 pm. The absolute accuracy of humidity measurement from the other device is about ± 2°C.

IV. CONCLUSION

With the monitoring weather station, we can get more precise reading for everyone via online. The meteorology data regarding atmospheric change such as pressure, rain fall and humidity are valid within 10 km radius from the Meteorology station. The need of more private weather station arises with the global weather issues. The lower the weather station cost will help to alert people in the high risk area.

ACKNOWLEDGMENT

This project has been approved by Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET). Deepest thanks to lecturers and technician for excellent guidance, caring, patience, and providing us with an excellent atmosphere for doing our final year project.

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LABVIEW BASED ON SMART PARKING SYSTEM

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Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

Abstract- LabVIEW based on Smart Parking project is about designing a system to monitoring the parking system that can be applied at the parking area such as shopping mall or offices. This project focuses to develop the front panel by using National Instruments software, Data Acquisition and hardware component. Basically, conventional car park system does not have the display panel and it cannot show the capacity or vacancy of parking lot space and the user must random to search any vacancy or have to wait the other car to exit from the parking lot space. LabVIEW based on smart parking system project to improve the conventional parking to make the parking lot space become well organized and more friendly and this project will create a car detecting system by develop a monitoring system based front panel of car park operation data. The system will convert the output from the sensor to the programmable language to the monitoring system based on the display panel. The purpose display panel to show the status and vacancy of parking space and Compact Rio component is used to provide interfacing between the hardware and software. By using the LabVIEW software, the simulation of physical system can be developed to monitor the quantities to measured and the status of equipment on the plant from the remote point without accessing the inaccessible area of the plant and also the front panel is successful developed and explained by designing a physical model of parking lot with car detector operation. This monitoring system can be applied in various industrial and personal applications such as home security system and factory automation.

I. Introduction
Smart parking system plays the important role to provide good parking services to public based on the research in existing parking system at the crowded area. Some parking area is difficult to find the available parking spaces, so these projects purposely implement to solve the problem. The LabVIEW based on smart parking project is focus on finding the best way user to get parking spaces and also monitoring the parking zone and availability of parking space so that they can make good decision about where they want to park and thus find the parking spaces conveniently. Continuously It will reduce traffic congestion by reducing the amount of traffic circulation in search of open spaces or attempting to park at a specify facility that is full.

II. Materials and Methods
This project is based on electronic application systems that improve the conventional parking system by using sensor detection and display panel using Graphical Programming Language Software.

The goal of this smart parking project is to design a system based monitoring parking system for applied on parking lot. The new improvement of the conventional parking system will make the parking lot more users friendly. This project will
create the virtual sensor operation by develop the LabVIEW front of car park operation data. The system will convert the output from sensor to the programmable language to the system base display by using the DAQ that can interface between software and hardware.

Firstly, LabVIEW is using G programming. G programming stands for graphical programming. It can be connected with data acquisition, analysis, and logical operations. The advantage of using LabVIEW is easiest way of programming than language programming, has a user interface to control all process or system design and time execution is short compare to Matlab. LabVIEW has front panel and block diagram as shown in Fig 1 and Fig 2 below.

In Fig 3 is a block diagram of a smart parking system based LabVIEW approach. It consists four parts: computer, data acquisition, input and output. The computer needs to install LabVIEW software. The design of the system using LabVIEW software and need execute or run the design to turn on the system. Data acquisition NI USB-6001 is interfaced between the signal input and signal output to computer. Input to this system is entry gate sensor, exit gate sensor, parking lot sensor and RFID system. Output of this system is divided to 2 outputs that is computer and data acquisition output. Input will proceed when the sensors at the entry gate detect the incoming car and monitor will display the detail instruction about the parking lot. User will present the RFID card and select the parking lot and gate will be opened. Car proceed to parking lot that their select. For the second steps, the cars already exit from the parking lot. When arrive at the exit gate, the sensor will detect the car and its will display details instruction. User will present the RFID card again to calculate the parking charge and pay the exactly amount of parking charge. Exit gate will open and user can proceed to leave the parking lot.

III. Result

This smart parking system is divided to 2 systems that is gate use and office use. For the gate use (entry gate), It has six conditions, that is a sensor detect, decide slot, open gate, close gate, park...
state change and exit. For the exit gate, it has 7 conditions that are a sensor detect, display price, open gate, close gate, read configure, write configure and exit (See figure 4). The second system is Office Use that includes 3 sub paneling that is parking view, configure and database (See figure 5) and the table result of the system have recorded in table 1.

Fig 4: Result from Front Panel Window of Smart Parking System (Gate Use)

Fig 5: Result from Front Panel Window of Smart Parking System (Office Use)
IV. Conclusion

From smart parking system project, it show that the information and method of smart parking system is used in this project by different version. Normally the smart parking system is using language coding (C, C++, and assembly language) to control the system but in this project is using graphical language. The design is including on Front Panel window and Block Diagram window. Front Panel window for monitoring of indicator status of parking lot, RFID, parking charge, configure and database. The block diagram window is for designing the system using graphical language. This project is using Data Acquisition (DAQ) for interface the hardware and software. Each input and output of hardware used in the project must be declared the pin number that connected to hardware in DAQ code. The connection is very important to process the signal from input to the design system before giving the signal to the output. The design can be implemented in the real environment as a shopping mall, office parking lot, apartment parking lot and others.

References


Development of Biometric Scanning Module by using Arduino for Attendance Monitoring System


University Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

Abstract - Since 2010, the biometric scanning module was used widely in the government sector to the data of attendance of staffs. The biometric scanning module well-known as Attendance Monitoring System which has a various type and working principle based on the development itself. A microcontroller is used as the master device which is Arduino Mega 2560 to a biometric scanning module; fingerprint sensor that command by C++ programming language. This project is able to create a database of users’ fingerprint which allowed then to have an easy attendance record. With helps of microcontroller, this project are able to be design as a portable and easy carried prototype. As conclusion, this project can make a database by itself up to 250 fingerprints of user. The attendance record can be achieved in 5 seconds per user in perfect time. This project might help the user on getting a secure and pure data of attendance that can be easily managed and analyzed.

I. Introduction

The Development of Biometric Scanning Module by using Arduino for Attendance Monitoring System is the enhance technology applied to improve the monitoring system nowadays. This technology of biometric scanning and integrated with Arduino Mega 2560 kit. This project utilized BIO-AMS to collect students’ attendance data by the showing the date, time and the confidence of the fingerprint’s image for lecturer monitoring their students.

II. Methodology

The monitoring attendance system project is to replace the paper-based attendance record. Besides that, with Arduino Mega 2560, RTC Module, SD Card Module, ADA751 Fingerprint Module, Arduino LCD Shield 16x2, and 10000mAH Power Supply it’s added value to this automatic update time and portable. A deep research has been made to build the smart monitoring and recording system. The system came out with the flowchart of BIO-AMS operation and block diagram as shown in Fig 1 and Fig2 respectively.

Fig 1: Flowchart of BIO-AMS Operation
Fig 2: BIO-AMS Block Diagram.

LCD 16x2 screen was integrate with the Arduino kit to ensure the ability of Arduino reacts with a fingerprint sensor, RTC Module, SD Card Module the Arduino kit. A circuit of BIO-AMS has been construct and connect with the Arduino kit are shown in Fig 3.

The program code for this project basically written in Arduino programming and the circuit being simulated by using Arduino IDE software to find any error or fault connection. Figure 4 shows the designation of casing box by using the AutoCAD software and the material used for the actual is Perspex. Troubleshooting of this circuit has been done to avoid any short circuit or fault occur during the installation process.

III. Results

The portable attendance can save each student’s fingerprint, hence makes the system more robust. During enrolment, the student’s fingerprint is assumed to be clean, not dry or damp, no scratches and not swollen.

Students are required to place their fingerprint. After the enrolment stage, the data will be saved in the fingerprint scanner module and verification system takes place by comparing the capture fingerprint characteristic with the previously enrolled data. Table 1 shows the types of issue that might occur when taking attendance.

In the recent time, most organizations such as universities are using a sheet of paper to record the student attendance. Students need to sign on the attendance sheet as an evidence for them to show that they attended the class.

An experiment has been conducted to know the time taken in recording student’s attendance using BIO-AMS. Table 2 shows the results of BIO-AMS compare to the paper-based system, Radio Frequency ID (RFID) system, and Fixed Biometric Attendance System that has been done by other researcher.

Table 1

<table>
<thead>
<tr>
<th>Problems</th>
<th>Fingerprint snapshots</th>
<th>Problems</th>
<th>Fingerprint snapshots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger misplacement</td>
<td>Dirty finger</td>
<td>Wet finger</td>
<td>Skin problem</td>
</tr>
</tbody>
</table>

For the observation, students needs 1 to 2 minutes to put on signature on the attendance sheets, 15 seconds for transmitting data from RFID and 10 seconds for the fixed biometric attendance system. This show that BIO-AMS have the fastest system among the other system by
Having average time of 5 seconds each student recorded as shown in Fig 5 below.

Fig 5: 2nd May 2016 data analyzed.

**Table 2: Comparison of Attendance System**

<table>
<thead>
<tr>
<th>ATTENDANCE SYSTEM</th>
<th>PAPER-BASED ATTENDANCE</th>
<th>RADIO FREQUENCY ID SYSTEM</th>
<th>FIXED BIOMETRIC ATTENDANCE SYSTEM</th>
<th>BIOAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME PER STUDENT</td>
<td>1 - 2 MINUTES</td>
<td>15 SECONDS WITHOUT DELAY</td>
<td>10 SECONDS WITHOUT DELAY</td>
<td>5 SECONDS WITHOUT DELAY</td>
</tr>
<tr>
<td>DATA STORED</td>
<td>ON PAPER</td>
<td>IN SERVER</td>
<td>IN SERVER</td>
<td>IN SD CARD</td>
</tr>
<tr>
<td>DATA SECURITY</td>
<td>LOW</td>
<td>LOW</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>ADVANTAGES</td>
<td>EASY MANAGED</td>
<td>FREE PAPERS, FAST</td>
<td>FREE PAPERS, FAST AND CONTAIN FULL INFORMATION</td>
<td>FREE PAPERS, FAST, CONTAIN IMPORTANT INFORMATION ONLY AND PORTABLE</td>
</tr>
</tbody>
</table>
IV. Conclusion

This project has introduced the configuration and advancement of Portable Attendance System which depends on unique finger impression ID. The system lessened numerous issues, for example, preventing the potential outcomes from securing deceiving in recording the participation, facilitates the lecturer to monitor students’ attendance, and the transportability spares time in taking participation as opposed to the lining in a line. Future works will extra security improvement by the encryption strategy includes more security so there will be no mysterious unique finger impression which can mess around with the recorded information and backup system.

References


Abstract- Mimic panels allow to graphically represent technology processes, diagrams of power networks, water supply and distribution network, gas grids, plans and other individually arranged solutions. With the application of modern, complex and automated technologies, mimic boards serve as a visualization tool effectively supporting control and management processes. By developing this project, it will demonstrate the basic function of mimic board including the operation and control of switches. Besides that, the mimic board will show the voltage and power rating that symbolize the actual power rating on the equipment and system. The fabricating of this mimic board can ease the user to know about power rating onboard. This module kit will demonstrate the basic function and application of mimic board including the operation and control of switches. Besides that, the mimic board will show the voltage and power rating that symbolize the actual power rating on the equipment and system. The Mimic Board will show up the status of machinery onboard. Thus, the idea of the project is to create a training module kit for Mimic Board of Ship Electrical System to help the student to understand better about ship electrical system.

Keywords: Mimic, Power Rating, Symbolize, Onboard.

I. Introduction

Mimic panels allow to graphically represent technology processes, diagrams of power networks, water supply and distribution network, gas grids, plans and other individually arranged solutions. With the application of modern, complex and automated technologies, mimic boards serve as a visualization tool effectively supporting control and management processes. It is possible to instantly visualize expanding and changing processes and to reflect the operating condition of devices by means of LED signaling with an option of control from front panel devices. The basic lighting components of mimic boards are LED modules with one or many LEDs. There are also other elements fixed in the board’s surface, including pushbuttons, switches, controllers, digital displays, analogue and digital meters. Updating and changing of board images is quick and easy thanks to special caps placed on the frames.

Mimic board consist of:

- A schematic mimic on the front representing the system being controlled
- Lamps and indicators to show the status and position of all the elements
- Switches to control and change the status of these plant items
- Full internal wiring, and equipment mounted on the front and internally.

Methods

The schematic for mimic board of ship electrical system must be designed, then develop the suitable shape for the project which also including the drilling and cutting. The mimic board of ship electrical system is fabricated with wiring before the system is tested and troubleshoot.
Fig. 1. Design schematic

Fig. 2. Relay Installation

Fig. 3. Wiring process

Fig. 4. Testing
### Table 1 Result from the mimic board

<table>
<thead>
<tr>
<th>Mimic Code</th>
<th>Description</th>
<th>Contact</th>
<th>Coil</th>
<th>Mimic Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator No.1</td>
<td>6.6kV Generator 1 (2000kVA Gen)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>Generator No.2</td>
<td>6.6kV Generator 2 (2000kVA Gen)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>Synchronized Generator 1 &amp; 2</td>
<td>To Synchronized Voltage cycle between G1 &amp; G2</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker Busbar Generator 1</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker Busbar Generator 2</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6 kV Busbar HV MSB(Common)</td>
<td>6.6kV Busbar No.1 (Generator 1)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6 kV Busbar HV MSB(Common)</td>
<td>6.6kV Busbar No.1 (Generator 2)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV // 440V</td>
<td>Step-down Transformer 6.6kV/3kV (Right)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV // 440V</td>
<td>Step-down Transformer 6.6kV/3kV (Middle)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV // 440V</td>
<td>Step-down Transformer 6.6kV/3kV (Left)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>Description</td>
<td>Action</td>
<td>Bars</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Synchronize motor Generator 1</td>
<td>To Synchronized motor Generator 1</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Synchronize motor Generator 2</td>
<td>To Synchronized motor Generator 2</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Synchronized Motor 1 &amp; 2</td>
<td>Synchronized Voltage cycle between Motor G1 &amp; G2</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>440V // 200V LV</td>
<td>Step-down Transformer 440V // 200V LV Generator 1</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>440V // 200V LV</td>
<td>Step-down Transformer 440V // 200V LV Generator 2</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Motor Generator 1 ( Port )</td>
<td>Motor to conduct Propeller 0-145 rpm</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Motor Generator 2 ( Stbd )</td>
<td>Motor to conduct Propeller 0-145 rpm</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Auxiliary Generator</td>
<td>6.6kV Gen. Set</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>400V Busbar LV MSB (Common)</td>
<td>3x400V Busbar No.2 (Auxiliary Generator)</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>400V Busbar LV MSB (Common)</td>
<td>3x400V Busbar No.2</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>Emergency Generator</td>
<td>3x400V Emergency Generator</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before right Step-down Transformer 6.6kV)</td>
<td></td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before left Step-down Transformer 6.6kV)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before middle Step-down Transformer 6.6kV)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (after right Step-down Transformer 6.6kV)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (after left Step-down Transformer 6.6kV)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (after middle Step-down Transformer 6.6kV)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before motor Step-down Transformer 6.6kV Generator 1)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before motor Step-down Transformer 6.6kV Generator 2)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before motor Step-down Transformer 6.6kV Generator 2)</td>
<td>9 &amp; 5</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>Control Type</td>
<td>Component Description</td>
<td>Led</td>
<td>10 &amp; 2</td>
<td>13 &amp; 14</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before synchronize motor Step-down Transformer 6.6kV Generator 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.6kV VCB</td>
<td>Vacuum circuit Breaker (before synchronize motor Step-down Transformer 6.6kV Generator 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker (before Step-down Transformer 3x400V LV MSB Generator 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker (before Step-down Transformer 3x400V LV MSB Generator 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker (after Step-down Transformer 3x400V LV MSB Generator 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker (after Step-down Transformer 3x400V LV MSB Generator 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker to 3x400V 60 Hz ESB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>440V ACB</td>
<td>Air Circuit Breaker to 3x400V 60 Hz ESB</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IV. Conclusion

This project requires more on the connecting of the component on the board with the power supply. This project may help the students to acquire knowledge about mimic board of ship electrical system beside ease the user for their working task. The mimic board of ship electrical system contains of power generation part and power distribution part that consists of HV (High Voltage) site and LV (Low Voltage) site.

Reference

Robot Floor Cleaner With Wireless Remote Cleaner

A. Afiq, N. Nurul Asyikin, M. Rohaimi
Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

Abstract- Efficiently and quality service in the industry today has become a growing attraction, especially with the increasing innovation in the electrical and electronic system. For buyers, they offer the best service to deliver fresh ideas and reliable supply capable of competing. This project is about an instruction given to from the wireless remote to the robot itself. Transmitter inside the remote transmitted instruction that given from the user to the receiver inside the robot. A benefit using wireless remote control to the robot is that easier for the user to control from a distance. Furthermore, it also can save time and energy.

Keywords: wireless remote control, transmitter, receiver, motor.

I. Introduction

Nowadays, the high living styles have become highly request. The robot floor cleaner with wireless remote control will be advantages for the user to complete house task. For the final year project, this project is about an instruction given to from the wireless remote to the robot itself. Transmitter inside the remote transmitted instruction that given from the user to the receiver inside the robot. This robot can provide an efficient floor cleaning by wiping and drying the floor.

II. Materials and Methods

The robot floor cleaner is improving of high quality living. Besides that, with robot floor cleaner can be control by wireless remote and be control from a certain distance by a user. This also saves time and energy. Firstly, is to design and creates the transmitter circuit (wireless remote control) as shown in the Figure 1 and Figure 5. Next, is to create the receiver circuit to receive the instruction from the remote and the relay circuit as shown in Figure 3 and Figure 4. Furthermore, is to create the PIC circuit to control the movement of the robot (motors) as shown in Figure 2. The program code for this project basically written in C language by PIC Compiler program. Next is to design a casing to place the receiver, relay and PIC circuit. The casing for the wireless remote control and robot are design using the SolidWorks software as shown in Figure 5. After that, troubleshoot of this circuit keep been made to avoid any dysfunction and faulty occur during the installation process. Lastly, the prototype will be decorate and clean up as a finishing.
III. Result

The robot starts when switching button on is pressed and the movement of the robot is controlled by using wireless remote control. The result is as table 1 below:
Table 1
Result of system function

<table>
<thead>
<tr>
<th>Instruction code/system</th>
<th>Result Motor 1</th>
<th>Result Motor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Button 1 (forward)</td>
<td>Forward</td>
<td>Forward</td>
</tr>
<tr>
<td>Button 2 (right)</td>
<td>Forward</td>
<td>Reverse</td>
</tr>
<tr>
<td>Button 3 (left)</td>
<td>Reverse</td>
<td>Forward</td>
</tr>
<tr>
<td>Button 4 (stop)</td>
<td>Stop</td>
<td>Stop</td>
</tr>
</tbody>
</table>

IV. Conclusion

This project focuses on functioning of wireless remote control with the robot and also PIC that control the motors. This robot cleaner are suitable for user that had no time to clean their house and had difficulty with cleaning. For example, allergies or handicap. The fabrication cost is less and the application is simple.

REFERENCES

Contactless Battery Charger Using Planar PCB Windings

S.M Hafizi, L.M.A. Adli, Z.M Zaifulrizal and A.A.F Izzuddin

Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

Abstract - This project presents practical details involved in the design and implementation of a contactless battery charger that employs a pair of neighboring printed circuit board (PCB) windings as a contactless energy transfer device. In this project, a prototype contactless battery charger developed for the application to battery is used as an example to address design considerations for the PCB windings and energy transfer circuit and demonstrate the performance of the contactless charger adapted to a practical application.

Keywords: Enhancement of Contactless battery charger using planar printed circuit board (PCB) winding.

I. Introduction

In this globalization era, electronic systems now can be considered very advance. The researchers make a research and develop a new modern system that can help others to do better in their job. Besides, this innovation is upgrade based on each function. Furthermore, for this year all the final semester students have been given the chance to develop and create the final project based on chosen title from panel. The final project that I choose “Enhancement of Contactless Battery Charger Using Planar PCB Windings. This project to improve gap of energy transfer.

