RESCUE BOAT CONTROLLED BY ANDROID

DANIAL HAIKHAL BIN ABDULLAH

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Jabatan Kejuruteraan Elektrik
Politeknik Sultan Salahuddin Abdul Aziz Shah

JUN 2017

DECLARATION

"I hereby declare that the work in this report is my own except for quotation and summaries which have been duly acknowledge"

Signature : …….....
Name : DANIAL HAIKHAL BIN ABDULLAH
Matric number : 08DEP17F1239
Date : …….....

VERTIFICATION PROJECT REPORT

Project report title has been reviewed and confirmed as being eligible and project writing requirement as specified.

Signature of Supervisor : ……..
Name of Supervisor : ZARINA BINTI MD AMIN
Date : …….

Signature of Supervisor : ……..
Name of Supervisor : NUR SURIYA BINTI MOHAMAD
Date : …….

Signature of Supervisor : ……..
Name of Supervisor : NORAZLINA BINTI JAAFAR
Date : …….

Signature of Supervisor : ……..
Name of Supervisor : HAYATI BINTI MOHD YASIN
Date : …….

ABSTRACT

Flash flood phenomena that has been occurred in our country is increasing rapidly years by years. According to the statistic, based on the year 2016/2017 that has been taken from the website **h20.water.gov.my** , it has stated that the increasing in the percentage of the flash flood victim has increased up to 9.6% from the year 2000 to 2016. The effects of the flash flood that has been occurred in our country has attacked the life of the flash flood victim, disturbing the economic and social activities and has destroyed the properties, caused difficulties and the cost of repairing and restoration is expensive for individual and so does the government.

To avoid lot of the flash flood victim from not getting the first aid as soon as possible we have invented a device called "Mini Rescue Boat Controlled with Android" to help the flash flood victim get the first aid as soon as possible and also to avoid their life from threatened. This device functioned like a boat with smaller size and only using the smartphone (Android) to control it, thus also allow it to carry the first aid kit such as lifebuoy, blanket, medicine and food. This device also use the system "Internet of Thinking (IOT)" in it's software.

As a result, this mobile, will succeed in decreasing the number of the flash flood victim from not getting the first aid as soon as possible and will also help lighten the burden of the rescue team from struggle giving a help to those in need.

Keywords – Arduino uno, motor driver, DC motor, servo motor, bluetooth HC-05, Application

ABSTRAK

Abstrak- Fenomena banjir kilat yang telah berlaku di negara kita semakin meningkat pesat tahun demi tahun. Mengikut statistik, berdasarkan tahun 2016/2017 yang telah diambil dari laman web h20.water.gov.my, telah menyatakan bahawa peningkatan dalam peratusan mangsa banjir kilat telah meningkat sehingga 9.6% dari tahun 2000 hingga 2016. Kesan banjir kilat yang berlaku di negara kita telah menyerang kehidupan mangsa banjir kilat, mengganggu aktiviti ekonomi dan sosial dan telah memusnahkan harta benda, menyebabkan kesukaran dan kos pembaikan dan pemulihan mahal untuk individu dan juga kerajaan.

Untuk mengelakkan banyak mangsa banjir kilat daripada tidak mendapat bantuan pertama secepat mungkin kami telah mencipta peranti yang dikenali sebagai "Mini Rescue Boat Terkawal dengan Android" untuk membantu mangsa banjir kilat mendapatkan bantuan pertama secepat mungkin dan juga untuk mengelakkan hidup mereka dari ancaman. Peranti ini berfungsi seperti bot dengan saiz yang lebih kecil dan hanya menggunakan telefon pintar (Android) untuk mengawalnya, dengan itu juga membolehkan ia membawa kit pertolongan cemas seperti selimut, selimut, ubat dan makanan. Peranti ini juga menggunakan sistem "Internet of Thinking (IOT)" dalam perisian itu.

Akibatnya, telefon bimbit ini, akan berjaya mengurangkan bilangan mangsa banjir kilat daripada tidak mendapat bantuan pertama secepat mungkin dan juga akan membantu meringankan beban pasukan penyelamat daripada perjuangan yang memberi bantuan kepada mereka yang memerlukan.

Kata kunci - Arduino uno, motor driver, DC motor, servo motor, bluetooth HC-05, Application

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ACKNOWNLEDGMENT

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Last but not least, also thank to each other for the corporation, diligence, commitment and dedication to complete this project right on time. Everyone has shown the highest degree of team spirit which has made it possible for us to overcome any obstacle coming in our way while in the process of completing this project.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Flood is the most devastating natural disaster experienced in Malaysia. Throughout Malaysia, including Sabah and Sarawak, there is total of 189 river basins (89 of the river basins are in peninsula Malaysia, 78 in Sabah and 22 in Sarawak), with the main channels flowing directly to the South China Sea and 85 of them are prone to become recurrent flooding. The estimated area vulnerable to flood disaster is approximately 29,800 km2 or 9% of the total Malaysia area, and is affecting almost 4.82 million people which is around 22% of the total population of the country. It is clear that, most of the people believe that, improper drainage condition is the main cause of floods. About 33% of the population agrees that, water damage to building is the main effect of flooding and other part suggested that evacuating people from flood prone to safe zones is the best way of reducing flood victims. It is finally agrees that, government and local community should take necessary measures to ensure proper drainage is build and clear during rainfall season and also the first aid got to be supplied to those flash flood victim when the monsoon season has arrived.

This paper presented a boat for a rescue mini boat that controlled using android using (IoT), which included HC-05, motor, motor driver, servo motor and an Arduino as a microcontroller and also an application connected with this device. The HC-05 has two operating modes, one is the data mode in which it can send and receive data from other Bluetooth devices and the other is the AT command mode where the default device setting can be changed. We can operate the device in either of these two modes by using the key pin as explained. Motor driver VH2SP30 if a full bridge motor drivers rather than a L289 H-bridge, it is capable of driving a high-current motors besides with the undervoltage and overvoltage shutdown with the maximum current rating is until 30A to support it together with the motor. Furthermore, the servo motor is just to ensure the mini boat can move to any direction be it 90˚, 180˚ and 270˚. Next, Arduino UNO R3 is used for building the mini rescue boat hence the physical components is the most suitable with the spects such as 32Kb flash memory and the operating voltage up to 5Volt and also with 6 PWM channels.

1.2 PROBLEM STATEMENT

Living in Malaysia we cannot escape from the monsoon season, over the years we will prepare for the monsoon season as we already know there will be flash flood occur especially in the east cost of Malaysia. Based on the researchgate Terengganu receive heavy rainfall during the North east monsoon that occurs between October and March and leads to severe floods almost every year at all over the state. Terengganu is located at the east coast of Peninsular Malaysia that has never missed a flooding event especially during the months of November and December during the north east monsoon period. The floods that occur at Dungun area of Terengganu state was due to the combination of physical factors such as elevation and also its close proximity to the sea apart from heavy rainfall received during the monsoon period. Hence, a flood that affects the Terengganu area and other location along the eastern coast is termed as a coastal flooding (Muhd Barzani et al., 2007) Another enormous flood in the Malaysian flood disaster history, striking in four states in the Peninsular Malaysia like: Melaka, Johor, Pahang and Negeri Sembilan. The flood incident started when the Northeast monsoon brought a heavy rain through series of continues storms, causing destructive flood in Kota Tinggi, Johor (MNRE 2007a). The flood strike as a result of two waves, the December 2006 which last for 13 days from 19 – 31 December, and January 2007 lasted for 7 days from 12 – 17 January. The series of floods were unusual as the 2006 average rainfall return period was 50 years while the 2007 had more than 100 years of return period (Shafie 2007, BadrulHisham et al., 2010). The flood was destructive with the highest water level recorded reached 2.75m, is the highest level ever recorded since 1950 and it resulted in more than 100,000 people to be evacuated and the death of 18 people recorded (MNRE 2007a). Table 1, below shows the flood history in Malaysia, including the lost and the fatality rate.