Contactless battery charger using planar PCB windings is a method that employs a pair of neighboring printed circuit board (PCB) windings as a contactless energy transfer device. Besides, this our project have to improve a prototype contactless battery charger. This project have to increase time contactless battery transfer. Moreover, for enhancement this project need to increase this efficiency contactless battery transfer. The windings will create the magnetic field to transfer the energy from the primary to the secondary. Lastly, for the final stage that is output of the process is the ‘Rectifier’ which converts the AC voltage from the planar to DC voltage as the output voltage.

II. Methodology

This chapter related project processing information about easy idea to discussed. The section is done by computer software like Proteus 8.1 and PSIM used to develop a circuit in order to enhancement and simulation of contactless battery charger. Furthermore, for the new system, will develop and created to the community, it is to be approved by society. By the way, it’s very difficult to determine the photograph for smart design because assessment method stay early crossing of the system. The scopes of works are collecting information about the project Energy Transfer.

III. Result

Operation Condition and Circuit Parameters Output Voltage Based on Distance Output Current which is shown in Table 1 below. Table 2 shows the output current produced during the experiment testing.
IV. Conclusion

As a conclusion, the project will benefit financially to economics and also environmentally. In addition, this product also friendly because all categorize of human can use this product. Moreover, by using this system, the energy can transfer without using any wires between it or in other called wireless. The system will properly function by creating suitable frequency to make the distance between the primary and secondary windings. Finally, the objectives of the project have been mostly achieved. With this, it has been studied the technology using for Contactless Battery Charger using Planar PCB windings from internet, journal and others. This project have been achieved to Enhancement Contactless Battery Charger, the time is long lasting to transfer energy. Apart from that, the efficiency contactless battery transfer increase.

Table 1: Output Voltage

<table>
<thead>
<tr>
<th>Distance</th>
<th>Output Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0 ~ 12 VDC)</td>
</tr>
<tr>
<td></td>
<td>(0 ~ 5 VDC)</td>
</tr>
<tr>
<td>1) 8cm</td>
<td>3.6V</td>
</tr>
<tr>
<td>2) 6 cm</td>
<td>4.3V</td>
</tr>
<tr>
<td>3) 4 cm</td>
<td>5.5V</td>
</tr>
<tr>
<td>4) 2 cm</td>
<td>6.2V</td>
</tr>
</tbody>
</table>

Table 2: Output Current

<table>
<thead>
<tr>
<th>Distance</th>
<th>Output Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0-12 VDC)</td>
</tr>
<tr>
<td></td>
<td>(0-5 VDC)</td>
</tr>
<tr>
<td>1) 8 cm</td>
<td>1.56mA</td>
</tr>
<tr>
<td>2) 6 cm</td>
<td>1.53mA</td>
</tr>
<tr>
<td>3) 4 cm</td>
<td>2.63mA</td>
</tr>
<tr>
<td>4) 2 cm</td>
<td>2.68mA</td>
</tr>
</tbody>
</table>
V. References


Abstract

The Development of Car Accident Detector by using Smart Phone is for the system envisioned an automatic collision detection and warning system relying on a GSM modem. The purpose of the project development is to highly aid the search and rescue of vehicles that have met with an accident. Apart from that, the vehicle to be safeguarded is to be fitted with the system sturdily ensuring good mechanical coupling with the entire chassis. In the case of an anticipated accident, the system detects it using the fact that the vehicle would be suddenly decelerated in such a condition. An accelerometer sensor continuously monitors the acceleration of the vehicle and will detect decelerations greater than threshold value and send the data to the microcontroller. The controller compares this with the threshold set value and immediately sends an SOS message to preset numbers.

Keywords: local area network, global system mobile, mechanical coupling, smart phone, collision detection.

I. Introduction

Efficiently and quality service in the industries today have become a growing attraction, especially with the increasing of innovation in the electrical and electronic system. Now a days, an accident rate keep increasing as compared to previous decade. The accident rate has increased by 54% each decade. Car Accident Detector is developed to minimize the action time after an accident.

This project deals with such system to detect possible collision and to prevent it. The aim of this project is to provide security to the driver and passengers inside a vehicle. A basic microcontroller SK40C is been used, which is cost effective with GSM for mobile alert or relax messages (mobile phone).

II. Objective

The objectives of this project are:

- To develop a new version of system for vehicle accident detection.
- To send early alert signal before accident through SMS.
- To test and troubleshoot the prototype of car accident detection system.

III. Problem Statement

Now days, there are many car accidents that are leading to cause of death. An alert by accident detection system helps to reduce fatalities stemming from car accidents by decreasing the response time of emergency responders. Smartphones and their onboard sensors such as accelerometers are promising platforms for constructing such systems. Furthermore, this paper provides three contributions to the study of using smartphone based accident detection systems. Apart from that, the project describe solutions to key issues associated with detecting traffic accidents, such as preventing false positives by utilizing mobile context information and polling.
onboard sensors to detect large accelerations.

The system consist of the architecture of our prototype as well as its capabilities for accident reconstruction. The system discuss on how smartphone reacts based accident detection that can reduce overall traffic congestion and increase the preparedness of emergency responders. Whenever accident being occurs, the nearby people call the ambulance. The problem associated with this is that the victims depend on the mercy of nearby people. There is a possibility that there are no people nearby during the accident or sometimes people around neglects the accident happened. This is the flaw in the manual system.

IV. Scope of project

The scope of study covers the accidents happen on highways by the car speeding due to increase in traffic and also due to rash driving of the drivers. Many situations the family members or the ambulance and police authority is not informed on time. Next, this project in delaying the help reached to the person suffered due to accident. Moreover, this project sparked from an idea to save the use of car accidents are a leading cause of death. With the advent of this technology, the project are able to reduce fatalities stemming from car accidents by decreasing the response time of emergency responders.

V. Methodology

In this system, SK40C is used as a main microcontroller. The system is designed for the early Car Accident Detector. The whole system is to be implemented on the vehicle itself. Therefore, when the accident happen, due to vibrations the accelerometer sensor gets activated. It measures the intensity of shocks and vibration. This vibration is detected by the microcontroller through MAX232, which is the interface microcontroller SK40C, then it converts accelerometer sensor analog signal in to digital mode. And here, GSM modem SIM300 is interfaced with microcontroller So that, when accident happens, the phone will sent automatically a SMS alert to the preset stored numbers entered in the database. Thus with this system rescue operation can be made faster. The system is implemented in vehicle and the vehicles are monitored continuously through microcontroller. When the vibration intensity beyond threshold value of 3G force impact in accelerometer sensor, it sends data to the microcontroller through ADC. These sensors have threshold values depending on different vibration intensities, GSM modem which are interfaced to Microcontroller are also activated. It is known that severe accident have greater than 3G and those with values less then 3G, accident are severe and not fatal. Therefore the suitable and acceptable threshold value is at 3g. The panic switch will be used when if accident is detected but no harm to lives then by pressing the panic switch manually relax message will be send. The system is implemented in vehicles. The vehicles are monitored continuously through microcontroller. Hence, when accident is detected, accelerometer sensor gets activated, these sensor have threshold values depend on different vibration intensities. If the vibration intensity is more than the specific threshold value, the accelerometer sensor activated at the same time, GSM modem which are interfaced to microcontroller are also activated. So, through GSM modem sends the messages as per condition.

VI. Conclusion

In conclusion, this system can be a new version of vehicle accident detection system. An embedded system is designed which can be most useful for accidents detection and prevention. It’s a low cost, efficient by which the action time can be minimized and also the information regarding accident can be sent to particular contact numbers e.g., Police stations, Doctors etc... Because of the flexibility of embedded system, it is very much compatible to any kind of vehicles because design of this system is compact. Overall this system is very much affordable can be easily implemented to all types of vehicles.
References


Development Of Dry Salted Fish Hybrid Machines

M.Syahir, Rafiee and A.A Makarimi

Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology

makarimi@unikl.edu.my

Abstract - Final Year Project is compulsory subject in order to complete study course in University of Kuala Lumpur Malaysian Institute of Marine Engineering Technology. In this course, student will be able apply their knowledge in marine technology as well as preparing them for on field experience for industrial environment later. We choose to establish a group of two members to perform to our project. The aim of study is to constructing development of dry salted fish hybrid machines with dimension 2.5feet long by 2feet wide by 2 feet length. The project also contributes to fisherman community as part of the needs to dry the fish. All results demonstrated to show the operation of the project.

Keywords: hybrid machine, fisherman community.

I. Introduction

Development of dry salted fish hybrid machines is using power supply and glass direct from the sunlight. This machines using temperature controller and have a humidity reading. Using a cheap material such as plywood with metal sheet coil. This machine can operate by using power supply or sunlight, and controlled using switch. Process to dry fish salted when switch motor and heater ON.

II. Materials and Methods

Humidity reading is the amount of water vapor in the air. Water vapor is the gaseous state of water and is invisible. Humidity indicates the like hood of precipitation, dew, or fog. Higher humidity reduces the effectiveness of sweating in cooling the body by reducing the rate of evaporating of moisture from the skin. This effect is calculated in a heat index table or humidex. Temperature control is a process in which change of temperature of a space (and objects collectively there within) is measured or otherwise detected, and the passage of heat energy into our of the space is adjusted achieve a desired average temperature. Figure 1 shows the prototype design of the project that shows the size and its dimension. They have 2.5feet long by 2feet wide by 2 feet length.
III. Result

Table 1 shows the observation of humidity readings taken during morning until early evening. It has increasing the temperature to dry the fish. With hybrid source it can be powered to demonstrate its application. Table 2, Table 3 and Table 4 shows the reading for different sizes of fish to be dried.

<table>
<thead>
<tr>
<th>TIME</th>
<th>TEMPERATURE READING</th>
<th>HUMIDITY READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.30 a.m.</td>
<td>34° c</td>
<td>20</td>
</tr>
<tr>
<td>11.30 a.m.</td>
<td>58.2° c</td>
<td>37</td>
</tr>
<tr>
<td>12.30 p.m.</td>
<td>59.3° c</td>
<td>38</td>
</tr>
<tr>
<td>2.00 p.m.</td>
<td>59.8° c</td>
<td>40</td>
</tr>
</tbody>
</table>

Figure 1. Design prototype
## REDBREAM FISH SIZE M

<table>
<thead>
<tr>
<th>TIME</th>
<th>TEMPERATURE READING</th>
<th>HUMIDITY READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.30 p.m.</td>
<td>30° c</td>
<td>22</td>
</tr>
<tr>
<td>4.30 p.m.</td>
<td>57.8° c</td>
<td>36</td>
</tr>
<tr>
<td>5.30 p.m.</td>
<td>58.3° c</td>
<td>38</td>
</tr>
<tr>
<td>7.15 p.m.</td>
<td>58.9° c</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 2: Fish size M

## REDBREAM FISH SIZE S

<table>
<thead>
<tr>
<th>TIME</th>
<th>TEMPERATURE READING</th>
<th>HUMIDITY READING</th>
</tr>
</thead>
<tbody>
<tr>
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<td>21</td>
</tr>
<tr>
<td>12.00 p.m.</td>
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<td>33</td>
</tr>
<tr>
<td>2.00 p.m.</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>4.45p.m.</td>
<td>28</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 3: Fish size S

## REDBREAM FISH SIZE M

<table>
<thead>
<tr>
<th>TIME</th>
<th>TEMPERATURE READING</th>
<th>HUMIDITY READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00 a.m.</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>12.00 p.m.</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>2.00 p.m.</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td>5.15p.m.</td>
<td>28</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 5: Fish size M
IV. Conclusion

This project focused on dry salted fish salted machine to reduce space for dries fish. Besides that, this machine also help small entrepreneur to increase productivity. Moreover, this machine can reduce process and save time.

References

Abstract - The objective of this project is to analyse and research the principle of thermoelectric technology and design a versatile and portable fish cold storage. This project is used to detect current temperature using sensor LM35 and variable resistor to adjust the set of temperature. The aim of this project is for cooling purpose operation and the temperature operation range is between 14 °C to 33 °C at cold side and 31 °C to 50 °C at the hot side. This is to prevent overheating and save energy. We used LM35 sensor to detect the current temperature at the hot and cold junction of thermoelectric by placing it at heat and cold sink. A 12V DC brushless motor is use for ventilation system for recycling the air in the interior section of cold box and also ventilation system at hot junction for the outer section.

Keywords: cooler box, fish storage, heat pump, semiconductor metal, thermo-electric

I. Introduction

Lembaga Kemajuan Ikan Malaysia (LKIM) is institution or organization to spearhead the development of the fishing industry and national fisheries. LKIM want to produces better storage than can store cold fish. So, we create this project to solve the solution. The basic idea of the project is to design and develop a cheap, versatile and portable storage box for cold fish using thermoelectric technology. This technology is very simple where the electrical current runs through two different types of semiconductor metals ("N" type and "P" type) creating a temperature difference. When electricity passes through the conductors one type of the conductor becomes hot and releases heat while the other type absorbs the heat and cools down. So the semiconductors work as heat pumps driving heat from one surface to the other. The side which absorbs the heat will cold the fish cold storage box. The fish cold storage box is suitable for transfer export and fisherman use. It is more economic than the existing product in the market. It is a simple and efficient cooling system with fully environmental friendly because it only use 12V DC power supply as shown in Figure 1.

II. Materials and Methods

This project is about thermoelectric cooler, the thermoelectric modules are solid-state device with Direct Current (DC) operating system which is no moving parts that convert electrical energy into a temperature gradient, known as “PELTIER effect” or convert thermal energy from a temperature gradient into electrical energy, the “SEEBECK effect”. Among the application the thermoelectric modules used as thermoelectric...
generators produce inefficient and little power. Typical applications of this type include NASA supplying power to spacecraft and electronic equipment. This application is using SEEBECK effect on the thermoelectric modules. Thermoelectric coolers don't contain Freon or other CFC or HCFC (an abbreviation for chlorofluorocarbons, Carbohydrgens containing Chlorene or Fluor), hazardous materials that are responsible for the thinning of ozone layer in the air. If placed and operate according to their manual, thermoelectric can coolers use less electricity than compressor-operated fridges. This will add another score to environmental friendliness. This system has less moving parts so less chance of breaking down and maintenance. An automatic sequential control system may cause a series of mechanical actuators in the correct sequence to perform a task. Referring to Figure 2 and Figure 3 shows the schematic diagram and product developed using solid work.

![Schematics Diagram](image)

**Fig.1. Schematics Diagram of the main circuit**
In this result, we observe that this project can work automatically. When both LM35 for cold and hot junction of thermoelectric detect the changing in temperature, it will collaborate with thermostat to give the reading of current temperature to LCD display. Thermostat will convert analog signal from LM35 to digital signal that is important for display in LCD. LM35 will detect the changing in voltage. The increase voltage value by Vref produce by output voltage LM35, the increase temperature reading until achieve at maximum point. The typical rate voltage output produce by LM35 sensor is 10.0mV per degree Celsius as shown in Table 1.
IV. Conclusion

As a conclusion, it has a problem with the casing and the peltier. From this project, it is acquired the experience on how to construct and operate a cooling system by applying all technical skills and theory that we learn before. Besides that, we also gain knowledge in AutoCAD drawing and application in thermoelectric technology which does not have in syllabus that we learn in diploma level. For the result, it will benefit a community in gaining new knowledge in cooling technology in daily applications. The project is portable and reasonable at price.

References


Development Of Thermoelectric Cooler Packs For Fishmonger Application

B.N Naquiddin, S. Ariff Firdaus and A. Makarimi Abdullah
Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology
makarimi@mimet.unikl.edu.my

Abstract - The objective of this project is to research and analysis the thermoelectric and design for the fishmonger application. This project using the system programmable integrated circuit (PIC) which that the PIC control the temperature using sensor which function to detect how low the temperature. In this project we aim the temperature between -10˚ and -5˚. And then we use DC power supply to give source to thermoelectric to run and also we use battery 12v. For cooler transition, the project referring to thermoelectric. The project uses a fan cooler to make the heat no heat the Peltier. Peltier also use in this project to make separate the heat and cooler.

Keywords: thermoelectric, temperature sensor, programmable integrated circuit.

I. Introduction
In fishery market, the normal practice the fishmonger using ice cube to maintain the freshness of their fish. By using ice cube it will increase the cost of and it also will increase the change polluted the fish if ice cube poisoned. The inverter product ‘thermoelectric effect cooler pack’ will help reduce this all factor. In the same time it will help fishmonger to keep the cleanliness area of fish market.

II. Materials and Method
This project is all about the thermoelectric cooler, thermoelectric uses the peltier effect to create a heat flux between the junction of two different types of materials. A peltier cooler, beater, or thermoelectric heat pump is a solid state active heat pump which transfer heat from one side of the device to the other, with consumption of electrical energy, depending on the direction of the current. This technology is far less commonly applied to refrigeration than vapor compression refrigeration. A typical thermoelectric cooler will consist of an array of p- and n- type semiconductor elements that act as the two dissimilar conductors. The array of elements is soldered between two ceramic plates, electrically in series and thermally in parallel. As a DC current passes through one more pairs of elements from n- to p-, there is a decrease in temperature at the junction, resulting in the absorption of heat from the environment shown in Figure 1.
III. Results Observation

Table 1 shows the overall results readings for range of cool and hot transition. The duration taken as at minimum of 5 minutes to 60 minutes. The analysis of the results has been explained detailed as sample readings.

<table>
<thead>
<tr>
<th>DURATION (TIME)</th>
<th>COOL</th>
<th>HOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 MIN</td>
<td>30.0 C</td>
<td>31.7 C</td>
</tr>
<tr>
<td>5 MIN</td>
<td>20.7 C</td>
<td>45.7 C</td>
</tr>
<tr>
<td>10 MIN</td>
<td>18.0 C</td>
<td>47.3 C</td>
</tr>
<tr>
<td>15 MIN</td>
<td>17.4 C</td>
<td>47.3 C</td>
</tr>
<tr>
<td>20 MIN</td>
<td>16.6 C</td>
<td>46.9 C</td>
</tr>
<tr>
<td>25 MIN</td>
<td>14.1 C</td>
<td>46.9 C</td>
</tr>
<tr>
<td>30 MIN</td>
<td>13.7 C</td>
<td>46.8 C</td>
</tr>
<tr>
<td>35 MIN</td>
<td>13.5 C</td>
<td>46.7 C</td>
</tr>
<tr>
<td>40 MIN</td>
<td>13.0 C</td>
<td>46.5 C</td>
</tr>
<tr>
<td>45 MIN</td>
<td>13.0 C</td>
<td>46.6 C</td>
</tr>
<tr>
<td>50 MIN</td>
<td>13.0 C</td>
<td>45.7 C</td>
</tr>
<tr>
<td>55 MIN</td>
<td>13.0 C</td>
<td>45.7 C</td>
</tr>
<tr>
<td>60 MIN</td>
<td>13.0 C</td>
<td>45.7 C</td>
</tr>
</tbody>
</table>

Table 1: Result of system function
IV. Conclusion
In fishery market, the normal practice the fishmonger using ice cube to maintain the freshness of their fish. By using ice cube, it will increase the cost of and it also will increase the change to polluted the fish if the ice cube poisoned. The inverter product “Thermoelectric effect cooler pack” will help to reduce this all factors. In the same time it will help fishmonger to keep the cleanness area of fish market.

References
    Thermoelectric Cooling - The Basics Revision 12/05/2000
Abstract - This study aims to develop a prototype of the new patching and plugged materials or a damage control device that is able to provide a temporary patch over holes in a ship hull for hull thickness up to 12 cm. This device is intended to control leakage or prevent fluid loss such as providing a quick and efficient way to plug holes in hulls of ships to minimize the ingress of flooding water. The device has a quick activating mechanism that provides a temporary patch over holes in a ship's hull. Based on the finite element calculations, it is proven that the device is effective as a temporary solution for hull patch.