Based on this research we can conclude that, the flash flood that occurred has a big impact to flash flood victim, and this has lead to another few problems especially during the evacuation; to a place that are more suitable for the victims such as school or public hall. AWANI,1 DECEMBER 2017, more than 13 000 victim has evacuated to 100 to the temporary relocation center in 9 district in Kelantan. Basically, Pasir Mashas shown the massive number in victim evacuation which is more than 10 000 people in 42 temporary relocation center. Most of the victim in Rantau Panjang and the nearest area around Sungai Golok that has effected due the flash flood and this has lead to the declining revenue sources. Regarding to this issue, flash flood has lead to the problem such as the flash flood victim did not get the first aid this is

because the rescue team could not go to small area in the village to reacue the victim as soon as possible and victim tend to catch cold, hungry and sick due to no first aid.

Figure 1.2.1: The rescue team is helping the flash flood victim during evacuation

1.3 OBJECTIVE

1. To design the hardware that can carry the first aid
2. To develop the software that can controlled by smartphone

1.4 LIMITATION

Although the research has reached its aim, there were some unavidable limitations in our project development. First this is because of the distance travelled by the mini reascue boat. This project can only travel in short distance while travel to another places, or not the boat will lost the connection between the controller, therefore we cannot promise for the boat to travel in the wide area.

Next, the second limitation is the Bluetooth connection itself. The Bluetooth connection must be strong between the boat and the controller, though we know unlike wifi module, the Bluetooth connection does not need a strong coverage nor strong data, but it is also has its own struggle in connectivity which is obstacle, if there were so many obstacle, this will affect the movement of the boat, because the Bluetooth cannot penetrate the obstacle.

1.5 SCOPE

1. Distance travelled : 60 m (with no obstacle)
2. Load carried : 5kg (max)
3. Density of water : 100kg/m^3
4. Speed :

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW

In this chapter, I have researched the components involved in the "MINI RESCUE BOAT" project, the statistic and percentage about flash flood.

2.2 STATISTIC

1. Flood is the most devastating natural disaster experienced in Malaysia is flood. Throughout Malaysia, including Sabah and Sarawak, there is total of 189 river basins (89 of the river basins are in peninsula Malaysia, 78 in Sabah and 22 in Sarawak), with the main channels flowing directly to the South China Sea and 85 of them are prone to become recurrent flooding. The estimated area vulnerable to flood disaster is approximately 29,800 km2 or 9% of the total Malaysia area, and is affecting almost 4.82 million people which is around 22% of the total population of the country. This study is aimed at finding the causes, effects and mitigation of floods. A comparative study was carried out to determine the people perception on floods. It is clear that, most of the people believe that, improper drainage condition is the main cause of floods. About 33% of the population agrees that, water damage to building is the main effect of flooding and other part suggested that evacuating people from flood prone to safe zones is the best way of reducing flood victims. It is finally agrees that, government and local community should take necessary measures to ensure proper drainage is build and clear during rainfall season. It is suggested that people should avoid developing new buildings on a water ways to reduce frequent occurrence of flooding, or people and government most ensure that, flood prone areas are not occupy with buildings.

FLASH FLOOD	SEA ADRIFT SURVIVAL
-151,072 (Kelantan) - 33,260 (Terengganu) -33,225 (Pahang) -7,813 (Perak) -328 (Johor) -33 (Selangor) Source: MStar online (Worst flash floods in have ever been occurred in Malaysia during 2014)	Salvador Alvarenga (438 days) Lapahele Sopi and Telea Paa (160 days) Poon Lim (133 days) Steve Callahan (76) Louis Jordan (66 days) Aldi Novel Adilang (49 days) Source: -The telegraph UK (sea survival stories) -BBC News

Table 2.1.1: Victim of flash flood in Malaysia

2. PUTRAJAYA: The flash floods which occurred in Kuala Lumpur yesterday was due to an inefficient drainage system.

Natural Resources and Environment Minister Datuk Seri Dr Wan Junaidi Tuanku Jaafar said there was a pressing need to review the drainage system in the all cities in the country, particularly Kuala Lumpur.

“After looking at the flash floods yesterday, we must review our current drainage system and improve it immediately before we are hit by another disaster.

"We have identified several contributing factors which caused the flash floods yesterday. These include the unexpected rainfall, low capacity culverts, clogged drainage and a shallow retention pond in Kajang due to siltation," he told a press conference today.

The affected areas included Jalan Bangsar, Jalan Tuanku Abdul Halim (formerly Jalan Duta), University Malaya and some parts of Kajang.

Flash floods hit several roads in Kuala Lumpur evening causing vehicles to be trapped following a downpour.

Wan Junaidi said the Drainage and Irrigation Department (DID) has been instructed to submit a detailed report on the drainage systems in the country.

"All state DID directors have been instructed to submit reports on the state of their drainage system for instance, on low-capacity culverts.

"We will decide whether or not to change it based on funding capabilities. If there is a funding issue, we will bring the matter to the government to help us resolve the issue," he said.

Wan Junaidi also said immediate maintenance work must be carried out at all drainage systems nationwide.

The ministry will also meet with town planners for a brainstorming session to improve the country's drainage system, he said.

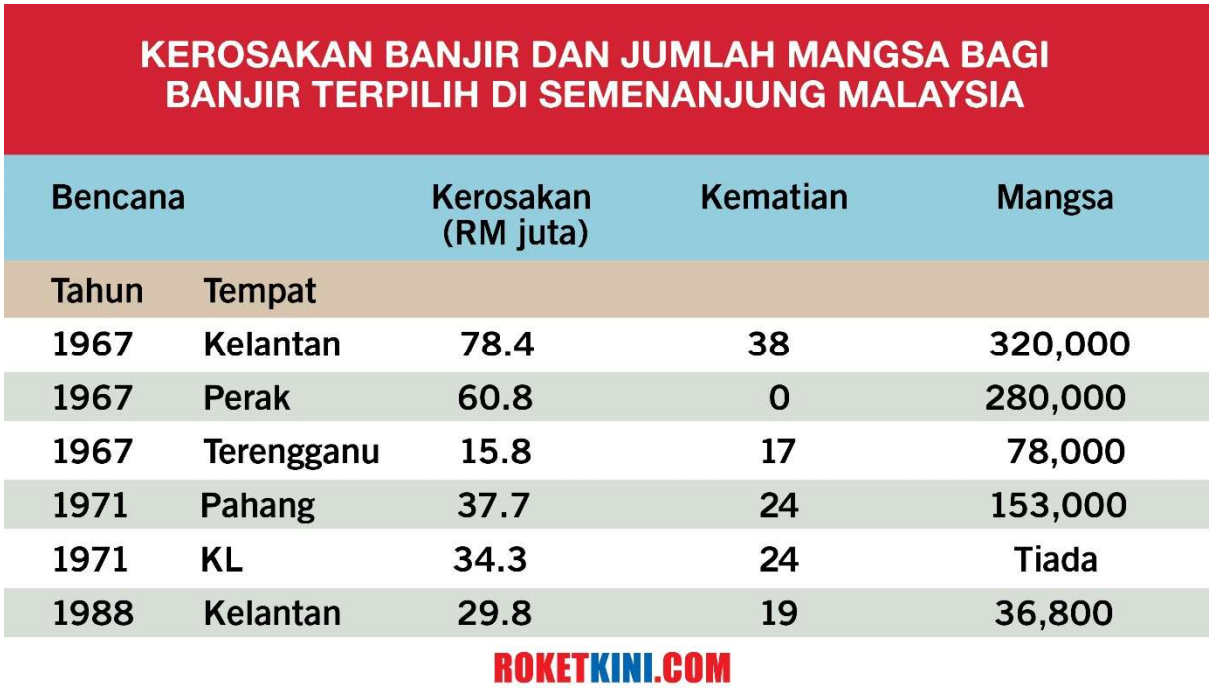
3. **Floods in Malaysia 2014** refer to floods throughout Malaysia. The floods in 2014 were the worst in Malaysia's flood history with over 300,000 evacuated. Since December 18, the Malaysian Meteorological Department has issued 38 severe weather alerts; 15 'Red' level warnings, 15 'Orange' warnings, and 8 'Yellow' alerts.

Kelantan

The number of displaced people in Kelantan reached 170,000 from approximately 36,000 families housed in 309 shelters involving eight districts. The New Town area recorded the highest number of flood victims at 44,061, Tumpat (30,569), Pasir Mas (23,568), Kuala Krai (23,500), Musang Cave (17,327), Machang (8,289), Red Land (3,546) and Pasir Puteh (192).

Pahang

The casualties involved in the flood affected nearly 35,000 people. Temerloh became the most affected area of the 12,012 flood victims in 71 relief centers. The other six districts were Kuantan with 3,046 victims in 17 evacuation centers, Pekan (4,873 victims in 17 evacuation centers), Maran (3,479 victims in 33 evacuation centers), Jerantut (6,025 victims in 59 evacuation centers), Bera (1,491 victims in 14 evacuation centers) and Lipis (2,299 victims in 31 evacuation centers). The East Coast Highway (LPT) for the Kuantan-Kuala Lumpur two-lane road and the old road are closed to traffic. People traveling to Kuantan from Kuala Lumpur were asked to use alternative routes through Seremban-Kuala Pilah-Serting-Muadzam Shah-Kuantan and vice versa.



KEROSAKAN BANJIR DAN JUMLAH MANGSA BAGI BANJIR TERPILIH DI SEMENANJUNG MALAYSIA

Bencana		Kerosakan (RM juta)	Kematian	Mangsa
Tahun	Tempat			
1967	Kelantan	78.4	38	320,000
1967	Perak	60.8	0	280,000
1967	Terengganu	15.8	17	78,000
1971	Pahang	37.7	24	153,000
1971	KL	34.3	24	Tiada
1988	Kelantan	29.8	19	36,800

Figure 2.1.1: Statistic of flash flood victim in Malaysia

4. KUALA LUMPUR, Dec 30 - The number of victims in Kelantan and Pahang continued to rise this afternoon, while Perak, Terenganu and Johor showed declines.

In KELANTAN the displaced victims increased to 158,476 people from 142,582 this morning.

According to a Kelantan National Security Council (MKN) spokesperson, the number involved 39,328 families housed in 317 evacuation centers.

The Kota Baharu district still has the most victims at 43,558 people in 63 relief centers.

The other seven districts, Pasir Mas, housed 9,960 victims in 35 centers, Tumpat (26,602 people in 32 centers), Tanah Merah (19,440 in 24 centers), Kuala Krai (23,500 in 103 centers), Gua Musang (13,327 in 24 centers), Machang (8,289 in 34 centers) and White Sand 192 in two centers), he said.

Flood conditions have not shown any signs of recovery as they continue to increase their numbers to 49,978 people compared with 49,369 people this morning at 261 relief centers in eight districts.

A spokesman for the Pahang Contingent Police Headquarters said a Temerloh district still housed the most evacuated victims of 19,875 people in 62 evacuation centers.

The other seven districts were 9,960 towns in 39 centers, Jerantut (6,025 people in 59 centers), Maran (4,351 in 32 centers), Kuantan (3,797 in 17 centers), Lipis (2,930 in 27 centers), Bera (2,854 in 19 centers) center) and Rompin 186 in six centers).

In PERAK, the flood situation showed a decline as the number of evacuees in the Kuala Kangsar district decreased, leaving the total number of victims in the state at 7,664 compared with 7,735 this morning.

According to a spokesman for the Perak National Security Council (MKN), the flood victims in Kuala Kangsar have so far 2,050 people from 539 families in 22 relief centers.

The total number of victims in the Perak Tengah area was 4,515 from 1,203 families in 19 centers.

In Hulu Perak, two new evacuation centers were opened, leaving 14 relief centers open with 799 victims from 215 families.

In Kerian the victims at two relief centers remain 300 people from 90 families.

In TERENGGANU, the number of casualties dropped to 25,775 compared with 30,652 this morning.

This is due to more victims leaving the evacuation center after the collapse.

According to Terengganu National Security Council (MKN) portal statistics, there are currently 15,918 manga in Kemaman, Dungun (9,507), Hulu Terengganu (74) and Kuala Terengganu (276).

In JOHOR, 153 people involving 43 families are still being held at the evacuation centers compared to 171 this morning in Muar, Batu Pahat, Ayer Hitam, Segamat and Kluang. – BERNAMA

NEGERI	BILANGAN MANGSA BANJIR DI PUSAT PEMINDAHAN
KELANTAN	158,476
PAHANG	49,978
TERENGGANU	25,775
PERAK	7,664
JOHOR	153
****Data ini sehingga pukul 7 pagi 30 Disember 2014 Sumber Bernama*	

Figure 2.1.2: The number of victims in Kelantan and Pahang continues to rise

People that have been involved in flash flood	55 persons
The average of time taken for the first aid to arrive in the house area	2-3 days
Family members that have been drowned during the flash flood	4 persons
Android user	76 persons
Responden that are agree if there is a smaller rescue boat that can be controlled with an android are provide in certain area	92 persons

Table 2.1.1: Google form analysis (Bases on 100 survey)

CHAPTER 3

METHODOLOGY

Methodology can be ‘analysis of the principle of methods, rules and postulates employed by a discipline’, ‘the systematic study of methods that are, can be, or have been applied within a discipline’ or ‘a particular procedure or set of procedures’.

Methodology includes a philosophically coherent collection of theories, concepts or ideas as they relate to a particular discipline or field of inquiry. Methodology refers to more than a simple set of methods, rather it refers to the rationale and the philosophical assumptions that underlie a particular study relative to the scientific method. This is why scholarly literature often includes a section on the methodology of the researchers.

Each step of project is a process to complete the project. Every step must be followed one by one and must be done carefully. If some error occurs it can make a project probably could not operate or do not look neat and perfect. Before the project finish, various process needs to be done according to proper procedures to ensure that projects do not have any problems.

This chapter contains:

- Block diagram
- Circuit diagram
- Flowchart
- Gantt chart
- Main components

3.1 BLOCK DIAGRAM

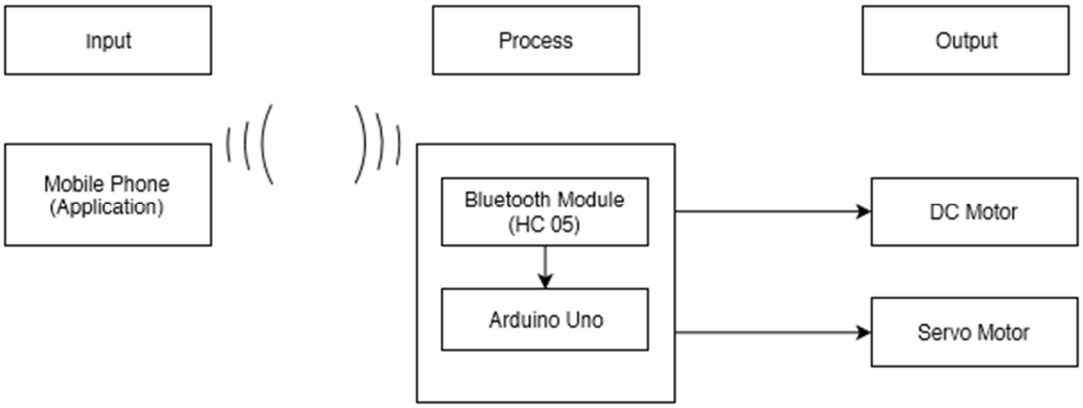


Figure 3.1: Block Diagram.

The input of the project development is the smartphone application which is Bluetooth Electronic Application. The process of the project consists of Arduino UNO and Bluetooth module HC 05. The movement, speed and direction of recue boat can control using the Bluetooth Electronic Application. .While the output of the project is called destination ; destination is the rescue boat itself. The rescue boat that will be build can travel around until 1.8km with the density of water between 1000kg/m³ and 1027kg/m³ with the gross load 5kg and with the speed 5000-30000RPM (DC 3V-12V).

3.2 CIRCUIT DIAGRAM

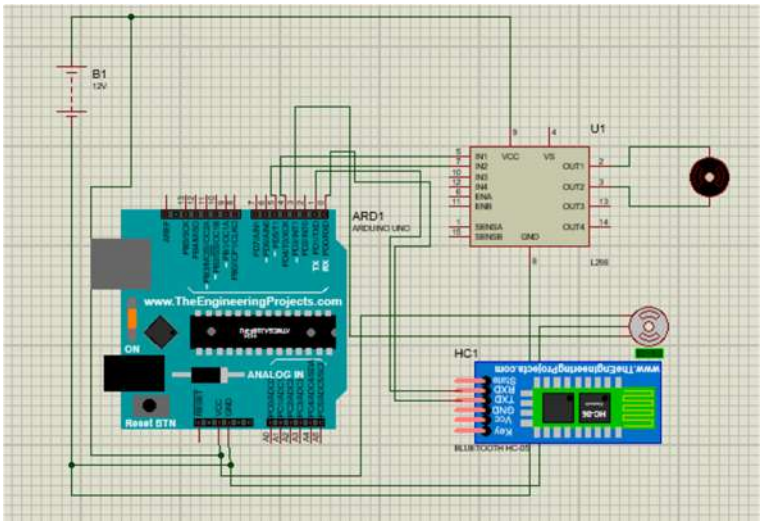


Figure 3.2: Circuit Diagram.