I. BACKGROUND OF THE INVENTION

Many types of damage control safety devices had been introduced by inventors around the world. The main focus of the invention is of course to provide a temporary solution to control leakage or prevention of fluid loss such as providing a quick and efficient way to plug holes in hulls of ships to minimize the ingress of flooding water and to return to port where permanent repairs can be undertaken. The inventive devices are not limited to only marine vessels but can be applied to cars, trucks, storage tanks, barges etc. The device can be used to control damage which results from collision, leaks from tank shell/wall injuries, metal fatigue, corrosion, rust, acts of war etc [1, 2, 6].

Design on damage control device had started as early as in 1900. [4] invented a magnetic curtain for covering leaks in ships whereby the invention consist of a roller-curtain will rolled down over a hole and the edges of the curtain may be provided with steel magnets that keep the edges tightly against the hull of the ship built of iron. The invention can also be used for wooden ship but without the magnet. The water pressure is relied on to keep the curtain over the leak. [5] invented a sheet, blanket or casing of flexible material such as canvas that impervious to water to fit along the outside of the hull. Suitable magnets are attached by magnetic attraction to adhere to the iron or steel hull and secure the sheet or blanket over the hole. This action will prevent the inrush of water.

[6] invented a sealing element which can be utilized for securing an opening in an underwater or land positioned material storage tank. The sealing element will be positioned over an opening of the vessel where the sealing element has first and second securing lines connected at opposed sides of the sealing element for positioning the element and maintaining sealing element over the vessel opening. The sealing element has a plurality of concentrically positioned, inflatable conduit spaced from one another by intervening passageways formed by an outer cover. The outer cover and the conduit are formed of materials that is deformable and substantially impervious to the passage of fluid such as natural rubber, synthetic rubber, material formed by polymerization etc. A damage control system for ships is invented by [3] to monitor, suppress and eliminate damage comprising an automation and monitoring system.
that can detect outages and failures of installations. The operating station of the system will display the ship’s layout and produced the picture of the situation more quickly so that the required initiating measures can be taken for damage prevention. An alarm unit is installed in each room or the area of a group of several rooms of the ship that are allocated together and cooperated with the damage control system. The display of the corresponding room and/or group of rooms allocated together in the perspective layout of the ship will undergoes a colour change when deploy and this will make it possible for the ship’s safety officer to locate the damage area.

It is crucial to plug small holes (i.e., up to six inches) when a ship suffer a breach in the hull since the inrush water can put the ship in danger of sinking with sometimes accompanying loss of life. A breach in a hull with a total area of 12 square inches, located 10 feet below the water line, allows water to enter the ship at a rate of nearly 9,000 gallons per minute (GPM). At this rate water will quickly fill most ship and sink. In order to reduce or stop the inrush water, [2] had invented a device that can provide quick and efficient plugging of holes in ship hulls. The device has a quick activating self-unfolding mechanism that provides a temporary patch over holes in a ship hull and a folding arm to block water from coming in through the breach in the hull.

[1] invented a system for sealing a vessel using a system which consist of a sealing assembly with a sheet of material, an actuator and a bracing assembly with a mesh structure. The system is capable to provide a temporary pollution prevention counter measures by deploying a synthetic sealing material from a storage roll and locks the sealing material into place against a portion of an inner wall of the vessel.

These studies have shown so many patch and plugging materials that have been invented before and some of new materials that are invented to secure the holes. When the underwater hull is pierced there are various ways to overcome this problem. The common problems encountered on board ship is repairing ruptures or small holes on ship’s hull. This damage if not been taken any action will causes large problems and rising of water level inside of the ship.

Currently, there are numerous ways can be done to overcome water from coming in, but it is necessary to patch the holes with an effective solution and equipment in securing the holes on board ship. One of the most common sites of leakage is the thru-hulls. A hose can pop loose or the thru-hulls itself fails, leaving a serious hole below the water line. The greatest difficulty in repairing underwater damage is usually the inaccessibility of the damage. If an inboard compartment is flooded, other compartments will flood if the door or hatch is opened to get to the actual area of the damage. The repair work may be hampered by tangled wreckage in the water, the absence of light and the difficulties of trying to keep buoyant repair materials submerged. The primary factors that make it difficult to repair underwater holes are the pressure exerted by the water. A hole 7 feet below the waterline is subjected to a water pressure of about 3 pounds per square inch. Since damage to ship hull can lead to sinking and fatality, it is necessary to improvise the patching materials that have been used before and tested for its effectiveness as a temporary damage control device.

II. BRIEF SUMMARY OF THE INVENTION

The invention of a prototype of the new patching and plugged materials relates generally to systems which can cover and secure holes in ship hulls cause by damage due to collisions or projectile impacts. The device has a quick activating mechanism that provides a temporary patch over holes in a ship’s hull. The device is made in parts that when assembled become a complete damage control device. The first part of the device or the device front is made into a cone shape made of steel with diameter of 4 cm and the back of the cone is attached with bolt thread of length 5 cm. The steel cone is then screwed to the second part of the device which is a rubber tube with diameter of 18 cm that is attached to four stainless steel plate of dimension 7 cm x 3 cm that are welded to a stainless steel connecting base of dimension 3 cm x 3 cm at 90 degree. The connecting based
is welded to a stainless steel rod of length 35 cm. Thread of length 17 cm is made and measured from middle to end of the rod. The third part of the device is a washer with external and internal diameter of 5 cm and 2.5 cm respectively. The fourth part is an aluminium plate of thickness 0.5 cm and dimension of 10 cm x 10 cm. The plate is covered with rubber tube of same size on the upper side facing the washer. The fifth part is a 20 cm sliding steel pipe and the final or the sixth part is a nut holder with steel rod.

In operation, the cone shape steel will be pushed through the holes in a ship’s hull. The rubber tube attached with aluminium and hinges will be in retracted position for ease of it to slide through the holes. This part will extend and cover the hole from outside the hull. The washer and the aluminium plate covered with rubber tube on top will be configured to sandwich a portion of the ship’s hull. Then the sliding steel pipe will be slide into the stainless steel rod and finally the nut holder with steel rod will be turned around the thread to secure it in place. The device can be used for hull thickness of up to 12 cm. The front and rear view of the device is shown in Fig. 1 and Fig. 2. The present invention provides a temporary prevention counter measure.

In this study, wood panel is used to test the effectiveness of the device to plug the holes. The panel edges are considered to be simply supported in this study. A combination of uniaxial tension loads and lateral pressure have been applied to the hull model. An equivalent displacement loading of 2.029 mm (equivalent to axial force of 15 kN) is applied along the stiffener directions on the equivalent panel and the model is subjected to hydrostatic pressure of 0.2 MPa. The limitation of this study is that the device total weight is about 5 kg and due to this, the device is suitable to be used for supply vessel and ship range between 40 to 50 meters length.

III. CONCLUSIONS

This paper has presented a development of damage control device which provide a quick and efficient way to plug holes in hulls of ships in order to minimize the ingress of flooding water. Results are given to prove that the umbrella seal type damage control device is able to plug holes ranging from 4 to 12 cm. This shows that the umbrella seal type damage control device is able to provide a temporary patch over holes in a ship hull. However, more work is needed in order to perfecting the design in the future. The design of the damage control devices has evolved over the years. It
should be appreciated that numerous attempts have been made to mitigate inrush water from damage or injured in the ship’s hull especially attempts at controlling leakage due to rupture in the hull of a ship. The objective of the design is achieved according to [8] when the device temporarily contain the leak until permanent repairs can be accomplish so as to prevent the sinking of the ship by inflow and outflow where more serious damage occurs.

REFERENCES


Abstract - Global mobile system for home appliance control system has been a major issue when the home living styles have improve and the technology have overcome to control every system of the house and business premise. This appliance control system works like a switch and comes with the easy access. This system can only be accessed and activated by the owner through a SMS (Short Message Service) by using a mobile phone to turn on or turn off the system. After sending the SMS, the system will automatically receive and the owner will give a command to access to the controlled appliances. The system can be activated selectively based on the command given. For example, the owner sending the alphabet ‘a’ to switch off or ‘A’ to switch on the lights alternate a few moments time release system, attached to the light can be activated selectively. In this project not only the lights as the main operation, but the radio and socket are included or can any of output to control. Thus, with this appliance control system the residential area seem to have residents impose only done from a phone call only.

Keywords: global mobile system shield, Arduino, mobile phone, microcontroller based system

I. Introduction

Nowadays, the high living styles have become highly request. The global mobile system for home appliance control system will be advantages for the user to own their appliance control system. For the final year project, this project enhances the appliance control for home and business premise when owners are not in the house or premise for travel or going for out for a while by active or deactivate the appliance inside the house or premise just by using a phone call. The system is based on SMS technology to revolutionize the standards of living. This system provides ideal solution to the problems faced by owners in daily life. The system is more adaptable and cost-effective because the system only functions from a SMS using a mobile phone.

II. Materials and Methods

The global mobile system for home appliance control system project is an improved of high quality of living. Besides that, with microcontroller and gsm shield, it’s added the automatic function to the system and can be access by user anywhere. A deep research has been made to by writer to build the global mobile system for home appliance control system. Firstly, is to design and creates the circuit of the microcontroller with the programming to carry the automatic function of the system. To be able the microcontroller reacts with Arduino, atmel 328/pu circuit also created together with microcontroller circuit as shown in the Figure 1 and PCB layout show in Figure 2.
The program code for this project basically written in Arduino Software program and the circuit being simulates by using Proteus to find any error or fault connection. Next is to design a casing to place this circuit. The casing box is design using the Ares software as shown in Figure 3 and the material used for the actual is soft board. After that, troubleshoot of this circuit keep been made to avoid any dysfunction or faulty occur during the installation process. Lastly, the prototype will be decorate and clean up as a finishing.

Fig.1. Design the main microcontroller circuit
Fig. 2. Design the voltage regulator circuit

Figure 3. Design the microcontroller
III. Result

The global mobile system for home appliance control system will start when being plugged to power supply. The system will initialize the microcontroller circuit and Arduino to get ready. Besides that, the red LED will turn on to show there is power supply. When system initialized, sending a sms to gsm shield and have connection with Arduino and gsm shield must be set receive and send feedback to Arduino to microcontroller then will processed and perform the task given by activated he relay needed by user. The output of this relay will conduct the task given. After the output successfully activate, the owner will receive sms to let the user knows system have been active. The result been recorded in the Table 1.

<table>
<thead>
<tr>
<th>Instruction code/system</th>
<th>Result</th>
<th>Instruction code/system</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS ‘A’</td>
<td>Lamp 1 light up</td>
<td>LED light up</td>
<td>SMS ‘a’</td>
</tr>
<tr>
<td>SMS ‘B’</td>
<td>Lamp 2 light up</td>
<td>LED light up</td>
<td>SMS ‘b’</td>
</tr>
<tr>
<td>SMS ‘C’</td>
<td>Lamp 3 light up</td>
<td>LED light up</td>
<td>SMS ‘c’</td>
</tr>
<tr>
<td>SMS ‘D’</td>
<td>Other output on</td>
<td>LED light up</td>
<td>SMS ‘d’</td>
</tr>
</tbody>
</table>

Table 1: Result of system function

IV. Conclusion

This project focused on functioning of the global mobile system for home appliance control system by using Arduino and microcontroller to access the system easily. This GSM system is suitable for user that usually goes for travel and difficult to control their home or business premise appliance or to those who love the high home living style. The performance of smart appliance control is effective with commercial home or premise appliance control. The fabrication cost is less and the application use is simple.

References

An Analysis Of Waste Storage Space Capacity In Lumut Maritime Terminal (LMT)

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¹,² Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL- MIMET)

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I. INTRODUCTION

The unbelievable development in worldwide interchange has enormous consequences in the expansion of the ports and dispatching in Malaysia. In Malaysia, this has urged project and development of different foundations to boost the blast in its growing interchange with the world's countries. The improvement of the oceanic framework has substance profit from this exchange and assumption blast. It relies on the estimation that 95% of Malaysia’s international trade, the life-blood of its economy, is being carried through the oceans via its international seaports.

Waste management can be challenging for modern, business and institutional parts. Associations must deal with a wide grouping of materials, large volumes of waste, and practices of various customers, visitors, and understudies from inside and outside of the district. No action fitted the provisions of all institutional affiliations. Regardless, a key solid waste resource organization arranging strategy will describe solid plans. Integrated waste resource administration arranging enables associations to make a broad technique that can stay versatile in light of developing financial, social, material (items and packaging) and normal conditions.

Abstract- The research is to find out the relationship between the total waste storage space capacity towards several factors such as the area of departments, and total waste generated by cargoes and workers. The impacts of the event related to the development of the waste storage exist in port operations. The port terminal management uses these study results to make decisions and planning for the redevelopment or expansion of the terminal. The planning of optimal waste storage space capacity is a matter of great importance for sectors namely for a marine terminal and port areas where it is planned to offer a waste storage space to store waste before they are liable. With the optimal design plan, efficiency can be attained to reduce the amount of waste and also able to provide enough storage space at once do not result in operations could be affected and can cause of loss for the business parties. Hence, this study was conducted to look and analyze at the total waste storage space capacity to fulfill the demand of total waste generated. Besides that, this study also examined to determine the efficiency of waste storage space capacity in Lumut Maritime Terminal (LMT). Finally, the research also to determine the best solution to improve the efficiency of waste storage space to gain optimum amount of waste generated in port operations.
II. LITERATURE REVIEW

[1] Waste is defined as “a portable object that has been abandoned by the owner” and also as an “orderly disposal garbage.” [2] Waste management systems must remain flexible in light of changing economic, environmental and social conditions. [4-5] defines solid waste management as “the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste.” [4] The three R’s are commonly used terms in waste management; they stand for “reduce, reuse, and recycle.” As waste generation rates have risen, processing costs increased, and available landfill space decreased, the three R’s have become a central tenet in sustainable waste management efforts. [6] The reduction can be achieved through the reuse of products. Efforts to take action to reduce waste before waste is produced can also be termed recycling. Storage is where solid waste is stored before it is collected. It could be kept in a skip or dustbins and not thrown away indiscriminately. [7] Containers used for storing wastes will be well-suited with their contents and appropriate regarding volume and shape. [8] Containers should also be durable, easy to handle, economical as well as resistant to corrosion, weather conditions, and metals, and glass tips.

III. METHODOLOGY

The selection of the data process is based on the technical variables were performed by literature approach. Only qualitative variables were used in this research. Previous literature indicated several technical variables which were used as elements or factors to be considered in identified the capacity of waste storage is using in port. It is emphasized that each variable has its role in generating a waste storage capacity.

1.1 Simple linear regression

Simple linear regression may anticipate scores on one variable from the scores on a second variable. The variable is known as the foundation variable and alludes as Y. The forecast variable is known as the indicator variable and alludes as X. At the point when there is one and only indicator variable, the forecasting strategy is called basic relapse. In basic direct relapse, the theme of this area, the expectations of Y when plotted as a component of X frame a straight line. [9] The effectiveness of regression analysis is because of its well-defined mathematical approach as well as being able to explain the significance of each variable and their relationships between independent variables.

IV. DATA ANALYSIS

Analysis conducted by this research is based on two objectives, which is the first objective is to determine the waste storage space capacity provided at Lumut Maritime Terminal (LMT). The primary objective is to analyze the total waste generated from workers and cargoes by area of the department in Lumut Marine Terminal (LMT) and also to provide the recommendation for Lumut Maritime Terminal (LMT) to optimize waste storage space capacity in port operation. Through the analysis, it can assist in identifying the level of effectiveness that focused on waste storage in the LMT port.

Based on Table 4.1 and 4.2 below, it shows the total waste storage capacity used in LMT is 13870 kg and the numbers of workers in total are 71 persons, while the total area is 182196-meter square and the total waste generated are 1062 kg.
Table 4.1: Total waste generated and total area of every block

<table>
<thead>
<tr>
<th>Location / Block</th>
<th>Area (m²)</th>
<th>Total Waste Generated (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block A</td>
<td>14,500</td>
<td>83.7</td>
</tr>
<tr>
<td>Block B</td>
<td>14,500</td>
<td>123.6</td>
</tr>
<tr>
<td>Block C1</td>
<td>5,000</td>
<td>18.6</td>
</tr>
<tr>
<td>Block C2</td>
<td>5,000</td>
<td>15.8</td>
</tr>
<tr>
<td>Block D1</td>
<td>7,482</td>
<td>20.2</td>
</tr>
<tr>
<td>Block D2</td>
<td>5,940</td>
<td>59.3</td>
</tr>
<tr>
<td>Block E</td>
<td>21,420</td>
<td>204.1</td>
</tr>
<tr>
<td>Block F1</td>
<td>5,940</td>
<td>131</td>
</tr>
<tr>
<td>Block F2</td>
<td>5,940</td>
<td>130.5</td>
</tr>
<tr>
<td>Block F3</td>
<td>5,940</td>
<td>87.8</td>
</tr>
<tr>
<td>Block F4</td>
<td>2,640</td>
<td>17.5</td>
</tr>
<tr>
<td>Block F5</td>
<td>3,300</td>
<td>26.3</td>
</tr>
<tr>
<td>Block F6</td>
<td>5,500</td>
<td>87.8</td>
</tr>
<tr>
<td>Block F7</td>
<td>9,000</td>
<td>32.5</td>
</tr>
<tr>
<td>Block G</td>
<td>47,000</td>
<td>12.1</td>
</tr>
<tr>
<td>Block H</td>
<td>1,500</td>
<td>0</td>
</tr>
<tr>
<td>Shed 1</td>
<td>3600</td>
<td>1.6</td>
</tr>
<tr>
<td>Outer Shed 1</td>
<td>1674</td>
<td>1.6</td>
</tr>
<tr>
<td>Shed 2</td>
<td>1,575</td>
<td>1.6</td>
</tr>
<tr>
<td>Shed 3</td>
<td>8,100</td>
<td>2.4</td>
</tr>
<tr>
<td>Shed 4</td>
<td>1,200</td>
<td>1.6</td>
</tr>
<tr>
<td>Shed 5</td>
<td>5,445</td>
<td>2.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>182,196</td>
<td>1062</td>
</tr>
</tbody>
</table>
Table 4.1: Total waste generated and total area of every block

<table>
<thead>
<tr>
<th>Location / Block</th>
<th>No of Worker</th>
<th>Total Storage Capacities (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block A</td>
<td>5</td>
<td>850</td>
</tr>
<tr>
<td>Block B</td>
<td>5</td>
<td>850</td>
</tr>
<tr>
<td>Block C1</td>
<td>2</td>
<td>850</td>
</tr>
<tr>
<td>Block C2</td>
<td>2</td>
<td>850</td>
</tr>
<tr>
<td>Block D1</td>
<td>4</td>
<td>850</td>
</tr>
<tr>
<td>Block D2</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block E</td>
<td>6</td>
<td>850</td>
</tr>
<tr>
<td>Block F1</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block F2</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block F3</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block F4</td>
<td>2</td>
<td>850</td>
</tr>
<tr>
<td>Block F5</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block F6</td>
<td>3</td>
<td>850</td>
</tr>
<tr>
<td>Block F7</td>
<td>5</td>
<td>850</td>
</tr>
<tr>
<td>Block G</td>
<td>8</td>
<td>850</td>
</tr>
<tr>
<td>Block H</td>
<td>0</td>
<td>850</td>
</tr>
<tr>
<td>Shed 1</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Outer Shed 1</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Shed 2</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Shed 3</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>Shed 4</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Shed 5</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>TOTAL</td>
<td>71</td>
<td>13870</td>
</tr>
</tbody>
</table>
Since p-value of Shapiro-Wilk test for no. of the worker is 0.011 lesser than 0.05, the data are not normal, and the p-value for total waste storage capacities is 0.000 lesser than 0.05. Therefore, data of total waste storage capacities are not normal. The null hypothesis of this test is that the population is not normally distributed.

**Spearman correlation**

The value of R is 0.40282 there appears to be a weak positive correlation between the two variables and the two-tailed value of P is 0.06306 > 0.05. By normal standards, the association between the two variables would not be considered statistically significant relation. Spearman rank correlation coefficient or Spearman rho is a nonparametric measure of statistical dependence between two variables and it assesses how well the relationship between two variables can be described using a monotonic function.