This circuit use Arduino Uno R3 as main component in this circuit. The Arduino will connect with Bluetooth Module HC 05 to access Bluetooth from phone (Bluetooth Electronic Application). For movement of the boat, this circuit use Hi Speed DC motor to provide movement and Servo motor to control the direction of the boat. This circuit use 12V battery to provide energy in this circuit. But output of Arduino only allow 5V voltage so we add L298 Motor Driver and connect direct the supply to L298 motor driver to support and give the enough voltage to DC motor and get the maximum speed.

3.3 FLOWCHART

3.3.1 Flowchart project

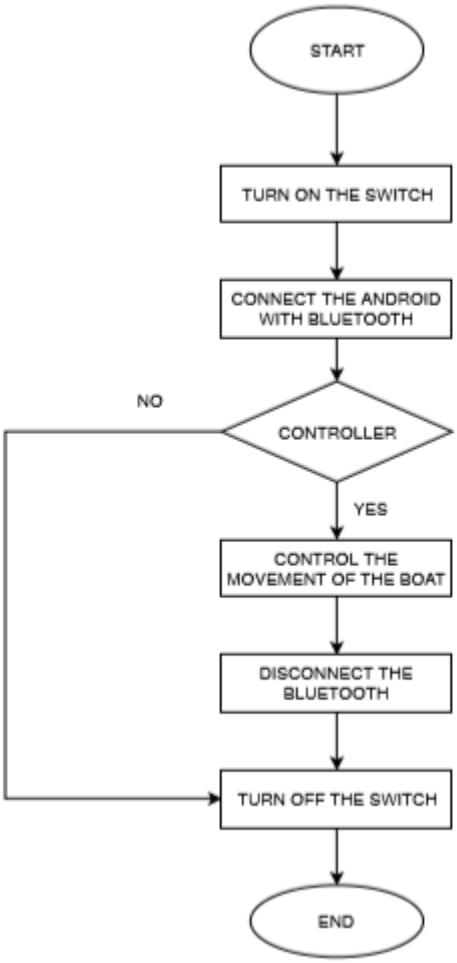


Figure 3.3.1: Flowchart project.

The motor of the of the boat can controlled by the Bluetooth Electronic Application from android. Using the app we can control the speed, movement and direction of the boat. Before we control the boat, we need to connect the boat and the boat using bluetooth with android.

3.3.2 Flowchart plan of project

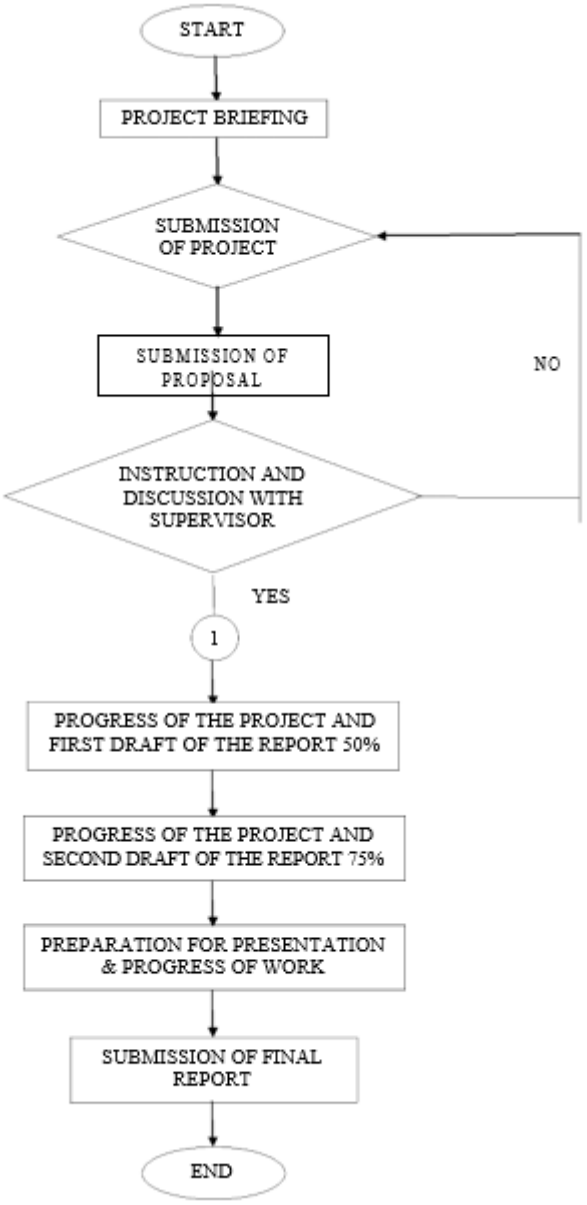


Figure 3.3.2: Flowchart plan of project.

3.3.3 Flowchart plan of project 1 (DEE5081)

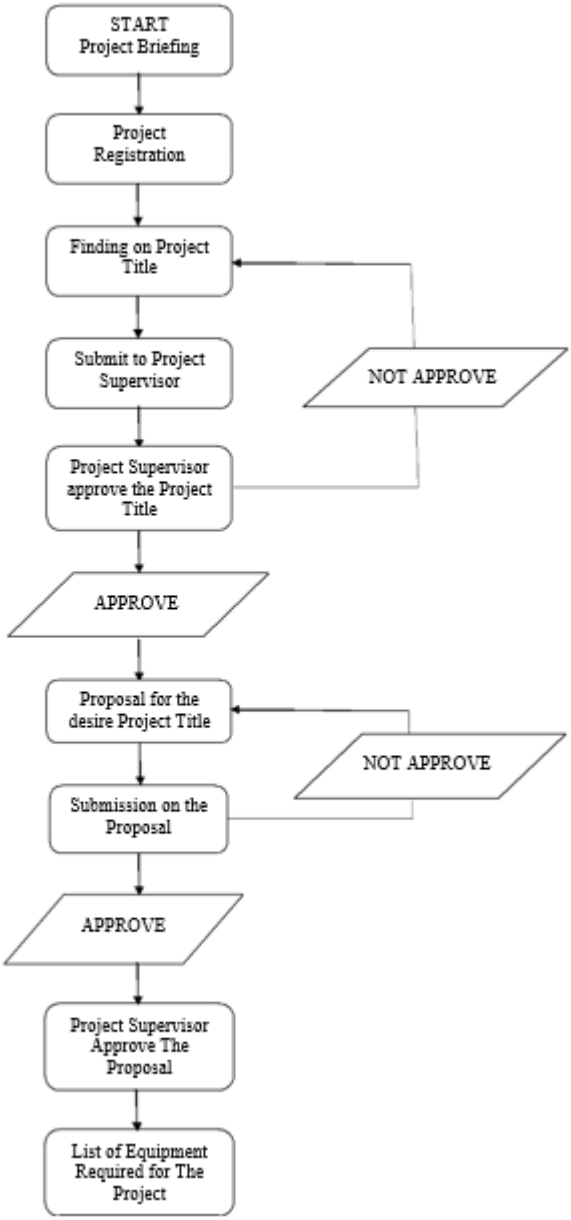


Figure 3.3.3: Flowchart plan of project 1 (DEE5081).

3.4 GANTT CHART

3.4.1 GANTT CHART PROJECT 1

GANTT CHART															
SESSION: DECEMBER 2018															
DEPARTMENT: ELECTRICAL ENGINEERING															
COURSE/CODE: DEP/DEE5061															
TASK/WEEK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
MAIN PROJECT PROGRESS															
IDEA PRESENTATION															
RESEARCH ON PROJECT															
DESIGN															
CIRCUTE SCHEMATIC AND SIMULATION															
COMPONENT SOLDERING															
TESTING AND DEBUGGING															
PRODUCT TESTING															
TROUBLESHOOTING															
														PLANING	
														IMPLEMENTATION	

Table 3.4.1: Gantt chart project 1.

3.4.2 GANTT CHART PROJECT 2

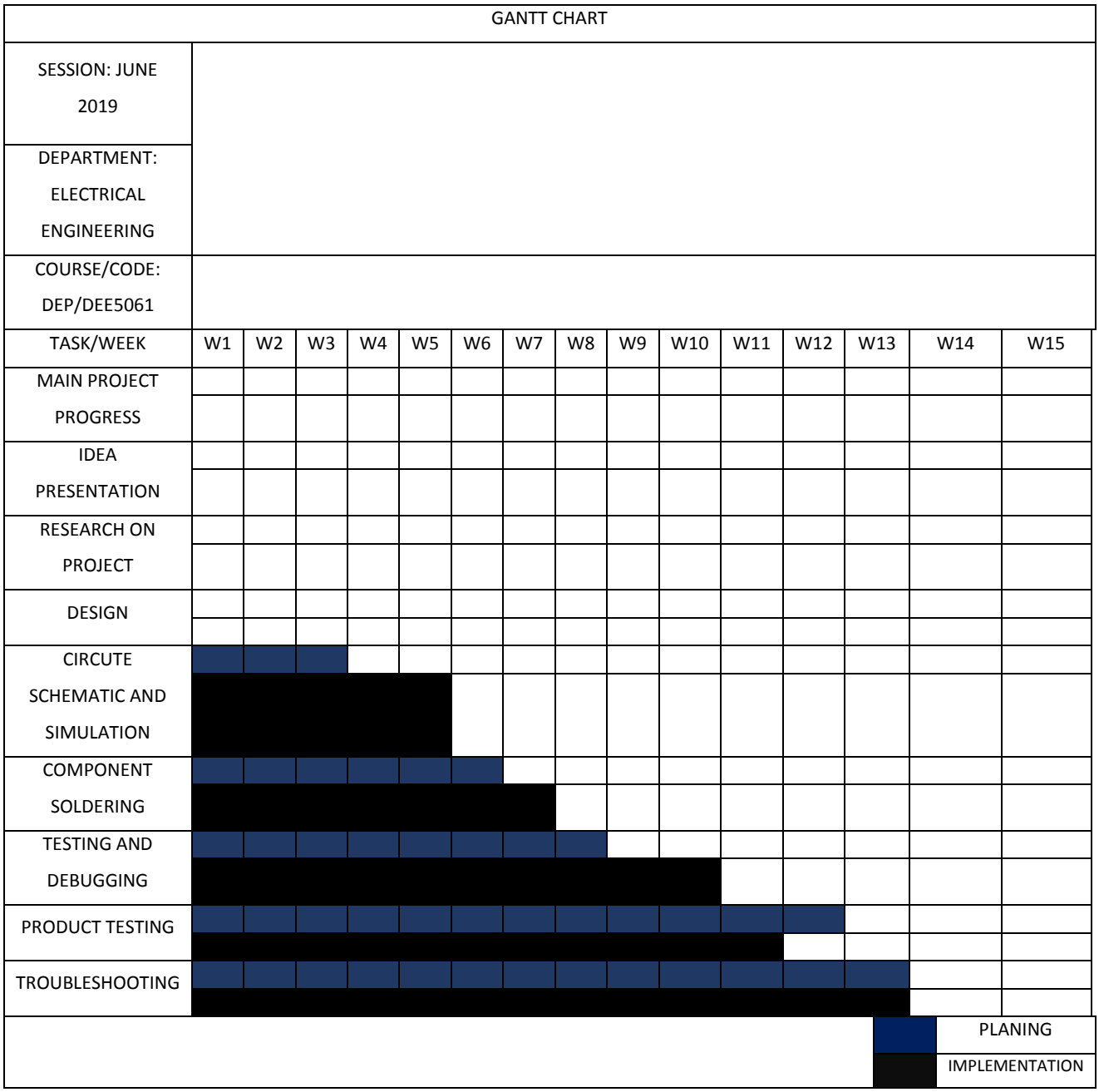


Table 3.4.2: Gantt chart project 2

3.4.3 GANTT CHART FULL PROGRESS OF PROJECT

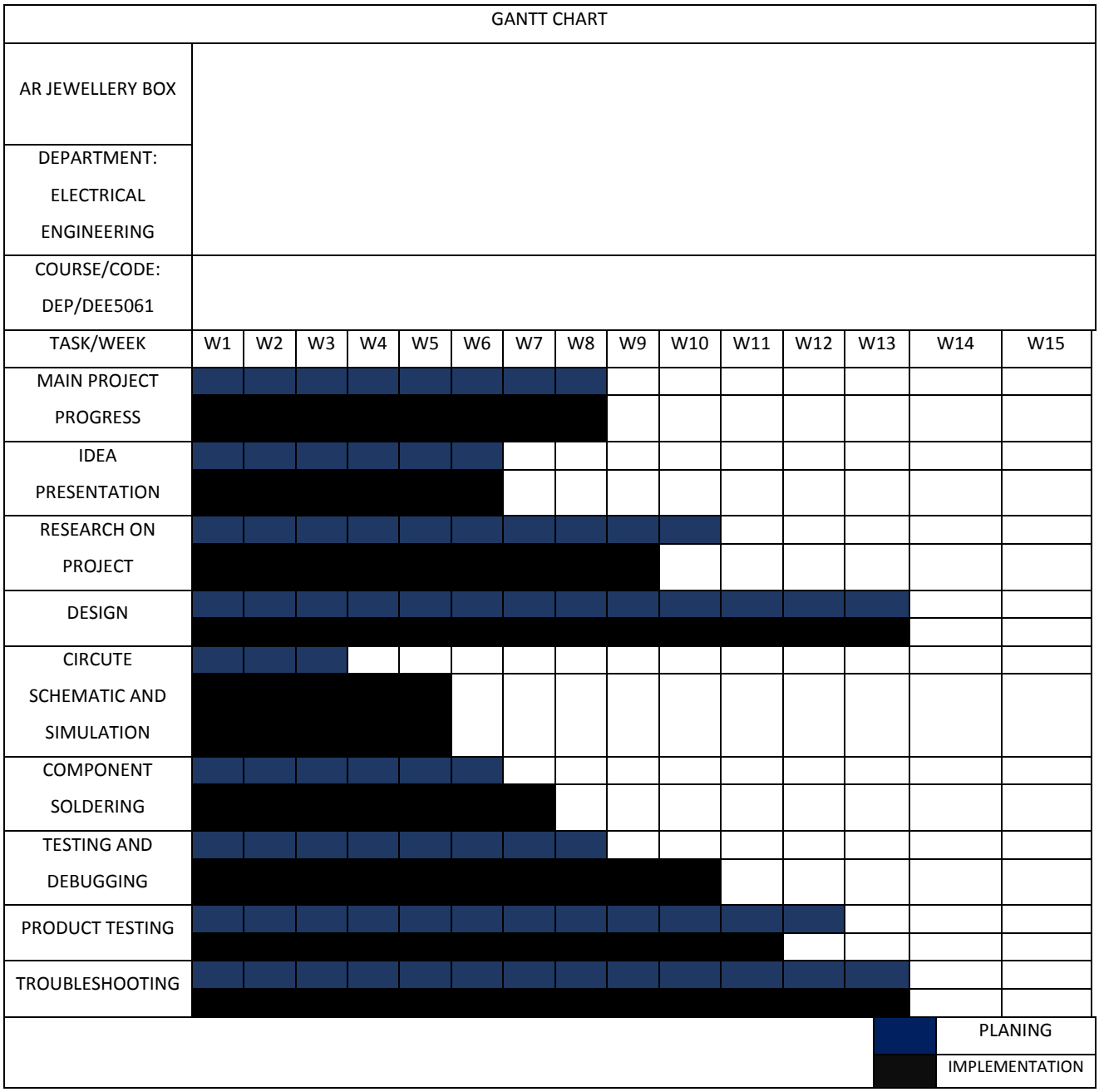


Table 3.4.3: Gantt chart full progress of project.

3.6 MAIN COMPONENTS

3.6.1 Arduino Uno R3

Figure 3.6.1: Arduino Uno R3

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno.