The ANOVA test shows that there is not a significant regression since p-value is 0.3296 lower than 0.05. Prediction for the area of storage and the total of waste generated cannot be expressed since the regression analysis is not significant.

**4.2.1 Regression Analysis**

The ANOVA table shows that there is not a significant regression since p-Value is 0.3296 lower than 0.05. Prediction for the area of storage and the total of waste generated cannot be expressed since the regression analysis is not significant.

**V. CONCLUSION**

Waste management is crucial to reducing organization’s impact on the environment. It is also a fundamental requirement in achieving efficient cost savings and a better financial return for specific business. LMT must create a system that is more efficient and able to optimize the use of existing waste storage space so that the operation can be improved and more efficient. The existing facilities need to be improved so that the port can attract more customers, while it is also helping to increase the number of clients and gain more profit to the LMT.
The use of a waste storage should be organized more effectual to prevent loss to the store yard where the waste space is larger than the amount of cargo. Segregation of waste should be promoted at the waste generation source itself. Subsequently, there are polyclinics in this study area, threw medical wastes in municipal bins. It is the duty of the municipalities to act carefully on such polyclinics to prevent the special waste from being mixed with ordinary municipal solid waste.

**RECOMMENDATION**

In the context of the problems of solid waste management in the study area, following suggestions are made for proper waste management:

- **Equipment technology**: It involved a survey of the existence of any technical obstacles which would complicate the waste disposal in ports. In this study, no such technical challenges could be identified.

- **Types and amount of waste**: This work item concerned a review of type and quantities of waste generated on ships and of the type and capacity of port reception facilities. By this, information on what kind of waste and the amounts generated on ships and delivered to ports was obtained. Information on port reception facilities: This concerned increasing information on port receptions facilities and to make the information more accessible. It includes the assessment of port receptions facilities carried out and the outcome of it such as inadequacies and any technical co-operation assistance that may be needed. It also involved making waste management plans and detailed information of the port authority more easy to access.

LMT must create a dumping zones area for the cargo waste so they can optimize their waste storage per day. LMT should use the latest technologies of equipment to handle waste so the waste can be handled smoothly. The existing facilities need to be improved thus the port can store the waste effectively with up to date facilities. Instead of dumping the waste, they should recycle or sell the waste for business profits. It can be extended for future reference in optimization to Lumut Maritime Terminal (LMT).

**References**


Abstract- The research is to find out the relationship between the power consumption and distribution towards several factors such as number of workers and area of departments. The impacts of the event related to economic development of the power distributing exist in port operations. The port terminal management uses these study results to make decisions and planning for the redevelopment and/or expansion of the terminal. Commonly, a new port layout with new truck traffic and more cargo handling equipment is required to handle with the projected container throughput. It is important for the port to describe maximum electrical load demand and design the electrical infrastructure accordingly. Therefore, this study was conducted to look and analyze at the major factor that affects the power distribution and supply to fulfill the demand of electrical energy. Besides that, this study also examined to determine the efficiency of power distribution supply in Lumut Maritime Terminal (LMT). Finally, this study also to determine the best solution to improve the efficiency of power distribution to gain optimum electrical supply in port operations.

I. Introduction
Port is important for countries as the main gateway to massive import and export activities which are directly contributing to the economics of its country. Technological innovations are growing exponentially especially in the distribution systems for the purpose to look after ports. Through the use of the optimal design plan, effectiveness obtained are capable of reducing the cost and also able to handle well enough power supply. The planning of optimal power distribution is a matter of great importance for areas namely for a marine terminal and port areas where it is intended to provide an optimum energy to supply for the use of the port operations and others.

II. Literature review
[1] The regenerative energy issue of electrical powered cranes and suggested ways for utilizing this energy especially for automatic stacking cranes. [2] While the sea space can include significant topographical scope identified with the worldwide exchange, the area in identified with the port's district and territory. As terminals, ports handle the biggest measures of cargo, more than whatever other sorts of terminals consolidated. [3] Demand is a measure of average power consumption over a fixed time interval. Peak (or maximum) demand is the highest demand level recorded over the billing period. [4] The strategic importance of the Straits of Malacca for world trade and ASEAN security could hardly be overemphasized. [5] The tremendous growth of ports.
recorded over the billing period. [4] The strategic importance of the Straits of Malacca for world trade and ASEAN security could hardly be overemphasized. [5] The tremendous growth of ports and shipping activities in Malaysia over the years underlines the value of the maritime sector to its economic well-being and the importance of the seas to the lives of its people. Ports are purposes of union between two geological areas of cargo flow (now and again travelers), the area and sea spaces.

III. Methodology
The selection of the data process is based on the technical variables were performed by literature approach. Only qualitative variables were used in this research. Previous literature indicated several technical variables which were used as elements or factors to be considered in identified the capacity of storage is using in port. It is emphasized that each variable has its own role in generating a storage used capacity.

3.1 Simple linear regression
In simple linear regression, researchers anticipate scores on one variable from the scores on a second variable. The predicted variable is known as the foundation variable and alludes as Y. The constructed variable is forecasted and referred to as the indicator variable and alludes as X. At the point when there is one and only indicator variable, the forecasting strategy is called basic relapse. In basic direct relapse, the theme of this area, the expectations of Y when plotted as a component of X frame a straight line. [6] The effectiveness of regression analysis is because of its well-defined mathematical approach as well as being able to explain the significance of each variable and their relationships between independent variables.

IV. Data analysis
Analysis conducted by this research is based on two objectives, which is the first objective is to determine the power consumption by area of department and number of workers in Lumut Maritime Terminal (LMT). The primary purpose is to analyze the relationship between the power distribution and consumption per day towards a number of employees and area of departments. Lumut Maritime Terminal (LMT) storage area and the recommendation for Lumut Maritime Terminal (LMT) to optimize power distribution in port operation. Through the analysis, it can assist in identifying the level of effectiveness that focused on power distribution in the LMT port.

Based on Table 4.0 and 4.1 below, it shows the total area of power distribution departments in LMT is 59794-meter square, and total number of workers is 86 people.

<table>
<thead>
<tr>
<th>Power Distribution Area</th>
<th>Workers</th>
<th>Power consumption (kWh) /per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shed 1</td>
<td>2</td>
<td>299</td>
</tr>
<tr>
<td>Outer Shed 1</td>
<td>2</td>
<td>85</td>
</tr>
<tr>
<td>Shed 2</td>
<td>2</td>
<td>296</td>
</tr>
<tr>
<td>Shed 3</td>
<td>3</td>
<td>295</td>
</tr>
<tr>
<td>Shed 4</td>
<td>2</td>
<td>294</td>
</tr>
<tr>
<td>Shed 5</td>
<td>3</td>
<td>344</td>
</tr>
<tr>
<td>Administrative office</td>
<td>15</td>
<td>225</td>
</tr>
<tr>
<td>Workshop</td>
<td>20</td>
<td>206</td>
</tr>
<tr>
<td>Guard post</td>
<td>2</td>
<td>145</td>
</tr>
<tr>
<td>Canteen</td>
<td>5</td>
<td>90</td>
</tr>
<tr>
<td>Wharf 1</td>
<td>10</td>
<td>548</td>
</tr>
<tr>
<td>Wharf 2</td>
<td>5</td>
<td>254</td>
</tr>
<tr>
<td>Wharf 3</td>
<td>5</td>
<td>254</td>
</tr>
<tr>
<td>Wharf Office</td>
<td>8</td>
<td>125</td>
</tr>
<tr>
<td>Tank</td>
<td>2</td>
<td>500</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>3960</td>
</tr>
</tbody>
</table>
Table 4.1: The area of department and power consumption per day.

<table>
<thead>
<tr>
<th>Power Distribution Area</th>
<th>Department area (m²)</th>
<th>Power consumption (kWh)/per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shed 1</td>
<td>3,600</td>
<td>299</td>
</tr>
<tr>
<td>Outer Shed 1</td>
<td>1,674</td>
<td>85</td>
</tr>
<tr>
<td>Shed 2</td>
<td>1,575</td>
<td>296</td>
</tr>
<tr>
<td>Shed 3</td>
<td>8,100</td>
<td>295</td>
</tr>
<tr>
<td>Shed 4</td>
<td>1,200</td>
<td>294</td>
</tr>
<tr>
<td>Shed 5</td>
<td>5,445</td>
<td>344</td>
</tr>
<tr>
<td>Administrative office</td>
<td>1500</td>
<td>225</td>
</tr>
<tr>
<td>Workshop</td>
<td>800</td>
<td>206</td>
</tr>
<tr>
<td>Guard post</td>
<td>600</td>
<td>145</td>
</tr>
<tr>
<td>Canteen</td>
<td>400</td>
<td>90</td>
</tr>
<tr>
<td>Wharf 1</td>
<td>8500</td>
<td>548</td>
</tr>
<tr>
<td>Wharf 2</td>
<td>8500</td>
<td>254</td>
</tr>
<tr>
<td>Wharf 3</td>
<td>8500</td>
<td>254</td>
</tr>
<tr>
<td>Wharf Office</td>
<td>400</td>
<td>125</td>
</tr>
<tr>
<td>Tank</td>
<td>9000</td>
<td>500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59,794</strong></td>
<td><strong>3960</strong></td>
</tr>
</tbody>
</table>

Based on the data collected, the current total power consumption per day in port operations is 3960 kWh per day, which consist of power distribution in shed areas, wharf areas and port operation area. Some of the equipment that operates at the port are a crane, conveyor, and utilities such as ventilation fan and lamp light.

4.1 Power consumption towards area of the departments

Figure 4.1: Area of departments versus consumption power consumption per day.

Since the p-value of Shapiro-Wilk test for the area of departments is 0.003 lesser than 0.05, the data are not normal, and the p-value for the power consumption is 0.119 more than 0.05. Therefore, the power consumption is normal.

4.1.1 Spearman rank correlation

The value of R is 0.6948 there appears to be average or medium positive correlation between the two variables and the two-tailed value of P is 0.00404 < 0.05. By normal standards, the association between the two variables would be considered statistically significant relation. [7] Spearman rank correlation coefficient, or Spearman rho is a nonparametric measure of statistical dependence between two variables and it assesses how well the relationship between two variables can be described using a monotonic function.

The ANOVA shows that there is a significant regression since p-value is 0.00347 lower than 0.05 constant (<0.005). It indicates that relationship between the area of department versus power consumption is significant.
4.2 Power consumption per day towards number of workers

Figure 4.2: Number of employees versus power consumption per day.

Since the p-value of Shapiro-Wilk test for a total of workers is 0.001 lesser than 0.05, the data are not normal and the p-Value for power consumption per day is 0.199 more than 0.05. Therefore, data of power consumption are normal.

4.2.1 Spearman correlation

Through normality test, the use of methods test between Spearman rank correlation and Pearson correlation can determine based on the results. If the variable results are normal, then the Pearson correlation will be used to support the normality test results. The value of R is 0.6948 there appears to be a very weak correlation between the two-tailed value of P is 0.5167 >0.05. By normal standards, the association between the two variables would not be considered statistically significant.

The ANOVA table shows that there is not a significant regression since p-Value is 0.838 greater than 0.05. Prediction for no of workers and the power consumption cannot be expressed since the regression analysis is not significant.

V. Conclusion

Based on the result, the result shows that LMT used the power supply close to the optimum by departments area. However, LMT still needs to improve the distribution area of the power supply. The data for total number of workers toward power consumption is not significant. This due to collection of the data only based on an interview with LMT’s person in charge for operational usage. The data for department’s area toward power consumption is significant. The power distribution area in LMT is fully utilized as LMT focus on certain departments for operational usage.

Recommendation

Notes have been made throughout the study on how to further improve the used of storage space or the storage operation management at Lumut Maritime Terminal (LMT). The other elements need to be issued and addressed to improve the power distribution and consumption are LMT should use the latest technologies of equipment that use minimum power kWh. It will indicate reducing power consumption lower the operational cost. New tools should be developed to facilitate the examination of energy and material flows and potential synergies between different factors. It is important to develop a resource efficiency monitoring and reporting system to meet the needs of ports.

LMT must create a schedule of power distribution operations per day that helps to find which departments area that needs to focus on optimizing their power consumption per day. In additional, this can be extended for future reference in optimization to Lumut Maritime Terminal (LMT).
Acknowledgements
First and foremost, all praise is to Allah, the Almighty, the Benevolent for His blessings and guidance for giving us the inspiration to embark on this research and instilling in us the strength for the completion of this research which had successfully become a reality. We would like to express our gratitude to all who have contributed one way or another to the making and completion of this Final Year Project. We would also like to extend our appreciation to Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology (MIMET) for providing us with the facilities which are vital to the completion of this Final Year Project.

References
Abstract- Ports and transporting are perceived as vital patrons in encouraging Malaysia's exchange, thus critical to its monetary success. Given this, it is fitting that Malaysia, a country encompassed by an ocean zone much bigger than its property mass, is recognized as the main sea country. The scope of this study is only focused on the use of the industry in Malaysia, which is it more specific about the optimal storage of capacity in use of the port terminal. This study will also focus on the need or appropriateness of a storage area to meet the requirements of a port terminal.

I. Introduction
In Malaysia, ports have developed past spots where ships stack and empty cargoes and travelers. The nation's ports have expected a basic part in the general example of exchange and transport, giving a connection between the transportation administration and the inland transport framework. The planning of optimal storage capacity is a matter of great importance for areas namely for a marine terminal and port areas where it is intended to provide storage to supply for the use of the business purpose and others.

Through the utilization of the optimal design plan, effectiveness obtained are capable of reducing the cost and also able to handle well enough storage space capacity. Port operations in Malaysia, just like the case around the world, have gone into a period of advanced improvement with computerization of holder terminal operations. There are dynamic and progressive changes that are occurring in the different parts of compartment sizes, ship sizes, equipment’s, between modular transport, IT, information trade and correspondence.

II. Literature review
[1] The tremendous growth of ports and shipping activities in Malaysia over the years underlines the value of the maritime sector to its economic well-being and the importance of the seas to the lives of its people. Ports are purposes of union between two geological areas of cargo flow (now and again travelers), the area and sea spaces. [2] While the sea space can include significant topographical scope identified with the global exchange, the area in identified with the port's district and territory. As terminals, ports handle the biggest measures of cargo, more than whatever other sorts of terminals consolidated. [3] To handle this cargo, port bases together need to suit transhipment exercises both on boats and inland and subsequently encourage union between area transports and oceanic’s frameworks. [4] The strategic importance of the Straits of Malacca for world trade and ASEAN security could hardly be over-emphasized. [5] The Straits are not only rich
in marine resources but are one of the oldest and busiest shipping lanes in the world.

III. Methodology

The selection of the data process is based on the technical variables were performed by literature approach. Only qualitative variables were used in this research. Previous literature indicated several technical variables which were used as elements or factors to be considered in identified the capacity of storage is using in port. It is emphasized that each variable has its role in generating a storage used capacity.

3.1 Simple linear regression

In simple linear regression, researchers anticipate scores on one variable from the scores on a second variable. The predicted variable is known as the foundation variable and alludes as Y. The constructed variable is forecasted and referred to as the indicator variable and alludes as X. At the point when there is one and only indicator variable, the forecasting strategy is called basic relapse. In basic direct relapse, the theme of this area, the expectations of Y when plotted as a component of X frame a straight line. [6] The effectiveness of regression analysis is because of its well-defined mathematical approach as well as being able to explain the significance of each variable and their relationships between independent variables.

IV. Data analysis

Analysis conducted by this research is based on three objectives, which is the first objective is to identify the ability of the storage capacity at LMT, and it is followed with the second objective which is to determine the capacity in used by the types of the cargo. The main purpose is to analyze the relationship between the storage space capacity area and the total usage of the Lumut Maritime Terminal (LMT) storage area and the recommendation for Lumut Maritime Terminal (LMT) to optimize storage space capacity usage.

Based on Table 4.0 and 4.1 below, it shows the total area of open yard storage in LMT is 160,602 meter square and for covered storage yard in total 21,594-meter square. It represents about 88% of the storage areas are open storage yard, and only 12% of the storage areas are covered storage yard.

Table 4.0 Covered yard storage

<table>
<thead>
<tr>
<th>Location / Block</th>
<th>m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shed 1</td>
<td>3,600</td>
</tr>
<tr>
<td>Outer Shed 1</td>
<td>1,674</td>
</tr>
<tr>
<td>Shed 2</td>
<td>1,575</td>
</tr>
<tr>
<td>Shed 3</td>
<td>8,100</td>
</tr>
<tr>
<td>Shed 4</td>
<td>1,200</td>
</tr>
<tr>
<td>Shed 5</td>
<td>5,445</td>
</tr>
<tr>
<td><strong>Total (m²)</strong></td>
<td><strong>21,594</strong></td>
</tr>
</tbody>
</table>

Table 4.1 Open yard storage

<table>
<thead>
<tr>
<th>Location / Block</th>
<th>m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block A</td>
<td>14,500</td>
</tr>
<tr>
<td>Block B</td>
<td>14,500</td>
</tr>
<tr>
<td>Block C1</td>
<td>5,000</td>
</tr>
<tr>
<td>Block C2</td>
<td>5,000</td>
</tr>
<tr>
<td>Block D1</td>
<td>7,482</td>
</tr>
<tr>
<td>Block D2</td>
<td>5,940</td>
</tr>
<tr>
<td>Block E</td>
<td>21,420</td>
</tr>
<tr>
<td>Block F1</td>
<td>5,940</td>
</tr>
<tr>
<td>Block F2</td>
<td>5,940</td>
</tr>
<tr>
<td>Block F3</td>
<td>2,640</td>
</tr>
<tr>
<td>Block F4</td>
<td>3,300</td>
</tr>
<tr>
<td>Block F5</td>
<td>5,500</td>
</tr>
<tr>
<td>Block F6</td>
<td>9,000</td>
</tr>
<tr>
<td>Block G</td>
<td>47,000</td>
</tr>
<tr>
<td>Block H</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Total (m²)</strong></td>
<td><strong>160,602</strong></td>
</tr>
</tbody>
</table>

The Table 4.1 shows the most efficient use of storage space with using a maximum load of cargo is in the area of block E for open yard storage and shed 3 for covered yard storage.
Open yard storage analysis

Since the p-value of Shapiro-Wilk test for the area of storage is 0.000 lesser than 0.05, the data are not normal, and the p-value for total cargo tonnage is 0.088 more than 0.05. Therefore, data of total tonnage are normal. The null hypothesis of this test is that the population is normally distributed. Thus if the p-value is less than the chosen alpha level, then the null hypothesis is rejected, and there is evidence that the data tested are not from a normally distributed population.

4.1.1 Spearman correlation

The value of R is 0.41934 represents to be a weak positive correlation between the two variables and the two-tailed value of P is 0.10591 > 0.05. By normal standards, the association between the two variables would not be considered statistically significant relation.

Table 4.2: Spearman correlation for open yard storage

<table>
<thead>
<tr>
<th>Area of Storage (m²)</th>
<th>Spearman Correlation (r)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.419</td>
<td>0.106</td>
</tr>
</tbody>
</table>

The ANOVA results show, there is not a significant regression since p-value is 0.7796 greater than 0.05. Prediction for the area of storage and the total of cargo tonnage cannot be expressed since the regression analysis is not significant.

4.2 Covered yard storage

Since the p-value of Shapiro-Wilk test for the area of storage is 0.229 and 0.737 respectively more than 0.05. Therefore, data of area storage and a total of tonnage are normally distributed.

4.2.1 Pearson correlation

Through normality test, the use of methods test between Spearman correlation and Pearson correlation can determine based on the results. If the variable results are normal, then the Pearson correlation will be used to support the normality test results.
The correlation coefficient \( r \) is 0.533 shows that there is a relationship between a total of storage space and the total of cargo tonnage. However, the relationship is medium. However, the p-value is 0.276425 > 0.05 it is no significant relation between the number of storage area and the total cargo tonnage.