3.6.2 Bluetooth Module (HC-05)

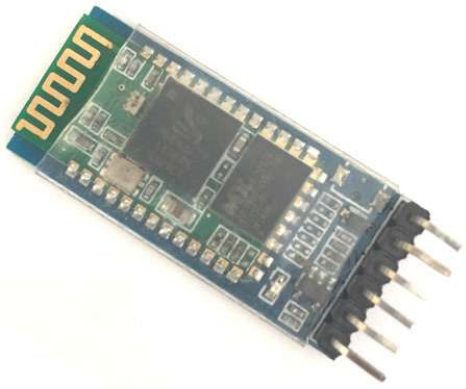


Figure 3.6.2: Bluetooth Module (HC 05)

The **HC-05** is a very cool module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which

makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode. So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you. However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that.

3.6.3 Servo Motor

Figure 3.6.3: Servo Motor.

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term *servomotor* is often used to refer to a motor suitable for use in a closed-loop control system. Most modern servomotors are designed and supplied around a dedicated controller module from the same manufacturer. Controllers may also be developed around microcontrollers in order to reduce cost for large-volume applications.

Why servo motor is better than stepper motor

Servomotors are generally used as a high-performance alternative to the stepper motor. Stepper motors have some inherent ability to control position, as they have built-in output steps. This often allows them to be used as an open-loop position control, without any feedback encoder, as their drive signal specifies the number of steps of movement to rotate, but for this the controller needs to 'know' the position of the stepper motor on power up. Therefore, on first power up, the controller will have to activate the stepper motor and turn it to a known position, e.g. until it activates an end limit switch. This can be observed when switching on an inkjet printer; the controller will move the ink jet carrier to the extreme left and right to establish the end positions. A servomotor will immediately turn to whatever angle the controller instructs it to, regardless of the initial position at power up.

The lack of feedback of a stepper motor limits its performance, as the stepper motor can only drive a load that is well within its capacity, otherwise missed steps under load may lead to positioning errors and the system may have to be restarted or recalibrated. The encoder and controller of a servomotor are an additional cost, but they optimise the performance of the overall system (for all of speed, power and accuracy) relative to the capacity of the basic motor. With larger systems, where a powerful motor represents an increasing proportion of the system cost, servomotors have the advantage.

There has been increasing popularity in closed loop stepper motors in recent years. They act like servomotors but have some differences in their software control to get smooth motion. The main benefit of a closed loop stepper motor is relatively low cost. There is also no need to tune the PID controller on a closed loop stepper system.

Many applications, such as laser cutting machines, may be offered in two ranges, the low-priced range using stepper motors and the high-performance range using servomotors.

3.6.4 Monster Motor Driver

Figure 3.6.4: Monster Motor Driver

VNH2SP30 is a full bridge motor driver intended for a wide range of automotive applications. The device incorporates a dual monolithic high side driver and two low side switches. The high side driver switch is designed using the STMicroelectronic's well known and proven proprietary VIPower M0 technology which permits efficient integration on the same die of a true Power MOSFET with an intelligent signal/protection circuitary. The VIN and motor out are pitched for 5mm screw terminals, making it easy to connect larger gauge wires. INA and INB control the direction of each motor, and the PWM pins turns the motors on or off. For the VNH2SP30, the current sense (CS) pins will output approximately 0.13 volts per amp of output current.

Specification:

- Voltage Range : 5.5V - 16V
- Maximum Current rating : 30A
- Practical Continuous Current: 14 A
- Current sense output proportional to motor current
- MOSFET on-resistance: 19 mΩ (per leg)
- Maximum PWM frequency: 20 kHz
- Thermal Shutdown
- Undervoltage and Overvoltage shutdown

3.6.5 DC Motor

Figure 3.6.5: DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

3.6.6 Rechargeable Battery

Figure 3.6.6: Rechargeable Battery

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction. Rechargeable batteries are produced in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of electrode materials and electrolytes are used, including lead–acid, nickel–cadmium (NiCd), nickel–metal hydride (NiMH), lithium-ion (Li-ion), and lithium-ion polymer (Li-ion polymer).

Rechargeable batteries typically initially cost more than disposable batteries, but have a much lower total cost of ownership and environmental impact, as they can be recharged inexpensively many times before they need replacing. Some rechargeable battery types are available in the same sizes and voltages as disposable types, and can be used interchangeably with them.

3.6.7 Jumper Wires

Figure 3.6.7: Jumper Wires.

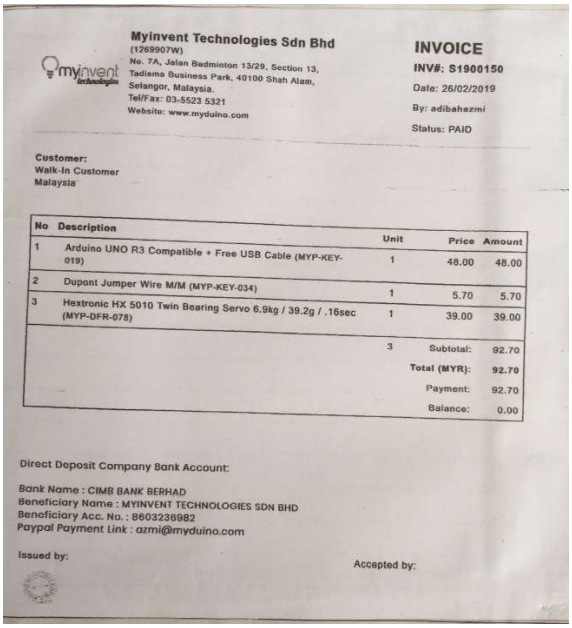
A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

3.7 Costing

COMPONENT	PRICE
ARDUINO UNO R3	RM48.00
JUMPER WIRE (M/M)	RM5.70
TWIN BEARING SERVO	RM39.00
BREADBOARD	RM7.00
LITHIUM BATTERY	RM60.00
DC 12V	RM75.00
CONNECTOR	RM3.00

ESP 8266 WIFI MODULE	**RM18.00**
DC ADAPTER CABLE	**RM6.00**
L289 MOTOR	**RM17.00**
BATTERY HOLDER	**RM6.00**
3D PRINTING MOTOR BRACKET	**RM30.00**
HC-05	**RM15.00**

Total = RM 559.00



Myinvent Technologies Sdn Bhd
(1269907W)
No. 7A, Jalan Badminton 13/29, Section 13,
Tadisma Business Park, 40100 Shah Alam,
Selangor, Malaysia.
Tel/Fax: 03-5523 5321
Website: www.myduino.com

INVOICE
INV#: S1900150
Date: 26/02/2019
By: adibahazmi
Status: PAID

Customer:
Walk-In Customer
Malaysia

No	Description	Unit	Price	Amount
1	Arduino UNO R3 Compatible + Free USB Cable (MYP-KEY-019)	1	48.00	48.00
2	Dupont Jumper Wire M/M (MYP-KEY-034)	1	5.70	5.70
3	Hextronic HX 5010 Twin Bearing Servo 6.9kg / 39.2g / .16sec (MYP-DFR-078)	1	39.00	39.00
		3	Subtotal:	92.70
			Total (MYR):	92.70
			Payment:	92.70
			Balance:	0.00

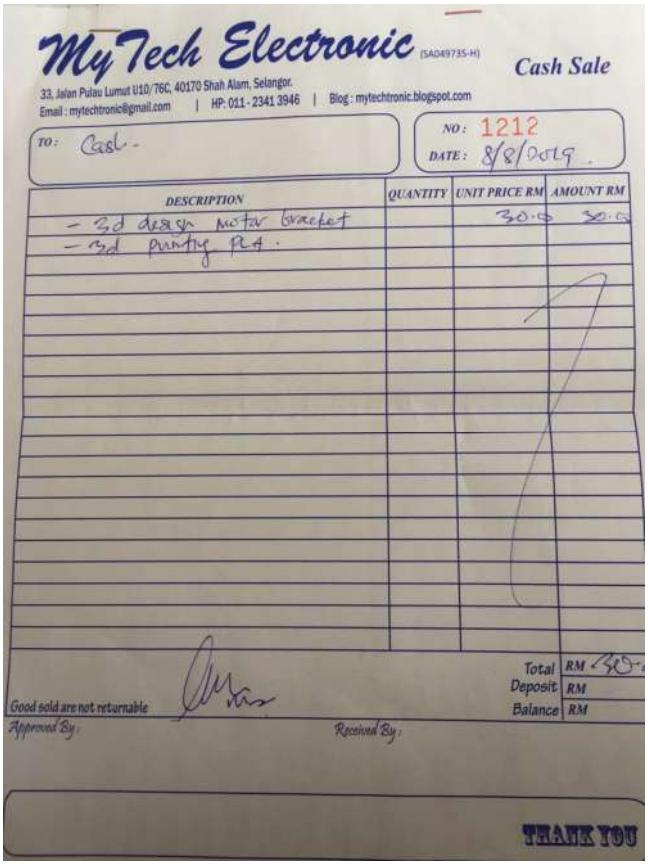
Direct Deposit Company Bank Account:

Bank Name : CIMB BANK BERHAD
Beneficiary Name : MYINVENT TECHNOLOGIES SDN BHD
Beneficiary Acc. No. : 8603236982
Paypal Payment Link : azmi@myduino.com

Issued by:

Accepted by:

Figure 3.7.1: Receipt of equipment



My Tech Electronic (SA049735-H)

Cash Sale

33, Jalan Pulau Lumut U10/76C, 40170 Shah Alam, Selangor.
Email : mytechtronic@gmail.com | HP: 011-2341 3946 | Blog : mytechtronic.blogspot.com

TO: Cash.