Table 4.3: Pearson correlation for covered yard storage

<table>
<thead>
<tr>
<th>Area of Storage (m²)</th>
<th>Total Usage in Tonnage (MT)</th>
<th>Pearson Correlation (r)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.533</td>
<td>0.276</td>
</tr>
</tbody>
</table>

The ANOVA results for covered storage yard shows that there is not a significant regression since p-value is 0.3219 greater than 0.05. Prediction for the area of storage and the total of cargo tonnage cannot be expressed since the regression analysis is not significant.

V. Conclusion

Based on the result, most of the data is not significant. So, it can be the data collected are not from the actual accurate data because the data are collected only a quarter of the year 2016. By the results of the linear regression, it shows the storage yard are not entirely utilized according to the ability of the storage area and leave a lot of empty space. The imbalance in use of the storage space it shows there is inefficiency with the operations management.

Recommendation

Notes have been made throughout the study on how to further improve the used of storage space or the storage operation management at Lumut Maritime Terminal (LMT).

Firstly, LMT must create a system that is more efficient and able to optimize the use of existing storage space so that the operation can be improved by more effective. Secondly, the existing facilities need to be improved so that the port can attract more customers, while it is also helping to increase the number of clients and gain more profit to the LMT. Furthermore, the use of a store should be organized more effectively to prevent loss to the store yard where free space is larger than the amount of cargo. In additional, this can be extended for future reference in optimization to Lumut Maritime Terminal (LMT).

Acknowledgements

First and foremost, all praise is to Allah, the Almighty, the Benevolent for His blessings and guidance for giving us the inspiration to embark on this research and installing in us the strength for the completion of this research which had successfully become a reality. We would like to express our gratitude to all who have contributed one way or another to the making and completion of this Final Year Project. We would also like to extend our appreciation to Universiti Kuala Lumpur, Malaysian Institute of Marine Engineering Technology (MIMET) for providing us with the facilities which are vital to the completion of this Final Year Project.
References


Development of Wave-Wake Monitoring System

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\textsuperscript{a}Department of Marine Electrical and Electronics
Malaysian Institute Marine Engineering Technology (MIMET), Universiti Kuala Lumpur

\textit{Abstract-} Wave wake is a water pattern generated by boat when its pass through water surface. This wave can be classified based on the characteristics. Increasing of boating activities at coastal and local waterways areas has increased concerns on their impact. Characteristics of wave wake height altered when the boat specification change has been adopted as input for this development. This paper describes the development of waterway monitoring system to differentiate various types of boat crossing using wave wake signals. A monitoring system that performs boat classification using the characteristics analysis of wave wake signals is presented. The Matlab software and wave wake waveforms characteristics were used in the implementation of type of boat detection.

I. INTRODUCTION
Wave is water particles that move up and down from one place to another place carrying energy with it [1]. Beside carrying energy, wave also produced acceleration that give impact to the shore. Wave wake contribute to the erosion of the banks and sedimentation problems. Its caused river begins to shallow and weaker [2][3]. Different boat specification such as speed and hull structure generate different type of wave wake characteristic [4][5]. Therefore, it is important to develop method to reduce damage on seashore environment. The analysis of wave wake signal can distinguish between the different in wave wake characteristics. It is important to understand the characteristic of wave wake signal in order to determine generation on wave wake from various specification of boats. Lastly, development of wave wake monitoring system is created by using guide user interface (GUI) in Matlab programming tools. This system ease user to monitor wave wake detection from different type of boats.

II. METHODOLOGY
A. Experimental Setup
In this project, data recording was performed at Jetty Kampung Baharu, Manjung River, Lumut, Perak with coordinates (4.294232 N, 100.668335 E). HOBO U20 9 m depth water level data logger has been used to record the wave height with sampling rate 60Hz, water temperature and time interval of each generated wave.

Fig. 1 shows the data collection layout during recording session. The water level logger was tight together with Polyvinyl chloride (PVC) pipe to make it more stable under water before it been deployed at jetty post. Two sets of water level logger has been used in this recording session and distance between each water level loggers, D, is 5.7 m. The water level logger was tight together with Polyvinyl chloride (PVC) pipe to make it more stable under water before it been deployed at jetty post. Two sets of water level logger has been used in this recording session and distance between each water level loggers, D, is 5.7 m. In this experiment, distance between boat and water level logger, d, is 10 meter and length distance for boat travelling, L, is 50 m.

Proceeding of the Marine Application & Technology Conference 2016 Lumut, Perak.
Two selected boats with different speed and hull structures are used. The first boat has 2.13 m breadth with 6.40 m length and the second boat has 3.04 m breadth and 8.53 m length as shown in Fig. 2. Repeating test has performed which at the first round, both boats crosses 5 times each at 10 knot or higher. Then, for second round both boats crosses another 5 times each with speed below than 10 knot. Distance between boat crossing line and water level logger is fixed by using Global Positioning System (GPS) to 10 m for each testing.

Fig. 1 Data collection layout

Fig. 2 Selected boat: (a) Boat with 2.13 m breadth and 6.4 m length, and (b) Boat with 3.14 m breadth with 8.53 m length.
During data collection, all activities are recorded using video and manual log such as time of boat crossing the water level logger and time of wave wake arrived at logger. All this information has been used as verification purpose during data processing.

B. Feature Extraction

In our wave wake monitoring system, type of boat crossing identification are using fractal dimension (FD) feature. In this paper, Katz’s algorithms is used to calculate FD features from wave height data. The idea of Katz’s algorithms is as follows.

Katz's algorithm which is introduced by Michael J. Katz [6]–[8]. In this algorithm, the FD of a curve is defined as

\[
D = \frac{\log_{10}(L)}{\log_{10}(d)}
\]

(1)

where 

\[ L = \text{Total length of the curve or sum of distances between successive points,} \]
\[ d = \text{Maximum distance between the first point of the sequence to the point of the sequence that provides the farthest distance.} \]

Thus, \( d \) can be expressed as

\[
d = \max(\text{distance}(1, i))
\]

(2)

The distance between each point of the sequence and the first, point \( i \) is the one that maximizes the distance with respect to the first point. Then, FD compares the actual number of units that make a curve with the minimum number of units required to reproduce a pattern of the same spatial extent [8], [9].

The computed FDs using this this method depend upon the measurement units used in which the FDs will vary according to the units used. However Katz's algorithm solves this problem by creating a general unit or yardstick.
that is the average step or average distance between successive points, $a$. Normalizing distances in equation (1) results the following FD represented by (3):

$$D = \frac{\log_{10}(L/a)}{\log_{10}(d/a)} \tag{3}$$

If $n$ is defined as the number of steps in the curve, then $n = L/a$, and therefore, (3) can be re-written as

$$D = \frac{\log_{10}(n)}{\log_{10}(d/L) + \log_{10}(n)} \tag{4}$$

In which (4) summarizes the Katz’s approach to calculate the FD of a waveform.

### C. Classification Methods

In this study, the authors used threshold to classify type of boat crossing. As shown in Table 1, five level wave wake signals state has been identified: (i) no boat crossing, (ii) boat with 6.4m length and speed less than 10 knots, (iii) boat with 6.4m length and speed more than 10 knots, (iv) boat with 8.52m length and speed less than 10 knots, (v) boat with 8.52m length and speed more than 10 knots, and (vi) unknown boat crossing. And their respective FD ranges are: (i) FD less than 1.00002, (ii) FD between 1.00002 to 1.00003, (iii) FD between 1.00003 to 1.000045, (iv) FD between 1.000045 to 1.000055, (v) FD between 1.000055 to 1.000095, and (vi) FD more than 1.000095.

<table>
<thead>
<tr>
<th>Boat Length (m)</th>
<th>Boat Speed</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>$FD &lt; 1.00002$</td>
</tr>
<tr>
<td>6.40</td>
<td>less than 10 knot</td>
<td>$1.00002 \leq FD \leq 1.00003$</td>
</tr>
<tr>
<td>6.40</td>
<td>more than 10 knot</td>
<td>$1.00003 \leq FD \leq 1.000045$</td>
</tr>
<tr>
<td>8.52</td>
<td>less than 10 knot</td>
<td>$1.000045 \leq FD \leq 1.000055$</td>
</tr>
<tr>
<td>8.52</td>
<td>more than 10 knot</td>
<td>$1.000055 \leq FD \leq 1.000095$</td>
</tr>
<tr>
<td>unknown</td>
<td>unknown</td>
<td>$FD &gt; 1.000095$</td>
</tr>
</tbody>
</table>

### III. DEVELOPMENT OF MONITORING SYSTEM

Wave wake monitoring system is created by using guide user interface (GUI) in Matlab programming tools. This system ease user to monitor recorded wave wake signals generated from different type of boats. The flowchart of developed monitoring system is shown in Fig. 3. The window interface of main program is shown in Fig. 4 consist an overview on wave, wave wake, wave effect and developer detail and contact. Upon starting this program, user needs to import wave wake data by pressing ‘IMPORT WAVE WAKE DATA’ button as shown in window interface in Fig. 5(a) and Fig. 5(b) will pop-up to get confirmation on load data. Later this system has option to zoom and select specific range of data. This option availability will be alert by message box as shown in Fig. 5(c) and Fig. 5(d). Data can be selected from wave wake signal plot graph as shown in Fig. 6(a). Once data already selected, time range will be display. Then user also required entering the sampling rate for selected data used. Pressing the ‘ANALYSE DATA’ button will trigger the analysis and the software will prompt the result of the wave wake signal analysis in term of different type of boat crossing. Imported wave wake signal, selected range wave wake, feature extraction and observation detection graph has been plotted again time as analysis
result as shown in Fig. 6(b). Besides that, user also have an option to identified type of boat crossing for selection imported data range by pressing “WHICH BOAT” button and the result will be pop-up as shown in Fig. 7.

Fig. 4: Main menu wave wake monitoring system.

Fig. 5: Window interface (a) Wave Wake Monitoring System, (b) Load Data Confirmation, (c) Zoom In/Out, and (d) Time Selection

Fig. 6: Window interface after done analysis.

Fig. 7: Result of boat crossing type for selection current selection data.
IV. CONCLUSION

Development monitoring system to ease user to monitor wave wake by import wave data collected. Type of boat and time boat crossing will be display on wave monitoring system for user information. Therefore, this can give added information for any agencies to reduce erosion near the seashore i.e. Oceanography agency. For further research, this project can focus to the wave wake generation at different areas that have different water way structure such as depth and type of water.

ACKNOWLEDGMENT

The authors would like to thank Universiti Kualalumpur (UNIKL) and Majlis Amanah Rakyat for providing the financial support under the STRG code of str14018. This project has been approved by UNIKL MIMET. Deepest thanks to, Madam Fatimah Abdul Hamid and Madam Norazlina Abdul Nasir as our main supervisor for excellent guidance, caring, patience, and providing us with an excellent atmosphere for doing our final year project and also to lecturers and technician of UNIKL MIMET.

REFERENCES


Customer Satisfaction on Luggage Handling Practice at Jetty in Peninsular Malaysia: A Case Study of Kuah Jetty

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Abstract- This study analyses the needs of luggage handling system for passenger ferries at both Kuala Perlis and Pulau Langkawi jetty. Both Kuala Perlis and Pulau Langkawi jetties currently adopt a conventional luggage handling system where passengers have to carry their own luggage or rent trolley to convey their possession from jetty to ferry checkpoint. The current practice is less reliable, time consuming and seems to burden ferry passengers. This study aims to identify a need, from customers’ view, to implement a new luggage handling system at the respective jetties. The new system would consist of the conveyor layout (from jetty to ferry), conveyor types and system, techno-economic aspects which will benefit both the passengers and ferry operators. A set of questionnaires was developed based on American Customer Satisfaction Index (ACSI) model which comprises Customer Expectation (CE), Perceived Quality (PQ) and Perceived Value (PV) as drivers of Customer Satisfaction (CS). The survey is distributed to a total number of 150 respondents who patronise the Kuah (Pulau Langkawi) and Kuala Perlis jetty. The data is analysed by using Statistical Package for Social Sciences (SPSS). The results indicate that there is a need for a new luggage handling system at the jetty.

I. INTRODUCTION

Baggage handling is one of services available at a jetty. It is corresponding to baggage handling on board ferry vessel. A systematic baggage handling management is very important as it give major impact on customer satisfaction. Baggage handling services at jetty involve loading and unloading of passengers’ luggage into and out of the vessel. Baggage handling system can be categorized into two, namely conventional and automated baggage handling system. Conventional involves a lot of labour works while an automated baggage handling system mostly uses conveyor belt to move passengers’ luggage while loading and unloading processes.

A modern automated baggage handling system is proven to be more effective in managing passengers’ luggage. It is dominantly used at airports for its accurate and efficient services and reduces baggage lost and damage. However, based on on-site observations and survey, this system is not very popular at sea jetty and terminal. Furthermore, Ferry and jetty operators prefer to implement conventional baggage handling system for its cheaper cost. Some expressed concerns that conveyor belt system might be inflexible and non-user friendly.

In addressing the above issues, the research was carried out with the following objectives:

I. To examine the relationship between luggage handling practice in jetty and customer satisfaction.
II. To prove whether there is a need to implement a new luggage handling system at Kuala Kuah and Kuala Perlis Jetty.
III. To propose a luggage handling system (conveyor system) inclusive of its techno-economic aspects that can benefit both passengers and ferry operators.

Thus, this paper will investigate customer satisfaction towards current baggage handling practices at the specific jetty and propose whether there is a need to implement a new modern baggage handling system at the respective jetties.

II. LITERATURE REVIEW

A. Key Terms

Ferry transportation: Ferry is a type of ship which used to transit passengers, vehicles and sometime cargoes across a body of water. Ferry transportation service is part of public transport system that usually provided at many waterside cities and islands allowing direct transit between points when bridges or tunnel are not available (Temba, 2012).

Customer satisfaction: In general, satisfaction is a person’s feeling of pleasure or disappointment resulting from comparing a product’s perceived performance in relation to his or her expectations (Kotler & Armstrong, 1991).

Baggage handling: Baggage handling is an act of handling luggage, baggage or passengers’ possession in package form at public transportation place. The term is often associated with the activities of handling passengers’ baggage and luggage at the airport by luggage handler. Collins-dictionary.com (2015) defines baggage handling as the work of dealing with and sorting passengers’ baggage at an airport. However, the term is not necessarily used only at the airport since the term is widely used in various type of transportation system.

B. Customer Satisfaction and Customer Loyalty

In nowadays business practices, customer satisfaction has been considered as one of the key elements to nurture customer loyalty to a product/service and/or a provider, which in turn affects a firm’s profitability and economic performance (Tsoukatos & Koulentaki, 2013). It is agreed by both management practitioners and academics that customer satisfaction is the backbone of the success of an organization. Conducting a research on customer satisfaction, while consume monies and lot of effort is very important to retain existing customers in an organization. It is widely understood that it is far less costly to keep existing customers than it is to wind new ones (Budiono, 2009). It was also assured by many that measuring and analysing customer satisfaction can help a business not only by keeping its customers, but provide valuable insights into how to attract new customers.

In general, customer satisfaction depends on the product’s perceived performance relative to a buyer’s expectations. If the performance falls short, the customers will probably feel dissatisfied with the products or services. In other hand, if the product or service performance matches or exceeds the customer’s expectation, customer will be satisfied or maybe delighted with what he or she had received (Kotler & Armstrong, 1991).

Another group of scholars believe that satisfaction of customers may develop not only because of single experience, but can be result of a series of various experiences (Ali, 2015). It is further supported by Hu et al. (2009) who define customer satisfaction as “a cognitive or affective reaction that emerges in response to a single or prolonged set of service encounters”. Similarly, Tsoukatos & Koulentaki (2013) suggested that repeated instances of transaction-specific satisfaction lead to overall satisfaction which in turn leads to loyalty.

Satisfied customers can bring lot of other advantages for the services providers as a ripple effect including loyalty to service provider, engagement in positive word-of-mouth promotion and paying premium prices (Ali, 2015). They might also turn into loyal customers. The latter can be defined as customers who are willing to purchase product or service from the same busi-
ness repeatedly regardless of type of product and its price. They also said to be bounded by the satisfied feeling that they had earlier while consuming product/service to the extent that they are neglecting product produced by other firms. Tsoukatos & Koulentaki (2013) appointed that in the early marketing studies, customer loyalty was approached under a primarily behavioural perspective with the frequency and regularity of repeat purchases as the main indicator towards service/product provider by only considering a single brand/service and not seeking for information on other brands and services.

By having loyal customers, business can enjoy a lot of benefits. For instance, a loyal customer can be assumed as a fixed deposit to a company and it is a lot easier to predict or to do revenue forecasting with the availability of loyal customers. Besides, having loyal customers can be counted as bless to a company. This group of customer could help company’s marketing effort by engaging their relatives and acquaintance by word-of-mouth promotion and on top of that it is quite effective. This is supported by Tsoukatos & Koulentaki (2013) which highlighted that customer loyalty is usually associated with increased sales, lowering customer cost, generating predictable income and profit patterns.

C. Customer Satisfaction and Service Quality

Customer satisfaction and service quality is closely related with each other. A gradual improvement of quality in service is proven succeeded to satisfy consumers. Eboli and Mazulla (2007) make a clear presentation on how an improvement of the supplied service quality can satisfy the consumer and attract further user in public transportation. They explore the relationship between global customer satisfaction and service quality attributes, based on needs and expectations expressed by the consumer of public transportation in urban area of Cosenza and manage to prove that the increase in service quality give positive impact on consumer satisfaction. In addition, Transportation Research Board (1999) similarly recalled that traditionally literature of customers’ satisfaction defined service quality as a measure of how well the service level delivered matches customer expectations.

D. Customer satisfaction in public transportation

Public transportation is an option provided by the government or public authorities as an alternative to reduce traffic congestion. It is also a mean to reduce the threat of high consumption of non-renewable resource by private motorization towards the quality of environment. Sometimes, public transportation system like ferry is provided to help the citizen crossing an area that cannot be done by using normal means of transportation. However, public transportations are often associated with passengers’ or travellers’ dissatisfaction. It is said that customers evaluate public transport based on certain aspects such as reliability, frequency, travel time and fare level, comfort and cleanliness, network coverage/ distance to stop and safety (Friman & Fellesson, 2009) and this aspects are usually not fulfilled in accordance to the user’s requirement by the service provider.

III. METHODOLOGY

A. ACSI Model

This study adopts American Customer Satisfaction Index (ACSI) model to measure customers’ satisfaction with service quality of baggage handling practices at Kuala Kuah Jetty. This model was first used as an alternative to indicate the satisfaction of consumer across United States economy. It was later then adopted by researchers as a mean to measure customers’ satisfaction on various field including in service providing sector. Angelova and Zekiri (2011) developed a structured questionnaire based on ACSI model to determine customers’ satisfaction with service quality delivery in the Macedonian mobile telecommunication market [7].
Table-1. ACSI model developed by Angelova and Zekiri (2011)

IV. DATA COLLECTION

Data and information were collected via distribution of questionnaire, personal interview and observation. A set of questionnaire was developed based on ACSI model. A total number of 150 respondents were randomly chosen in the survey conducted in Kuah and Kuala Perlis Jetty.

A. Analysis of Service Quality

In order to have a better picture of the data collected, a set of table which consists of mean and standard deviation for every question in service quality section has been constructed. Mean value from the table above shows the average level of passengers’ evaluation. The average mean value for Customer Expectation indicates that passengers have a high expectation towards the luggage handling service at the jetty; they expect smooth procedures, effective luggage handling service and kind staff (see Table 2 below).

Table-2. Analysis of service quality

The jetty operator was successful in pleasing their customers in term of quality as the average mean value for Perceived Quality indicates that the passengers were pleased with the services provided by the jetty operator. The same goes to the Perceived Value as the average mean also shows that most passengers felt that they had received services commensurate to price that they had paid. However, the mean value of SC7 (5.9) reveals that the passengers were not sure if they were comfortable of the current luggage handling system.

The average mean value of Customer Satisfaction demonstrates that most passengers were satisfied with the current luggage handling system. The standard deviation in the table above measures the dispersion of the data set collected. A small standard deviation means that the values in statistical data set are close to the mean of the data set, while an average or large standard deviation shows that the values in the data set are farther away from the mean or average value.
V. ANALYSIS OF CUSTOMERS’ SATISFACTION AND NEEDS FOR NEW LUGGAGE HANDLING SYSTEM

The analysis found that 35% of the passengers were satisfied with the current luggage handling practices by the operator. This in fact is different from what has been expected by the researcher. From researcher’s observation this might happen due to the fact that the survey was conducted on a low season where the number of tourist was not at its peak level and the jetty was not crowded as it is on a peak season. However, the findings from the service quality section previously reveal that the passengers were not sure if they were comfortable with the current luggage handling system. As a result, in this section, even though the majority were satisfied with current luggage handling system, the survey suggested a need to implement new luggage handling system at Kuala Kuah jetty.

As anticipated from the survey, majority of passengers looked forward to the implementation of a new luggage handling system. About 88% of the passengers suggested that the operator should transform their luggage handling practices due to various reasons.

The 150 respondents who participated in the study were asked on the idea of baggage handling system and its proposed additional costs at the jetties. 61% of them agreed with the idea. Furthermore, 44% of them also agreed with the additional cost of RM 3.00 per person.

CONCLUSION

Even though at the moment it seems like the operator has been successful at satisfying their customers, the company has to strive for better service. This study has proven that there is actually a need to transform the existing luggage handling practice to a more reliable and effective system. Though at first it might cost the operators, they should consider the profit and the priceless word-of-mouth marketing to be gained from the satisfied customers.

It has already been proven by previous businesses and studies that customer satisfaction and loyalty play crucial roles in today’s competitive market. For that, ferry and jetty operators should cooperate and work with each other to compete with their rival especially airlines services providers. For the record, ferry service providers have already won in terms of the lower cost charged for the service provided, but looking to nowadays economic trend it should not be long until the airlines service providers can compete in this price competition. In order to stay in the game, the operators need to offer more than just a lower price since nowadays customers are no longer price sensitive as long as they can get a better service.

REFERENCES


MULTIPLE REGRESSIONS WITH SECOND ORDER INTERACTION ON WATER QUALITY INDEX (WQI) AT MANJUNG RIVER AND ITS TRIBUTARIES

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ABSTRACT- This research focuses on identify the main parameter that have a significant contribution in the water quality index and to promulgate the best second order of multiple regression to predict the water quality index (WQI) at Manjung river and its tributaries which included Sungai Ayer Tawar, Sungai Sitiawan and Sungai Lumut. This research is also highlights a multivariety technique to examine the relationship between dependent and independent variables. There are six independent variables which are the water quality parameters and water quality index as the independent variable were included in this data set. The Multiple Regression (MR) models were involved is the second-order interaction with 42 possible models were considered. The elimination of variables with the was employed to get the selected model. The best model includes used the second order interaction with variables of (DO, COD, BOD, TSS, AN and pH). The best model obtains then being verified by the Mean Absolute Percentage Error (MAPE) calculation to measure the models’ relative overall fit.

I. INTRODUCTION

Water is a transparent fluid which forms the world's streams, lakes, oceans and rain, and is the major constituent of the fluids of organisms. It is importance for us to maintain the water quality because water is the vital element not only for humans but other organism too. The water quality index helps us to maintain the water from contaminated. According to (Jackson and Smith, 1931), good quality water is essential for all living beings. Water has long been recognized as an indispensable factor in the normally functioning organism. With the growth of human populations, commercial and industrial activities, surface water has received large amount of pollutants from variety of sources according to (Satheeshkumar, and Anisa, 2011). Water resources management involves the monitoring and management of water quality as much as the monitoring and management of water quantity. (Manikannan et al. 2011) stated that the quality of surface water provides significant information about the available resources for supporting life in the ecosystem. Water quality index (WQI) provides a single number that expresses the overall water quality at a certain location and time based on several water quality parameters. Water quality describes whether or not the surrounding environment may be endangered by pollutants in the water. The term “water quality” is used to describe the microbiological, physical and chemical properties of water that determine its fitness for a specific use. These properties are determined by substances which are either dissolved or suspended in the water. There are many factors or parameters that can be included in a WQI model and could vary depending upon the designated water uses and local preferences. Some of the frequently used factors include DO, pH, BOD, COD, total suspended solid, coli form bacteria, temperature, and
and etc.

The objectives of the study are;

a) To identify the main parameter that has a significant contribution in water Quality Index at Manjung River.

b) To determine the best first order interaction multiple regression model to predict Water Quality Index (WQI).

II. MATERIALS AND METHOD

Study area: The scope of study is at Manjung River, Perak. The scope also to identify the main parameter that has a significant contribution in the water quality index and to promulgate the best model that can be used to measure the water quality index in Manjung River and its tributaries. Site sampling stationary were proposed and to identify the water quality index parameter and also to measure the water quality index in Manjung River and its tributaries. Water quality index parameters are measured using statistical analysis Multiple-regression.

Data collection: The data analysis of this study was taken as a secondary data from a water sampling research of Manjung River. It was taken along the Manjung river basin at 6 sampling stations with five times of frequency for both tides (study period is within July 2012 and November 2012). Each parameter was analysed based on the Water Quality Standard and Regulation in Malaysia.

Among that information are the 6 variables that are taken as the independent variables. They are:

1. SI - Sub index of parameter
2. DO - Dissolve Oxygen
3. BOD - Biological Oxygen Demand
4. COD - Chemical Oxygen Demand
5. AN - Ammonical Nitrogen
6. TSS - Suspended Solid
7. pH - Salinity

III. STATISTICAL ANALYSIS

Multiple regression (MR) models with interaction: Multiple regression analysis, a form of general linear modeling (Hair et al., 2010) is a statistical technique that can be used to analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables. The objective of regression analysis is to predict a single Dependent Variable (DV) from the knowledge of one or more Independent Variables (IV)’s. Interaction effects represent the combined effects of variables on the criterion or dependent measure. When an interaction effect is present, the impact of one variable depends on the level of the other variable. Part of the power of MR is the ability to estimate and test interaction effects when the predictor variables are either categorical or continuous. As, Pedhazur and Schmelkin (1991) had noted, the idea that multiple effects should be studied in research rather than the isolated effects of single variables is one of the important contributions of Sir Ronald Fisher. When interaction effects are pre-
present, it means that interpretation of the individual variables may be incomplete or misleading. The specific MR model that has been explained by Lind et al. (2005) can be stated as follows:

\[ Y_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + \ldots + b_k X_{ki} + e_i \]

(1)

Where, X is the random variable representing the ith value of the DV, Y. Thus, \( X_{1i}, X_{2i}, \ldots X_{ki} \) are the ith value of IV for \( i = 1, 2 \ldots n \).

**Multiple regression (MR) models with interaction:** Multiple regression analysis, a form of general linear modeling (Hair et al., 2010) is a statistical technique that can be used to analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables. The objective of regression analysis is to predict a single Dependent Variable (DV) from the knowledge of one or more Independent Variables (IV)’s. Interaction effects represent the combined effects of variables on the criterion or dependent measure. When an interaction effect is present, the impact of one variable depends on the level of the other variable. Part of the power of MR is the ability to estimate and test interaction effects when the predictor variables are either categorical or continuous. As, Pedhazur and Schmelkin (1991) had noted, the idea that multiple effects should be studied in research rather than the isolated effects of single variables is one of the important contributions of Sir Ronald Fisher. When interaction effects are present, it means that interpretation of the individual variables may be incomplete or misleading. The specific MR model that has been explained by Lind et al. (2005) can be stated as follows:

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### Table 1: Description of variables involved in the model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y )</td>
<td>Water Quality Index</td>
<td>mg/</td>
</tr>
<tr>
<td>( X_1 )</td>
<td>SI Dissolved Oxygen (DO)</td>
<td>mg/l</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>SI Biological Oxygen Demand (BOD)</td>
<td>mg/l</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>SI Chemical Oxygen Demand (COD)</td>
<td>mg/l</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>SI Ammonia Nitrates (AN)</td>
<td>mg/l</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>SI Suspended Solid (SS)</td>
<td>mg/l</td>
</tr>
<tr>
<td>( X_6 )</td>
<td>SI Salinity (pH)</td>
<td>pH</td>
</tr>
</tbody>
</table>

### Model result

**All possible models:** In the development of the MR models for this datasets, Water Quality Index (WQI) would be the Dependent Variable (DV) noted by \( Y \), whereas, DO \( (X_1) \), BOD \( (X_2) \), COD \( (X_3) \), AN \( (X_4) \), SS \( (X_5) \) and pH \( (X_6) \) would be the Independent Variables (IV). All possible models, \( N \) can be calculated by using the formula:

\[ N = \sum_{j=1}^{q} j(C_j^q) \]

Where, \( N \) is the number of possible models generated and \( q \) is the number of variables and \( j = 1, 2 \ldots q \). For this study, \( q = 6 \) and the possible model are:

\[ N = 1(C_{1}^6) + 2(C_{2}^6) + 3(C_{3}^6) + 4(C_{4}^6) + 5(C_{5}^6) + 6(C_{6}^6) = 192 \]
Selected model: Multicollinearity is the inter-correlation of IV. The higher correlation coefficient will increase the standard error of the beta coefficients and produce assessment of the unique role of each independent resulting in difficult or impossible output. Multicollinearity exist if Correlation Coefficient >0.95. Zainodin-Noraini multicollinearity remedial procedures had been applied and details are explained in Abdullah et al. (2011) and Zainodin et al.

Next, the coefficient test should be carried out as an elimination procedure of insignificant variable by using the backward elimination as shown by Abdullah et al. (2008). In this step, one insignificant variables have been eliminated from the model M144.6.0. At the end of this phase, only seven variables have been left in the model (model M144.6.1) Table 2 shows the entered variable before the elimination procedure and the remaining variable after the elimination of insignificant variables.

Table 2: Model 144.6.0 with entered variable before elimination procedure of insignificant variables and model M144.6.1 with remaining variable after elimination procedure of insignificant variables.

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>43.08972</td>
<td>5.56017</td>
<td>7.74907</td>
<td>6</td>
</tr>
<tr>
<td>X1</td>
<td>-0.30108</td>
<td>0.09828</td>
<td>3.06338</td>
<td>0.004262</td>
</tr>
<tr>
<td>X2</td>
<td>0.80912</td>
<td>0.07624</td>
<td>10.6124</td>
<td>2.49E-12</td>
</tr>
<tr>
<td>X4</td>
<td>-0.14976</td>
<td>0.06177</td>
<td>2.42414</td>
<td>0.020812</td>
</tr>
<tr>
<td>X5</td>
<td>-0.27625</td>
<td>0.07761</td>
<td>-3.55926</td>
<td>0.001122</td>
</tr>
<tr>
<td>X15</td>
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<td>0.00137</td>
<td>3.71244</td>
<td>9</td>
</tr>
<tr>
<td>X24</td>
<td>-0.00096</td>
<td>0.00071</td>
<td>1.34835</td>
<td>0.18646</td>
</tr>
<tr>
<td>X25</td>
<td>-0.004</td>
<td>0.00106</td>
<td>3.73921</td>
<td>0.000679</td>
</tr>
<tr>
<td>X145</td>
<td>4.31E-05</td>
<td>1.3E-05</td>
<td>3.31577</td>
<td>0.002181</td>
</tr>
</tbody>
</table>

Eight selection criteria (8SC): Identification of the best model should be based on Eight Selection Criteria (8SC) as shown in Abdullah et al. (2011). The objective is to determine a model with the lowest value of a criterion statistic. The calculation of the criterion statistics will be based on the Sum of Square Error (SSE), number of estimated parameters and the sample size. Table 3 shows the details of each model selection criteria.

Where, n would be the number of observations, (k+1) is the number of model's parameters and SSE the sum of square of error. The Akaike Information Criterion (AIC) (Akaike, 1974) and Finite Prediction Error (FPE) (Akaike, 1970) are developed by Akaike. The Generalised Cross Validation (GCV) is developed by Golub et al. (1979) while the HQ criterion is suggested by Hannan and Quinn (1979). The RICE criterion is discussed by Rice (1984) and the SCHWARZ criterion is discussed by Schwarz (1978). The SGMASQ is developed by Ramanathan (2002) and the Shibata criterion is suggested by Shibata (1981).

From 192 possible models generated during the stage of this analysis, only 42 models have been selected with the same SSE value and number of model parameter. These models then been grouped and any models from this group can be the selected model. The best model was then chosen from the selected models by using the 8SC based on the majority of least values as shown in Table 5. The best model selected is M144.6.1.

Best model verification
The final phase of model building is applying the Goodness-of-Fit on the final best model. The goodness-of-fit comprises of the randomness test and normality test. Randomness test is to determine that the residuals are randomly distributed and normality test on the Kolmogorov-Smirnov statistics is to ensure that the normality assumptions are not violated. Since the value of Z = 0.648 < asymp. Sig (2-tailed) = 0.795, therefore, \( H_0 \) is accepted and this test supported the conclusion that there is enough evidence that the residuals is randomly distributed. Since the Kolmogorov-Smirnov statistics (0.648) gives the significant p-value = 0.795>0.05, therefore, \( H_0 \) is accepted. There is enough evidence at 0.05 significant levels that the standardized residual is normal.
0.648) gives the significant p-value = 0.795>0.05, therefore, \( H_0 \) is accepted. There is enough evidence at 0.05 significant levels that the standardized residual is normal.

From here, the best regression model would therefore be represented by:

\[
WQI = 41.1126 + (-0.27374)X_1 + 0.77025X_2 + (-0.16089)X_4 + (-0.23683)X_5 + 0.005068X_{15} + (-0.00405)X_{25} + 3.27E-05X_{14}
\]

Where \( X_1 \) is SIDO, \( X_2 \) is SIBOD, \( X_4 \) is SIAN, \( X_5 \) is SISS, \( X_{15} \) is interaction between SIBOD and SISS, \( X_{25} \) is interaction between SIBOD and SIAN, \( X_{145} \) is interaction between SIBOD, SIAN and SISS.

Model accuracy measurement

The Mean Absolute Percentage Error (MAPE) is used in quantitative forecasting methods because it produces a measure of relative overall fit. The absolute values of all the percentages errors are summed up and the average is computed (Levy and Lemeshow, 1991). In this study MAPE is used to verify the best model obtain. It is usually expressed as percentages and is defined by the formula:

\[
MAPE = \frac{1}{n} \sum \left| \frac{A_t - F_t}{A_t} \right| \times 100
\]

Where, \( A_t \) is the actual value and \( F_t \) is the forecast (estimated) value. The difference between \( A_t \) and \( F_t \) is divided by the actual value \( A_t \) again. The absolute value of this difference is then summated up and finally divided by the total number of observations to get the MAPE.

<table>
<thead>
<tr>
<th>Table 3: 8 selection criteria for best model identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC: ( \frac{SSE}{n} (e)^{2(k+1)/n} ) RICE: ( \frac{SSE}{n} \left( 1 - \frac{2(k+1)}{n} \right)^{-1} )</td>
</tr>
<tr>
<td>FPE: ( \frac{SSE}{n} \left( \frac{n + k + 1}{n - (k + 1)} \right) ) SCHWARZ: ( \frac{SSE}{n} \left( n \right)^{2(k+1)/n} )</td>
</tr>
<tr>
<td>GCV: ( \frac{SSE}{n} \left( 1 - \frac{k+1}{n} \right)^{-2} ) SGMASQ ( \frac{SSE}{n} \left( 1 - \frac{k+1}{n} \right) )</td>
</tr>
<tr>
<td>HQ: ( \frac{SSE}{n} (\ln n)^{2(k+1)/n} ) SHIBATA: ( \frac{SSE}{n} \left( \frac{n + 2(k+1)}{n} \right) )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: One-Sample Kolmogorov-Smirnov Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolmogorov-Smirnov Z</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
</tr>
</tbody>
</table>

Model accuracy measurement

The Mean Absolute Percentage Error (MAPE) is used in quantitative forecasting methods because it produces a measure of relative overall fit. The absolute values of all the percentages errors are summed up and the average is computed (Levy and Lemeshow, 1991). In this study MAPE is used to verify the best model obtain. It is usually expressed as percentages and is defined by the formula:

\[
MAPE = \frac{1}{n} \sum \left| \frac{A_t - F_t}{A_t} \right| \times 100
\]

Where, \( A_t \) is the actual value and \( F_t \) is the forecast (estimated) value. The difference between \( A_t \) and \( F_t \) is divided by the actual value \( A_t \) again. The absolute value of this difference is then summated up and finally divided by the total number of observations to get the MAPE.
calculation is summed for every fitted or forecast point in time and divided again by the total number of fitted point's a.

MAPE of 10% is considered as highly accurate, whereas a MAPE in the range 11-25% or even higher is quite common. The lower the MAPE value the best the model can be used in forecasting or evaluating the missing values. Anything above 50% is considered inaccurate and is not fit for forecasting. By substituting the remaining observation that has not been included in the model building analysis, the value of MAPE obtained is 9.49%. This value indicates that this model could be best used for estimation of missing value or forecasting.

IV. CONCLUSION
The parameter have the significantly contribution to water quality index in Manjung Rivers and its tributaries are dissolved oxygen, biochemical oxygen demand, ammonia nitrate and total suspended solid. Based on the research the best model for second order multiple regression is Model 144.6.1.

ACKNOWLEDGMENT
The research and data analysis had been helped out by reading throughout the journals and also from the supervisor. Many thanks for Madam Aminatul Hawa Yahaya, for her endless support and guidance. The authors would also like to thank anonymous reviewers for their useful comments suggestions and recommendations.

REFERENCES
LOGISTIC REGRESSION MODEL OF WOMAN PARTICIPATION IN MARITIME INDUSTRY

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Malaysian Institute of Marine Engineering Technology
Universiti Kuala Lumpur
33200 Lumut Perak, Malaysia

ABSTRACT- This study is to investigate the involvement of women in the shipbuilding industry. The study was conducted in Malaysia Maritime industry, to find the participation of women in the shipbuilding industry and includes the overview of the research background, the problem statement, research objective, research and question, the significant of study, the limitation of research conclusion. The role of women in manual jobs in shipyards, it is quite restricted, however, this study would take a new approach to identify the problem. Therefore, women who worked in the shipbuilding industry have to face a variety of risks and obstacles while performing their duties. Studies conducted to determine the barriers faced by women in the shipbuilding work and to identify the effects.

I. INTRODUCTION
The research focused on the involvement of women in the shipbuilding industry. The study was conducted in Malaysia Maritime industry, to find some percentage of participation of women in the shipbuilding companies than men. This research that can Encouraging women’s participation the commercial building and construction industry offers a range of jobs and career paths for women and men, although traditionally it has been a male domain. Shipbuilding offers challenging, highly technical and complex career avenues such as surveying, interior design, quantity surveying and landscape architecture. Building and construction suits both women and men. Each have their own strengths and they can bring these to their workplace and both work with enthusiasm in their chosen area of expertise.

Throughout history women have not been thought of as doing actual work. When they are actually getting paid for their work it was very little. They were employed “in the lowest paid, least stable, and most unrewarding occupations. Women were forced out of the public work arena by men who believed that their position of power to be threatened. The type of work that women could obtain was that of “unskilled, low status, poorly paid, seasonal, and irregular. When the involvement of women in the shipbuilding industry intensifies, these women began to be recognized show. Example, a study will be conducting in a Malaysia Maritime industry, to find out the involvement of women in the ship building company. Although, the involvement of women is seen as not as much as the involvement of men, yet they are still able to be input to contribute their ideas and efforts.

II. LITERATURE REVIEW
This chapter explaining the related literature review on focus the role of women involvement in shipbuilding. This research provides a structured methodical approach towards the goal. Role of women industries is important that can help to achieve the once of organization. This research shows that, position women do the work in shipbuilding are same with the men. This report examines the reasons for the lack of women working in a professional capacity within the shipbuilding industries. A key factor is barriers of women involvement in shipbuilding industries. Analyze about to encourage increased recruit-
recruitment, retention and progression of women in the shipbuilding industry. To make this analogy is relevant to know the guidelines in order to increase number of women involvement in the shipbuilding company.