NO: 1212
DATE: 8/8/2019.

DESCRIPTION	QUANTITY	UNIT PRICE RM	AMOUNT RM
- 3d design motor bracket		30.00	30.00
- 3d printing PLA.			

Total RM 30.00
Deposit RM
Balance RM

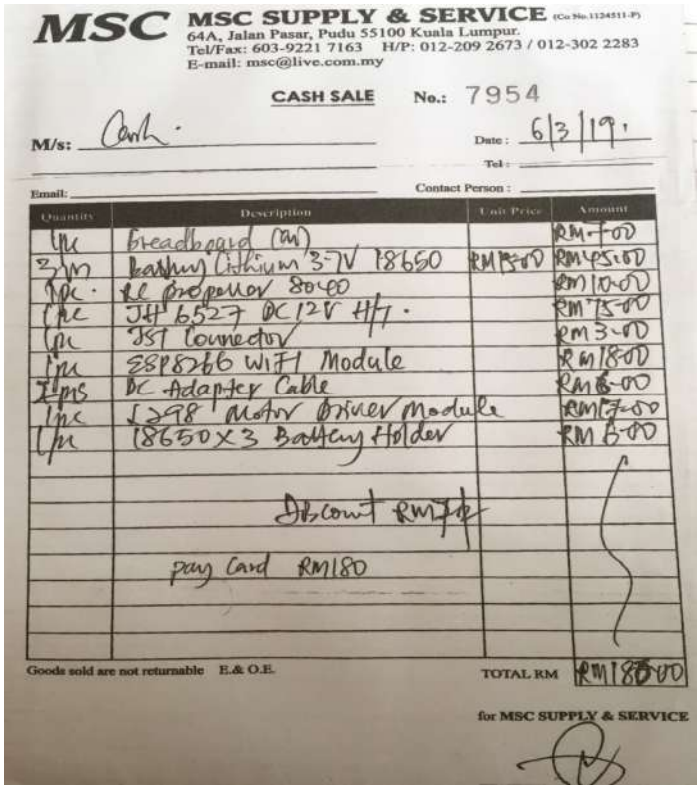
Good sold are not returnable

Approved By:

Received By:

THANK YOU

Figure 3.7.2: Receipt of 3D printing



MSC SUPPLY & SERVICE (Co No. 1124511-P)
64A, Jalan Pasar, Pudu 55100 Kuala Lumpur.
Tel/Fax: 603-9221 7163 H/P: 012-209 2673 / 012-302 2283
E-mail: msc@live.com.my

CASH SALE No.: 7954

M/s: Cash. Date: 6/3/19.

Tel:

Email: Contact Person:

Quantity	Description	Unit Price	Amount
1pc	Breadboard (M)		RM 7.00
3pcs	Rechargeable Lithium 3.7V 18650	RM 15.00	RM 45.00
10pc.	RC propeller 8040		RM 10.00
1pc	JST 6527 DC 12V H/T.		RM 15.00
1pc	JST Connector		RM 3.00
1pc	ESP8266 WIFI Module		RM 18.00
1pcs	DC Adapter Cable		RM 6.00
1pc	L298 Motor Driver Module		RM 7.00
1pc	18650X3 Battery Holder		RM 6.00
	Discount RM7.00		
	pay Card RM180		

Goods sold are not returnable E.& O.E.

TOTAL RM RM180.00

for MSC SUPPLY & SERVICE

Figure 3.7.3: Receipt of component and equipment

CHAPTER 4
RESULT

4.1 Introduction

This chapter will explain the result get from the expected result of the developed project. It will show and explaining the result has been received from the developed expected result. The result show is from the reading of configure the application, control the movement off the boat from android.

4.2 How do Internet of Things (IoT) works in this device.

Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals and people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The IoT concept has faced prominent criticism, especially in regards to privacy and security concerns related to these devices and their intention of pervasive presence.

On this, the device needs to paired first with Bluetooth on android phones. This Bluetooth is the only medium to transfer or access the data that to be connected to the devices. Without Bluetooth, the data will not allowed to be transfer cause I had been to use the wireless network only on this devices. We have programme a specific Bluetooth password to be connected. The data will be transferred directly from application to devices via Bluetooth to controlled the boat because Bluetooth did not had delay and did not use internet connection. So the devices can be controlled directly from application in mobile phone.

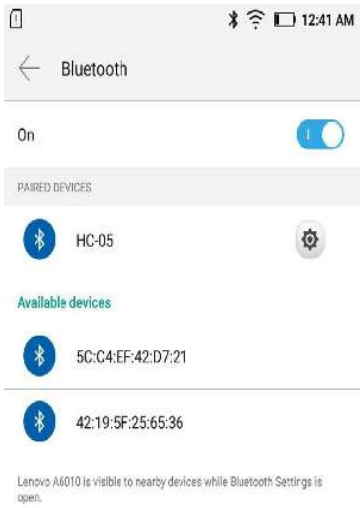


Figure 4.2.1: The devices paired with HC 05 Bluetooth module on Mini Rescue Boat

Figure 4.2.2: Open the Apps and the connect the Apps with Bluetooth Module

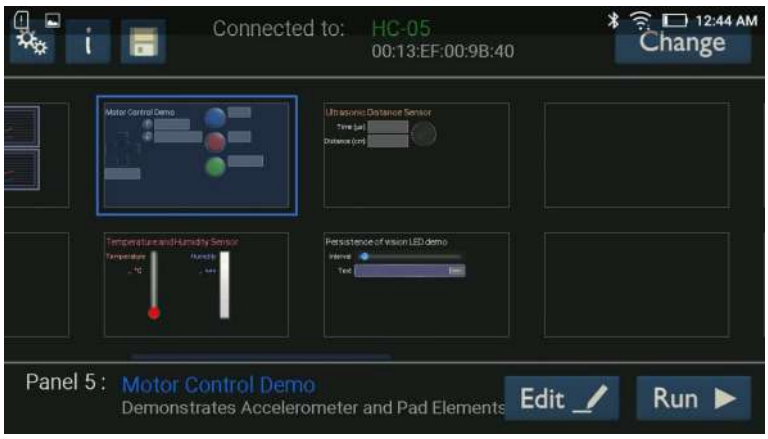


Figure 4.2.3: Apps is connected and ready to run.