III. STATISTICAL ANALYSIS

The main data techniques used in this research study were obtained through the direct effort of the researcher through questionnaire. Data was analyzed by using Multiple Binary Logistics by using statistical package for social sciences (SSPS). Descriptive analysis was used to analys the data from questionnaire.

IV. ANALYSIS AND FINDING

The findings are based on data collected by use of questionnaire so as to determine the barriers faced by women in the shipbuilding work and to identify the effects. Beside that during this analysis also can know about women who worked in the shipbuilding industry have to face a variety of risks and obstacles while performing their duties. The totals of respondent are 30 respondents, which were responding on the questionnaire.

Research Question 1 : What the barriers that women face in working in the shipbuilding industry?

Table 1.0 : The Result From Questionnaire

The table 1.0 show question in Section D, which is The Organizational Commitments, is the strong answer about the women who worked in the shipbuilding industry has to face a variety of risks and obstacles while performing their duties.

Research Question 2 : How to encourage women involvement in shipbuilding?

Table 2.0 : The Result From The Questionnaire

The table 2.0 show question in Section D, which is The Organizational Commitments, is the strong answer about the women who worked in the shipbuilding industry has to give appropriate work can encourage women to involved in the marine industry the factor in participation of woman involve in the shipbuilding.

V. CONCLUSION

Ro 1: Is achieve, all the information obtained from the best model. All the variable that appeared in the best model is organizational commitment which is give appropriate work can encourage women to involved in the marine industry the factor in participation of woman involve in the shipbuilding.

Ro 2 : Is achieve, from the data obtained and the best model, it can be conclude that there are 15 possible model but only have 1 quantitative variable and others are qualitative variable, show the best organizational commitment toward among of participation of woman in shipbuilding industry.
ACKNOWLEDGMENT

The research and data analysis had been helped out by reading throughout the journals and also from the supervisor. Many thanks for Madam Aminatul Hawa Yahaya, for her endless support and guidance. The authors would also like to thank anonymous reviewers for their useful comments suggestions and recommendations.

REFERENCES


Single Order Multiple Regression Model of Water Quality Index (WQI) in Manjung River and its Tributaries

Aminatul Hawa Yahaya and Iffa Munira Mohd Mizan
Malaysian Institute of Marine Engineering Technology

I. ABSTRACT
This research highlights a multi-variety technique to examine the relationship between dependent and independent variable in forecasting the water quality index in Manjung Rivers and its tributaries. The model building process been used to analyse and generate the data. There are 63 possible models for single order multiple regressions. The number of possible model started to reduce as we started to eliminate insignificant variable. This model then needs to run under eight selection criteria to identify the best model. The best model will be verified by using Mean absolute percentage error (MAPE) in order to measure the validity of the model.

II. INTRODUCTION
Water is the vital element for the living organism. It is importance for us to maintain the quality of water from being contaminated by the foreign substance or naturally contaminated. The water quality index objective is to provide the water quality information in the understandable and useable form that able to be understood by the public. Multiple regressions are one of the statistical methods that can be used to measure the water quality index. Regression analysis is a statistical process for estimating the relationship between variables. It helps in understanding the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. There is several type of regression model and one of it is multiple regressions. Multiple regressions are an extension of simple linear regression and we can use this model to predict the water quality index. The multiple regression been used in this study cases to isolate the influences of the changes in water quality from all influences factors that might effecting the purpose of the value changes.

The main idea of this research is to build a new model of multiple regressions to predict the water quality index. This will provide the reader with the fundamental understanding of the research. The main objective of this research is:

a. To identify the mains parameters that have a significant contribution in the water quality index in Manjung Rivers and its tributaries.

b. To determine the best single order multiple regression model to predict the water quality index in Manjung Rivers and its tributaries.

III. MATERIALS AND METHOD
Study area: The scope of the study focused along the Manjung River and its main tributaries. This tributary is connected directly to the main river. The examples of tributaries in Manjung River are Sg. Air tawar, Sg. Setiawan and Sg. Lumut.
Data collection: The data analysis of this study was taken as a secondary data from a water sampling research of Manjung River. It was taken along the Manjung river basin at 6 sampling stations with five times of frequency for both tides (study period is within July 2012 and November 2012). Each parameter was analysed based on the Water Quality Standard and Regulation in Malaysia.

Among that information are the 6 variables that are taken as the independent variables. They are:

1. SI - Sub index of parameter
2. DO - Dissolve Oxygen
3. BOD - Biological Oxygen Demand
4. COD - Chemical Oxygen Demand
5. AN - Ammonical Nitrogen
6. TSS - Suspended Solid
7. pH – Salinity

IV. STATISTICAL ANALYSIS

Multiple regression (MR) models with interaction: Multiple regression analysis, a form of general linear modelling (Hair et al., 2010) is a statistical technique that can be used to analyse the relationship between a single dependent (criterion) variable and several independent (predictor) variables. The objective of regression analysis is to predict a single Dependent Variable (DV) from the knowledge of one or more Independent Variables (IV)'s. Interaction effects represent the combined effects of variables on the criterion or dependent measure. When an interaction effect is present, the impact of one variable depends on the level of the other variable. Part of the power of MR is the ability to estimate and test interaction effects when the predictor variables are either categorical or continuous. When interaction effects are present, it means that interpretation of the individual variables may be incomplete or misleading. The specific MR model that has been explained by Lind et al. (2005) can be stated as follows:

\[ Y_i = b_0 + b_1 X_{i1} + b_2 X_{i2} + b_3 X_{i3} + \ldots + b_6 X_{i6} + e_i \]

Where, X is the random variable representing the ith value of the DV, Y. Thus, \(X_{i1}, X_{i2}, \ldots, X_{i6}\) are the ith value of IV for \(i = 1, 2 \ldots n\).

Model result

Phase 1: All possible models

Phase 1 is to identify all possible model in the data from single order multiple regression up to 5th interaction. For single order multiple regression, there are 63 possible models. In the development of the MR models for this datasets, Water Quality Index (WQI) would be the Dependent Variable (DV) noted by Y, whereas, DO (X1), BOD (X2), COD (X3), AN (X4), SS (X5) and pH (X6) would be the Independent Variables (IV). All possible models, N can be calculated by using the formula:

\[ N = \sum_{j=1}^{q} j(C_j^q) \]

Where, N is the number of possible models generated and q is the number of variables and \(j = 1, 2 \ldots q\). For this study, \(q = 6\) and the possible model are:

\[ N = (C_1^6) + (C_2^6) + (C_3^6) + (C_4^6) + (C_5^6) + (C_6^6) = 63 \]
Table 1: Description of variable shows in the model

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Water Quality Index</td>
</tr>
<tr>
<td>X1</td>
<td>SI Dissolved Oxygen (DO)</td>
</tr>
<tr>
<td>X2</td>
<td>SI Biological Oxygen Demand (BOD)</td>
</tr>
<tr>
<td>X3</td>
<td>SI Chemical Oxygen Demand (COD)</td>
</tr>
<tr>
<td>X4</td>
<td>SI Ammonia Nitrates (AN)</td>
</tr>
<tr>
<td>X5</td>
<td>SI Suspended Solid (SS)</td>
</tr>
<tr>
<td>X6</td>
<td>SI Salinity (pH)</td>
</tr>
</tbody>
</table>

Table 2: Correlation matrix

The MC is only detected if the variable (X1, X2) is more than 0.95 and if the MC is exists, the variables need to be remove because it do not shows any relationship between the dependent and independent variables. If the MC is not detected, the variable is still valid to be used. This MC test in compulsory to every model in order to eliminate any insignificant relationship.

Table 3: Coefficient Test Result

Tables 3 shows that none of the variable have p value higher than 0.05 so all the variable can be used because it give a significant relationship. The variable need to be eliminated, if the p values are more than 0.05

Phase 3: Best Model

For phase 3, we need to run the remaining model in phase 2 into eight selection criteria to find the best model.

Table 4: 8 selection criteria for best model identification

with p value higher than 0.05. Below is the example of coefficient test.

<table>
<thead>
<tr>
<th></th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.0000</td>
</tr>
<tr>
<td>x1</td>
<td>0.0003</td>
</tr>
<tr>
<td>x2</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
Where, \( n \) would be the number of observations, \( (k+1) \) is the number of model’s parameters and \( SSE \) the sum of square of error. The Akaike Information Criterion (AIC) (Akaike, 1974) and Finite Prediction Error (FPE) (Akaike, 1970) are developed by Akaike. The Generalised Cross Validation (GCV) is developed by Golub et al. (1979) while the HQ criterion is suggested by Hannan and Quinn (1979). The RICE criterion is discussed by Rice (1984) and the SCHWARZ criterion is discussed by Schwarz (1978). The SGMASQ is developed by Ramanathan (2002) and the Shibata criterion is suggested by Shibata (1981).

From 63 possible models generated during the stage of this analysis, only 18 group models have been selected with the same SSE value and number of model parameter. These models then been grouped and any models from this group can be the selected model. The best model was then chosen from the selected models by using the 8SC based on the majority of least values as shown in Table 5. The best model selected is M7.

**Best model verification**

The final phase of model building is applying the Goodness-of-Fit on the final best model. The goodness-of-fit comprises of the randomness test and normality test. Randomness test is to determine that the residuals are randomly distributed and normality test on the Kolmogorov-Smirnov statistics is to ensure that the normality assumptions are not violated. Since the value of \( Z = 0.645 < \text{asymp. Sig (2-tailed)} = 0.799 \), therefore, \( H_0 \) is accepted and this test supported the conclusion that there is enough evidence that the residual is randomly distributed. Since the Kolmogorov-Smirnov statistics (0.645) gives the significant p-value = 0.799>0.05, therefore, \( H_0 \) is accepted. There is enough evidence at 0.05 significant levels that the standardized residual is normal. This statement is supported by the scatter plot and histogram in Figure 2.

From here, the best regression model would therefore be represented by:

\[
\text{WQI}= 20.7422+ (0.1091*DO) + (0.5252*BOD)
\]

Where \( X_1 \) is SIDO, and \( X_2 \) SIBOD. This interaction factor between SIDO and SIBOD maybe causes whereby increased biochemical oxygen demand can affect the dissolved oxygen.

**Model accuracy measurement**

The Mean Absolute Percentage Error (MAPE) is used in quantitative forecasting methods because it produces a measure of relative overall fit. The absolute values of all the percentages errors are summed up and the average is computed (Levy and Lemeshow, 1991). In this study MAPE is used to verify the best model obtain. It is usually express accuracy as percentages and is defined by the formula:

\[
\text{MAPE} = \frac{1}{a} \times \sum_{t=1}^{a} \left| \frac{A_t - F_t}{A_t} \right| \times 100
\]

Where, \( A_t \) is the actual value and \( F_t \) is the forecast (estimated) value. The difference between \( A_t \) and \( F_t \) is divided by the actual value \( A_t \), again. The absolute value of this calculation is summed for every fitted or forecast point in time and divided again by the total number of fitted point’s \( a \). In this case, the number of \( a = 3 \), number of data reserved for this purpose.
MAPE of 10% is considered as highly accurate, whereas a MAPE in the range 11-25% or even higher is quite common. The lower the MAPE value the best the model can be used in forecasting or evaluating the missing values. Anything above 50% is considered inaccurate and is not fit for forecasting. By substituting the remaining observation that has not been included in the model building analysis, the value of MAPE obtained is 3.11901%. This value indicates that this model could be best used for estimation of missing value or forecasting.

V. CONCLUSION
At the end of this research we able to identify the mains parameters that have a significant contribution in the water quality index in Manjung Rivers and its tributaries. We also able to identify the best single order multiple regression models to predict the water quality index in Manjung Rivers and its tributaries. This new technique is more simple and accurate. The number of parameter that been used are lesser than the previous technique.

VI. ACKNOWLEDGMENT
The research and data analysis had been helped out by reading throughout the journals and also from the supervisor. Many thanks for Madam Aminatul Hawa Yahaya, for her endless support and guidance. The authors would also like to thank anonymous reviewers for their useful comments suggestions and recommendations.

VII. REFERENCES
Abstract: This research focuses on a conservation and preservation of marine turtles. The scope of this research is conducted in Segari, Perak Darul Ridzuan, Malaysia. The main objectives of this research are to analyze the factors of the extinction of sea turtles and to execute in increasing a public awareness towards the importance of turtle lives in the marine environment. 70 questionnaires have been distributed to the targeted sample. Total 50 respondents or 71.42% of respondents have participated in this research comprises, among 16 turtles management staff, 9 fisherman and 25 visitors who have visited the turtle venue. The results show the factors contributed to the declining of marine turtles is due to the marine turtle was caught in fishing nets or fishing activities by 62.0%, consumption of egg by 20%, habitat destruction of 14.1% and weak enforcement by 4.0%. However, the results to increase among public awareness could be done by local community involvement in conservation by 56.0%, provide more education on marine turtle awareness by 22.0% and also to ban on turtle egg consumption by 20.0%. As a conclusion, it is found that, most of the people who live in Segari, Perak and neighborhood are not aware about the extinction numbers of marine turtles. Thus, government and non-government bodies play an important role in protecting marine turtles besides to create more awareness campaign about marine turtles among citizen.

Key words: Turtle, Factors, Awareness,

I. INTRODUCTION

Marine turtle is among the world’s endangered species as declared by the International Union for the Conservation of Nature and Resources (IUCN). All species of marine turtles and their population are fast diminishing due to animal predation and human exploitation. According to Kaur (2009), an article titled Save Our Treasure Turtles: Roundtable Discussion to Enhance Enforcement on Poaching by Foreign Fishing Vessels showed that this habit must be maintained to ensure a secure marine ecosystem, turtles also play a major role in maintaining the balance of marine ecosystems. In addition, to being an icon of the country’s marine heritage, turtles attract snorkelers and scuba-divers, indirectly contributing income to the economy through tourism related activities. This research focuses on the conservation of marine turtle which is refers to
analyzing factors contribute to the decreasing of marine turtle populations. There are various factors, for example factor in nature, tourism, technology, human, economy and government. This research is aimed to further investigate on two factors which are believed the most significant factors on the turtle conservation and preservation. The two factors are human and economic factor. Besides that, it is also to concentrate on how to increase awareness of the importance of living turtles in marine life. The significance of this research contributes to a deeper analysis of the conservation of marine turtles. The scope of this research is conducted in Turtles Sanctuary Segari, Perak, Malaysia. The main objectives of this research are to analyze on the factors causes the extinction of sea turtles and to increase public awareness on the importance of turtle lives in the marine environment to focus on by reason of fishing activities and waste disposal into the sea. It is suggested to increase awareness among seafarers to ensure safety turtle is not guaranteed or threatened by reason of trawling activity and toxic manufacturing of fishing vessels which is leading to the decreasing factors on the turtle population. The factors contribute to the decrease number of marine turtles are included in human activities, government and economic environment. Among the threats these marine reptiles face is entanglement, habitat loss, and consumption of their eggs and meat. Sea turtles often drown when caught in fishing gear, both nets and long lines. Coastal development can destroy important nesting sites, impact coral reefs, and artificial light from houses and other buildings attracts hatchlings away from the ocean. Pollution like plastic bags are often mistaken for food such as jellyfish and ingested, which blocks their intestines and potentially kills them. In some countries, they hunt for their meat and shells and their eggs are eaten.

Fig 1. Turtle Management Center, Segari, Perak

<table>
<thead>
<tr>
<th>No</th>
<th>Turtle Centre and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turtle and Marine Ecosystem Center, Rantau Abang, Terangganu</td>
</tr>
<tr>
<td>2</td>
<td>Daerah Turtle Sanctuary, Kemaman, Terangganu</td>
</tr>
<tr>
<td>3</td>
<td>Management &amp; Information Center Turtle, Pengkalan Badak, Melaka</td>
</tr>
<tr>
<td>4</td>
<td>Turtle Management Center, Segari, Perak</td>
</tr>
<tr>
<td>5</td>
<td>Management &amp; Information Center, Cherating, Pahang</td>
</tr>
<tr>
<td>6</td>
<td>Meromictic Turtle Kerachut, Pulau Pinang</td>
</tr>
</tbody>
</table>

II. LITERATURE REVIEW

Central Management And Conservation Of Sea Turtles

The aim of this literature review is to define the factors cause turtles to extinction and focus on awareness among the public about the importance of marine turtles. Central management of turtles and turtle conservation is central to protect turtles from extinction. Therefore, programs are often carried out in the central management of the turtle is a turtle hatchery program and release the hatchlings into the sea. Department of Fisheries Malaysia in collaboration with the State Government that has the turtles come to lay their eggs has built centers of information and management of sea turtles. The information center and turtle management are working to implement publicity programs, conduct research, and management of a turtle hatchery in the state. According to The Fisheries Department Malaysia, turtles management and information center have been built and the center is still operating until present. The list are as follows:

Based from main web of Fisheries Department Malaysia, the main factors among endangered turtles are as follows:

1) Exploitation of turtle eggs and turtle:
Turtle eggs are used as a source of food and income, the meat is used for food and jewelry made of shells for sale.

2) Trapped in gear:
Turtles may also die when caught in trawl nets,
drift nets and other fishing equipment operated by a fisherman.

**iii) Habitat destruction:**
There are plenty of beaches where turtles come to lay their eggs destroyed due to the construction of the hotel are made, resort, residential, industrial areas, and the next erosion was caused by natural conditions such as erosion.

**iv) Tourism activities:**
Due to the activities and the activities undertaken by tourists such as installing fire among themselves, making noise, disturbing the turtles that come ashore to lay their eggs and activities that may disturb the turtles.

**v) Contamination:**
Caused by oil spills, garbage disposal, and industrial waste materials that endanger turtles.

**vi) Light spills:**
Rays of light or light a fire that lit up the turtle nesting beaches will disturb the turtles that goes to the beach to lay their eggs. This is because turtles are very sensitive to bright light.

**vii) Victimization:**
Children with newly hatched turtles into the sea during the winter will be crabs, dogs, birds and lizards while in the water to feed the fish bigger.

This species is endangered by reasons from fishing activities and waste disposal into the sea. In this case, awareness must be installed among the seafarers to ensure safety turtle is not guaranteed or threatened by reason of trawling activity and toxic manufacturing of fishing vessels. According to an article titled Save Our Treasure Turtles: Roundtable Discussion to Enhance Enforcement on Poaching by Foreign Fishing Vessels by Kaur et al. (2009, p. 27) “this habitat must be maintained to ensure a secure marine ecosystem; turtles also play a major role in maintaining the balance of marine ecosystems. In addition to being an icon of the country’s marine heritage, turtle attracts snorkelers and scuba-divers, indirectly contributing millions of Ringgit to the economy through tourism-related activities. Therefore, this turtle conservation must be done to address the problem of the extinction of sea turtles are becoming more common. Turtles are a valuable treasure in the ocean ecosystem.

**Threatens To The Turtles**

As we are aware, the main threats to the turtle are from fishing activities and irresponsible society. Besides that, wave products from the industrial activities. In addition, the use of trawl fishermen can cause a turtle death. Garbage into the sea, especially the plastic allows the turtle to eat plastic because plastic resembles a jellyfish. According to Ahmed et al. (2006, p. 43), “Pollution can have serious impacts on both sea turtles and the food they eat. Marine turtles can mistake floating plastic materials for jellyfish and choke to death when trying to ingest these materials. Trash, particularly plastic bags thrown overboard from fishing vessels or tourist boats, or dumped from beaches swept out to sea can become a deadly meal for turtles. Discarded fishing gears are known to entangle marine turtles and can re-

**Importance of Turtles in Biodiversity**

In marine life, turtle is the most important asset in maintaining the natural environment of the sea. This is because the turtle is one animal alive at sea and ashore. The turtle is also an animal life for centuries. Rahall (2009, p. 2), marine sea turtles have existed in the world’s oceans for more than 100 million years. Turtles are air-breathing reptiles that are found in tropical and subtropical seas throughout the world. Rhodin et al. (2011, p. 4), claim that turtles in Asia present major components in environments and part of web interacting and codependent species that constitute healthy functioning ecosystems. Without turtles and tortoises, those ecosystems and the critically important human-welfare eco services, would gradually suffer from the loss of biodiversity and degradation in ways still incompletely understood and difficult to predict. No turtle species should be lost to extinction, as none is expendable or unimportant. Kaur et al. (2009, p. 27), turtle also plays a major role in maintaining the balance of marine ecosystems. In addition to being an icon of the country’s marine heritage, turtle attracts snorkelers and scuba-divers, indirectly contributing millions of Ringgit to the economy through tourism-related activities.
Fig 2. Plastic garbage Threatens Besides that, poaching of turtles also made to be used as food ingredients. According to Kaur et al. (2009, p. 27), there has been a subsequent decline of about 38% in the last 10 years. Poaching has become a serious threat to the sea turtles’ survival as they are usually caught in large numbers, thus drastically reducing the total population in Malaysian waters. This problem has to be redressed immediately. Furthermore, poaching activities are more frequent in Southeast Asian waters specifically in Malaysia, Indonesia and the Philippines, where turtle population flourishes due to protection strategies employed by the governments such as the establishment of the TIIHPA. Therefore, essential to find ways to curb or eradicate this illegal activity for the sake of turtles’ continuous survival.

III. METHODOLOGY

Questionnaires Survey

A set of questionnaires was designed and distributed to the target respondents to find out the information needed and related to the objectives of the research and, it is used for analysis. The questions are used to contribute the overall validation in variables of the research. An open and closed ended format of the questionnaires was used in the questionnaire. In addition, Likert scale question is also used to rank feedback from respondents’ quality from high to low or best to worst using five level scales. The questionnaire survey was sent to the targeted sample requesting to respond to the questions given. The questionnaire is prepared in dual languages, English and Bahasa Malaysia in order to cater better understanding of questions asked among respondents.

The questions are divided into three sections. The sections are as follows:

a) Section A: General Information of Respondent: This includes information about gender, age, highest level of education, current position and main communication avenues to update about turtle extension.

b) Section B: Independents Variable: It covers on independent variables of factors causes the extinction of sea turtles and how to increase public awareness on the importance of turtle lives in the marine environment.

c) Section C: Dependent Variable: This section covers on dependent variable of conservation and preservation of marine turtles.

Population, Sample and Respondents

Population is the total of all subjects that conform to set of specification, comprising the entire group of person that is of research interest to the research result can be designed. The population of this research comprises visiting people, staff at Turtle Sanctuary Center, and also among fishermen at Segari, Perak, Malaysia. The percentage of samples is at 50/70 x 100% = 71.42%. The sample represented by 71.42% of the total population which covered among several department by the company. It is included among officers department, cleaners department, visitors and fishermen local nearby.

<table>
<thead>
<tr>
<th>No</th>
<th>Department</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Officer in Turtle’s Management</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Fisherman in Lumut, Perak</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Visitors in Turtle Management in Segari, Perak</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

TABLE 2. The List of Respondents

Proceeding of the Marine Application & Technology Conference 2016 Lumut, Perak.
TABLE 3.
List of Respondents Survey

<table>
<thead>
<tr>
<th>No</th>
<th>Respondents</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Segari Turtles Management Staffs</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Local fisherman</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Visitors (Schedules: Sunday-am, Monday-am Tuesday-pm, Wednesday-pm, Thursday-pm, Friday-pm, Saturday-pm)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

Analysis Data

The data has been analyzed by using the function in Statistical Package for Social Sciences (SPSS). Kruskal-Wallis Test is used to decide whether the population distributions are identical without assuming them to follow the normal distribution and Multiple-response set is used much like a new variable made of other variables that already have. A multiple-response set acts like a variable in some ways, but in other ways it doesn't. A multiple-response set can contain a number of variables of various types, but it must be based on two or more dichotomy variables (variables with just two values).

IV. RESULTS AND DISCUSSION

The summary of results based from two research objectives is as follows:

TABLE 4:
Frequency for declining factors for turtle

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat destruction</td>
<td>7</td>
<td>14.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Caught in fishing</td>
<td>31</td>
<td>62.0</td>
<td>76.0</td>
</tr>
<tr>
<td>Nets/fishing activities</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Consumption of eggs</td>
<td>10</td>
<td>20.0</td>
<td>96.0</td>
</tr>
<tr>
<td>Weak enforcement</td>
<td>2</td>
<td>4.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows the main factors contributed to the declines of marine turtles, which is from caught in fishing by 31 or 62%, consumption of eggs by 10 or 20.0%, habitat destruction of 7 or 14.0% and weak enforcement by 2 or 4.0%. The Ministry of Fishing should do a regular inspection of the trawlers boat. The size of the trawlers must be according to specified by the Ministry of Fisheries. The size of the net must be not too small to prevent small fish captured together in the trawler. The number of fishing man also needs to be monitored to ensure the population of fish is maintained.

TABLE 5.
Frequency of reduction of consumption turtle eggs

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>More education and awareness</td>
<td>11</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Ban of turtle egg consumption</td>
<td>10</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>Local community involvement</td>
<td>28</td>
<td>56</td>
<td>98</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100.0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5 shows, local community involvement plays an important role in combating the declining of turtles by 56%, meanwhile, more education and awareness by 22% and to ban of turtle egg consumption by 20%. On top of that, the Ministry of Education should establish a new syllabus for the education system on ecosystem which should cover on protection of nature and endangered species such as tiger, orangutan and turtle. This syllabus should inculcate from primary school in order to develop a spirit of love towards nature. Besides that, the Ministry of Education should also develop new co-curricular activities such as beach cleaning, educational visit to turtle conservation in order to introduce to young generations about endangered species.
CONCLUSION AND RECOMMENDATION

The focus on extinction factors and public awareness information is very important towards turtle conservation and preservation. Awareness should be taken into account in helping to protect major extinction of sea turtles from human activities. Initiative should be considered to bring awareness to the community about the importance of sea turtle. The Malaysian Fisheries Department claimed that turtle conservation program implemented by their department could not be fully implemented without the support and cooperation from publics and locals. Various programs have been implemented and organized throughout the year by the Department of Fisheries such as organizing drawing competitions, coloring for school children, talks and camping centers turtles to school students, civil servants, private sector and fishermen in instilling awareness among them. To increase awareness and education about turtles to publics, the Malaysian Fisheries Department has distributed meaningful brochures or pamphlets in the various forms including the video. Finally, the limitation in this research is to get an important confidential information by related departments and also lack of cooperation among local communities/ fishermen and visitors which lead to the success of this research.

REFERENCES

Abstract - Marine companies are cheered to apply CSR by fulfilling the guidelines of ISO 26000, the standard providing voluntary guidance of social responsibility. ISO 26000 constitutes guidelines for all types of organizations in both the public and private sectors, in developed and developing countries, add value to existing social responsibility programmes by developing an international regulations on what social responsibility means and the social responsibility issues that organizations need to address, providing guidelines on translating principles into effective action and distilling the best practice that has already evolved and disseminating it worldwide for the good of the international community (ISO & Social Responsibility). This research focuses on the effectiveness of CSR activities on awareness and benefits towards contribution of CSR among marine companies. The scope of this research is conducted at various marine companies in Kemaman, Terangganu, Malaysia. However, only few companies are chosen to be as a sample. The selected marine companies are: Petronas Branch, Sapura Kencana, Baker Hughes and Koperasi Petronas. These marine companies involve in various marine activities such as in shipbuilding, construction, maintenance and repair, marine fabrication, oil and gas. A questionnaire survey is used in this research. The data is used to analyse the research objectives. 80 sets of questionnaires have been distributed to the targeted respondents. The rate of return is 81.25% and received 65 respondents who have responded, and the failure rate is 18.75% from the total questionnaires distribution. The results shows that, there are no preferences on the awareness of CSR in marine companies, there is no enough evidence to conclude the respondents are totally aware on the implementation of CSR, the highest mean rank on the awareness of CSR is among Top Management whose age are between 40-49 years, and companies have been established between 6-8 years, and have implemented CSR for 3-5 years. However, for the level of participation in
CSR programs the awareness is more among Middle Management, whose age are between 30-39 years old and have been working between 2-4 years, the companies have been established CSR between 6-8 years, and have implemented CSR for 3-5 years. In addition, 43 of total 65 respondent or 66.15% have agreed that, health insurance is a benefit plan that has received from CSR activities. The lowest benefit is on pension plan by 12 respondents or 18.46%. Meanwhile the benefit on insurance is a mandatory requirement for hirement of new staff. Respondents claimed that, the companies did not received support from government to conduct CSR activities. Finally, respondents have agreed that, the most group that has been influenced by the company’s CSR are among employees and, almost of the respondents are alert on the benefits gained from CSR activities.

Keywords: Effectiveness, CSR, Awareness, Benefits

I. INTRODUCTION

In today’s economic and social environment, issues related to social responsibility are gaining more importance, especially in the business sector such as shipping. CSR is understand as a management concept and a process that integrate social and environmental concerns in business operations and a company’s interactions with the full range of its stakeholders. Previously, the implementation of CSR has been used in a lot of sectors such as banking, servicing, SME companies and hospitality. After the implementation of CSR, these sectors have completely built a new connection with people surrounding and also an improvement in financial performance. The marine companies involve in this research are from business of designing, constructing, manufacturing, acquiring, operating, supplying, repairing and/or maintaining vessels, or component parts, shipyards, dry docks, marine railways, marine repair shops, shipping and freight forwarding services and similar enterprises, oil and gas. The reason this title has been chosen is to analyze the effectiveness contribution of CSR activities among marine companies towards company performance in value of the employer and employee, financial performance and, also the perception of the society. The effectiveness of CSR activities is also affected by the performance of top management and employer and employees contribution. This research has been conducted in Kemaman, Terangganu, Malaysia since there are a lot of developing marine companies there.

The main objectives of this research are:

i) to discover an awareness on CSR activities among marine companies.

ii) to identify benefits from CSR activities among marine companies.

II. LITERATURE REVIEW

Definitions and Concept of CSR

The European Commission defined CSR as a concept where companies integrate social and environmental concerns in their business actions and in their connection with their stakeholders on a voluntary basis. Holmgren (2010), identified that CSR is a responsibility beyond the requirements of national law regarding questions of human rights, environmental and social rights. At present, there is no universal or agreed definition of CSR. McWilliams and Siegel (2000), stated that a positive, negative and neutral impact of CSR on financial performance. This variation may be because of the empirical analysis, have demonstrated that a particular flaw in existing studies of contribution of CSR with the financial performance and have identified the pressure on firms to engage in CSR has increased over the last 3 decades, but not all managers have responded to these pressures. Those who resist typically have invoked the trade-off between CSR behavior and profitability. It is concluded that CSP (Corporate Social Performance) and R&D (Research and Development) are highly connected. Galbreath (2008), had conducted a research on how CSR can be effectively constructed into a strategy and has summarized on the following:

1) What is a firm trying to get in the long-term (mission)?
2) What internal and external issues impact on the firm’s ability to achieve its mission (strategic issues)?
Contribution of CSR to Financial Performance

B. Cheng, I. Ioannou and G. Serafeim (2010, p.1), had done an investigation on how CSR lead to better access to finance. Although there has been argued that CSR may execute unnecessary cost to a firm, but had provide a few proof that firm with better CSR performance face lower capital constraints. It is stated that, there were two different mechanisms which separated the CSR performance and capital constraints: Firstly, a better CSR performance is associated with a superior stakeholder engagement that in turn significantly reduces the likelihood of opportunistic behavior and introduces a more efficient form of contracting with key constituents. Secondly, firms with better CSR performance are more likely to publicly disclose their CSR activities and consequently become more transparent and accountable. From the observations and result, it is claimed that CSR were importantly in ways to create value creation. To obtain financing in capital markets, the firms must have a better CSR performance. It is also suggested that, managers that are able to create successful CSR strategies can build a lot of benefits for their firms.

III. METHODOLOGY

Research Hypothesis

To meet the research objectives, thus the research hypothesis could be:

\[ H1: \text{The more awareness on CSR activities, the more efficient the effectiveness of CSR.} \]

\[ H2: \text{The more benefits from CSR activities, the more efficient the effectiveness of CSR.} \]

IV. RESULT AND DISCUSSION

The result obtains from the questionnaire are analyzed by using Statistical Package for Social Sciences (SPSS) version 20.0. Kruskal-Wallis Test is used to decide whether the population distributions are identical without assuming them to follow the normal distribution. Multiple-response set is used much like a new variable made of other variables that already have. A multiple-response set acts like a variable in some ways, but in other ways it doesn't.
Characteristics of Respondents

The summary of respondents’ characteristics shows that the job position shown that Top Management was the lowest respondents with 6 respondents (9.2%) and Middle Management was the 10 respondents (15.4%). The highest percentage was Front Line Management or others with 49 (75.4%) respondents. The Age of respondents who answered this questionnaire were 39 (60%) for age between 20-29 years old, 21 (32.3%) for age between 30-39, 3 (4.6%) for age between 40-49 and last 2 (3.1%) between 50-59 years old. The highest frequency age of respondents was between 20-29 years old. The proportion of Male respondents was at 66.2% and for Female respondents at 33.8%. The numbers of Male respondents were 43 individuals and Female were 22 individuals. The majority of the respondents were Male than Female. The Educational Qualification shows that for PhD holders about (6.2%) that were 4 respondents, Master holders at (3.1%) show the total respondents were only 2 respondents, and Bachelor holders (38.5%) were 25 respondents. For the Diploma holder it has (30.8%) about 20 respondents, STPM/SPM holders (15.4%) and the total respondents were 10 respondents. Lastly is the respondent’s that held others certificate was (6.2%) about 4 persons. The Bachelor holders have the highest educational qualification among the respondents and the lowest are for Master and others holders. Respondents who worked less than one year has highest frequency with 26 (40%) respondents, followed by 2-4 years 25(38.5%), 8-10 years 6 (9.2%), 5-7 years 5 (7.7%) and last one 3 (4.6%) respondents worked more than 11 years.

Characteristics of Company

The summary of company characteristics shows that the company had been established with the highest were more than 12 years by 29 (45.3%), followed by 6-8 years by 12 (18.8%), 3-5 years and 9-11 years by 9 (14.1%) and last less than 2 years by 5 (7.8%). Majority respondents were from private companies by 56 (86.2%), followed by government link 5 (7.7%) and others owned 4 (6.2%). The proportion of staff in each of the respondents’ companies shows that 16 (25.8%) respondents worked in company whose owned less than 20 staffs. While, 26 (41.9%) respondents worked in company whose had 21-50 staffs, followed by 7 (11.3%) person in capacity of 51-80 staffs. In companies, 3 (4.8%) people in 81-110 staffs and last one 10 (15.4%) person in companies whose have capacity of staffs more than 110. So, the highest frequency owned by companies whose had 21-50 staffs. Company scope is divided into 4 categories; shipbuilding, construction, maintenance, repair, marine fabrication, oil and gas industries and others. The majority percentage were oil and gas industries by 35 (53.8%) respondents, followed by others, 15 (23.1%), shipbuilding, construction, maintenance and repair, 10 (15.4%), lastly marine fabrication 5 (7.7%). The period of CSR implementation shows that the highest result were 21 (35%) companies have implemented CSR in less than 2 years. 9 (15%) person answered 3-5 years, followed by 14 (23.3%) 6-8 years and second highest owned by companies who have implemented CSR more than 12 years, 16 (26.7%).

<table>
<thead>
<tr>
<th>TABLE 1.</th>
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</thead>
<tbody>
<tr>
<td>Kruskal-Wallis Test on Awareness of CSR</td>
<td></td>
</tr>
<tr>
<td>Who decides, manages and coordinates the company’s CSR activities?</td>
<td>.000</td>
</tr>
<tr>
<td>Is the company’s CSR policy aligned with national development goals?</td>
<td>.553</td>
</tr>
<tr>
<td>What level does your company participate in CSR initiatives?</td>
<td>3.285</td>
</tr>
<tr>
<td>How important is the socially responsible and ethical behavior towards its employees?</td>
<td>1.011</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>2</td>
</tr>
<tr>
<td>df</td>
<td>2</td>
</tr>
<tr>
<td>p-value</td>
<td>.000</td>
</tr>
</tbody>
</table>

Respondents were fully aware about who decides, manages and coordinates the company’s CSR activities. From the table above, 50 (83%) respondents answered that the company’s CSR policy aligned with national development goals. This showed that, almost of the respondents are
aware about CSR. While 11 (18%) person answered that, the company’s CSR policy were not aligned with national development goals. It is only 10 (15.4%) respondents know about the level of company participate in CSR initiatives either global, regional or national. Another 55 (84.6%) respondents don’t know it. It is showed that, almost of the respondents did not aware about the level of CSR that their company participated. This question was asked to cover on the level of CSR’s importance. 62 (95.4%) respondents claimed that CSR is very important or important. Only 3 (4.6%) agreed that CSR is not important. It is concluded that, almost of the respondent are aware on the importance of CSR.

The highest frequency of the benefits plan received by respondent is on health insurance by 43 (66.2%) over 65 (100%) respondents. While, the lowest benefit is on pension plan by 12 (18.5%) from 65 respondents. The major benefit for marine company regarding socially responsible and ethical behavior is towards its employees. All results are quite same, however the highest was recruitment of new qualified employees by 27 (41.5%) from 65 respondents. The lowest rank was used of existing public incentives by 15 (23.1%) from the total 65 respondents.

V. CONCLUSION

CSR is a responsibility beyond the requirements of national law regarding questions of human rights, environmental and social rights. The integration of social, environmental, and economic improvement through CSR makes workplaces more sound. A lot of studies show that, when companies implement CSR successfully, the result is positive employee relations with respect to recruitment, morale, retention, and productivity. The awareness of CSR activities in marine companies shows that, there is no preferences on the awareness of CSR. The data gathered from respondents and companies categories shows that, there is no enough evidence that can conclude that respondents are totally aware on the implementation of CSR. Meanwhile for the benefits offers from CSR activities shows that 43 of total 65 respondent choose health insurance as the main benefits plan. While, the lowest is pension plan by 12 people. Insurance is a mandatory requirement for hirement of new staff. The highest frequency is belongs to health insurance. Pension plan is the lowest result because a lot of the respondents is new staffs and also among fresh graduates. Respondents do not know either their marine company has already develop pension plans for their future or has not developed it. Furthermore, the most selected assistance program is on health and witness by 45 respondents while the lowest is on family and lifestyle program by 22 respondents. Family and lifestyle program is the last choice because most
because most of the respondent is not married and single. Based on the analysis, the major benefit for the company regarding socially responsible and ethical behavior towards its employees is on recruitment of new qualified employees. The use of existing public incentives gets the lowest voted by the respondents. It is conclude that, a lot of employees do not know about the public incentive by the government. Majority of the respondents agreed that, their company didn’t receive any support from government. This could happen either employees don’t know about it or their company don’t revealed to all employees. The most group that has been influenced by the company’s CSR is employees. This shows that, respondents are alert on the benefits gain from CSR and this benefit are in various conditions.

VI. RECOMMENDATION

For the future recommendation from this research, it is recommended the followings: i) to achieve an increase level of cooperation between the various departments of the business in terms of achieving CSR related to company aims and objectives, ii) to introduce CSR aspects of the business at the initial stage of the project, iii) to integrate CSR with a long-term aims and objectives, iv) to implement an effective review system in terms of improving the quality of CSR, v) in term of management practices and, vi) to motivate the smaller among employers and employees to improve CSR programs. This research should propose further in-depth research to examine further on the perception and expectations of marine companies in exercising CSR and its effective implementation.

ACKNOWLEDGEMENT

The author would like to thank Universiti Kuala Lumpur Malaysia Institute of Marine Engineering Technology for providing the opportunity to conduct this research and sponsorship from Final Year Project that has made this research possible. A special thanks to all team members for the contribution and support towards the completion of this research.

An additional resources, suggestions and recommendations were done with the help from a Main Supervisor name, Madam Hajah Ismila Binti Haji Che Ishak and, Co Supervisor, Madam Fauziah Binti Abdul Rahman and finally to related friends of Universiti Kuala Lumpur Malaysian Institute of Marine Engineering Technology (UniKL MIMET) too.

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