Figure 4.2.4: Application interface

4.3 Overview

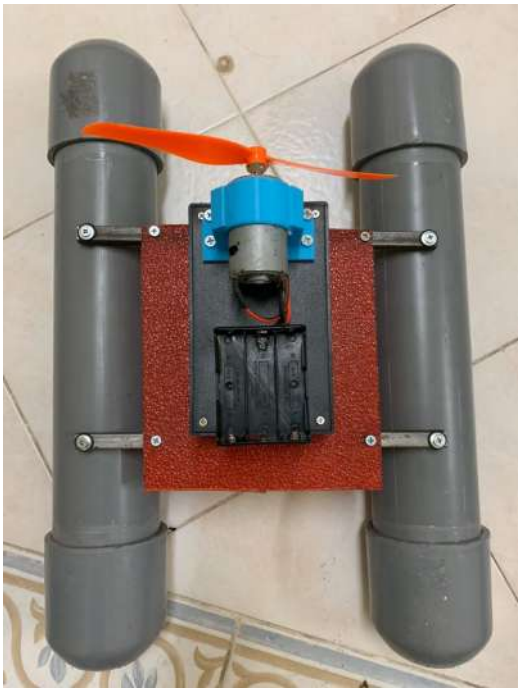
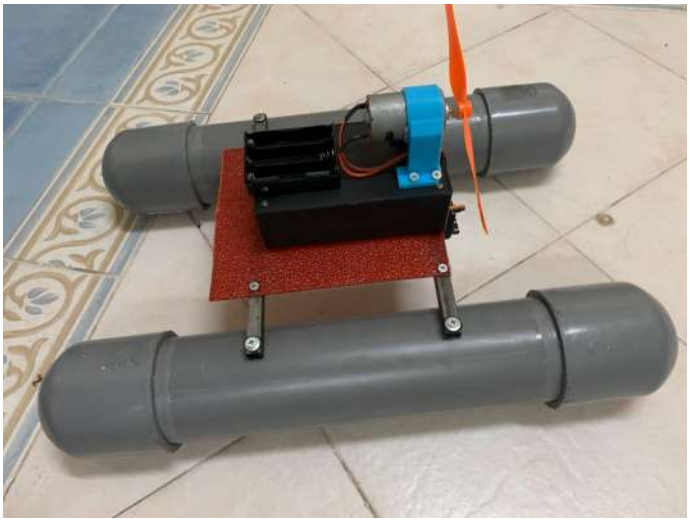


Figure 4.3.1: Front view



Figures 4.3.2 Side view

4.4 How this project works?

This product has been specially designed to easy move in the small place when flash flood happened. Also, the size of the product is not too big and easy to move in shallow water conditions. Furthermore, the boat can move without engine or fan inside water because this boat can move from pressure of air like hovercraft. The boat can floating on water with load approximately 5KG. Then, the boat can move at 30Km/h with hi speed 12V dc motor. The boat had one servo motor to control the direction of the boat, the boat will easy to turn right or turn left when it moved. The boat will easy to controlled with anybody who had any android devices because it designed to easy be controlled. The boat used rechargeable battery so it can be used repeatedly and long life than ordinary battery. This boat also have switch button so it can save the battery life.

This project are develop to avoid lot of the flash flood victim from not getting the first aid as soon as possible. It can rescue the victim at small places. It can be controlled using android phone and can the rescue man did not go to the destination just send the first aid and food from safety places just using android phone.

CHAPTER 5

ANALYSIS AND DISCUSSION

5.1 What is Internet of Things (IoT)

In a nutshell, the Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and to other connected devices. The IoT is a giant network of connected things and people – all of which collect and share data about the way it used and about the environment around it.

That includes an extraordinary number of objects of all shapes and sizes – from smart microwaves, which automatically cook human food for the right length of time, to self-driving cars, whose complex sensors detect objects in their path, to wearable fitness devices that measure human heart rate and the number of steps human taken that day, then use that information to suggest exercise plans tailored to human. There are even connected footballs that can track how far and fast they are thrown and record those statistics via an app for future training purposes.

5.2 How IoT works?

Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.

For example, if I own a car manufacturing business, I might want to know which optional components (leather seats or alloy wheels, for example) are the most popular. Using Internet of Things technology, I can:

- Use sensors to detect which areas in a showroom are the most popular, and where customers linger longest;
- Drill down into the available sales data to identify which components are selling fastest;
- Automatically align sales data with supply, so that popular items don't go out of stock.

The information picked up by connected devices enables me to make smart decisions about which components to stock up on, based on real-time information, which helps me save time and money.

With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean human can automate certain tasks, particularly when these are repetitive, mundane, time-consuming or even dangerous.

5.3 Why IoT is important?

The internet of things helps people live and work smarter as well as gain complete control over their lives. In addition to offering smart devices to automate homes, IoT is essential to business. IoT provides businesses with a real-time look into how their companies' systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations. IoT enables companies to automate processes and reduce labor costs. It also cuts down on waste and improves service delivery, making it less expensive to manufacture and deliver goods as well as offering transparency into customer transactions. IoT touches every industry, including healthcare, finance, retail and manufacturing. Smart cities help citizens reduce waste and energy consumption and connected sensors are even used in farming to help monitor crop and cattle yields and predict growth patterns. As such, IoT is one of the most important technologies of everyday life and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

5.4 Benefits of IoT

Benefits of IoT The internet of things offers a number of benefits to organizations, enabling them to:

• Monitor their overall business processes;
• Improve the customer experience;
• Save time and money;
• Enhance employee productivity;
• Integrate and adapt business models;
• Make better business decisions; and
• Generate more revenue.

IoT encourages companies to rethink the ways they approach their businesses, industries and markets and gives them the tools to improve their business strategies.

5.5 Pros and cons of IoT

Some of the advantages of IoT include:

• Ability to access information from anywhere at any time on any device;
• Improved communication between connected electronic devices;
• Transferring data packets over a connected network saves time and money;

• Automating tasks helps improve the quality of a business' services and reduces the need for human intervention.

Some disadvantages of IoT include:

• As the number of connected devices increases and more information is shared between devices, the potential that a hacker could steal confidential information also increases;

• Enterprises may eventually have to deal with massive numbers -- maybe even millions -- of IoT devices and collecting and managing the data from all those devices will be challenging.

• If there's a bug in the system, it's likely that every connected device will become corrupted;

• Since there's no international standard of compatibility for IoT, it's difficult for devices from different manufacturers to communicate with each other.

5.6 IoT standards and frameworks

There are several emerging IoT standards, including:

• 6LoWPAN (IPv6 over Low -Power Wireless Personal Area Networks), an open standard defined by the Internet Engineering Task Force (IETF). The 6LoWPAN standard enables any low-power radio to communicate to the internet, including 804.15.4, Bluetooth Low Energy and Z-Wave (for home automation).

• ZigBee0, a low-power, low data-rate wireless network used mainly in industrial settings. ZigBee is based on based the IEEE 802.15.4 standard. The ZigBee Alliance created Dotdot, the universal language for IoT that enables smart objects to work securely on any network and understand each other.

• LiteOS, a Unix-like operating system for wireless sensor networks. LiteOS supports smartphones, wearables, intelligent manufacturing applications, smart homes and Internet of Vehicles (IoV). The operating system also serves as a smart device development platform.

• OneM2M, a machine-to-machine service layer that can be embedded in software and hardware to connect devices. The global standardization body, OneM2M, was created to develop reusable standards to enable IoT applications across different verticals to communicate.

• DDS (Data Distribution Service) was developed by the Object Management Group (OMG) and is an IoT standard for real-time, scalable and high-performance machine-tomachine communication.

• AMQP (Advanced Message Queuing Protocol), an open source published standard for asynchronous messaging by wire. AMQP enables encrypted and interoperable messaging between organizations and applications. The protocol is used in client/server messaging and in IoT device management.

• CoAP (Constrained Application Protocol), a protocol designed by the IETF that specifies how low-power compute-constrained devices can operate in the internet of things.

• LoRaWAN (Long Range Wide Area Network), a protocol for wide area networks, it's designed to support huge networks, such as smart cities, with millions of low-power devices.

IoT frameworks include:

• AWS IoT, a cloud platform for IoT released by Amazon. This framework is designed to enable smart devices to easily connect and securely interact with the AWS cloud and other connected devices.

• ARM Mbed IoT, a platform to develop apps for the IoT based on ARM microcontrollers. The goal of the ARM Mbed IoT platform is to provide a scalable, connected and secure environment for IoT devices by integrating Mbed tools and services.

• Microsoft's Azure IoT Suite, a platform that consists of a set of services that enables users to interact with and receive data from their IoT devices as well as perform various operations over data, such as multidimensional analysis, transformation and aggregation, and visualize those operations in a way that's suitable for business.

• Google's Brillo/Weave, a platform for the rapid implementation of IoT applications. The platform consists of two main backbones: Brillo, an android-based operating system for the development of embedded low power devices; and Weave, IoT-oriented communication protocol that serves as the communication language between the device and the cloud.

• Calvin, an open source IoT platform released by Ericsson designed for building and managing distributed applications that enable devices talk to each other. Calvin includes a development framework for application developers as well as a runtime environment for handling the running application.

5.7 Consumer and enterprise IoT applications

There are numerous real-world applications of the internet of things, ranging from consumer IoT and enterprise IoT to manufacturing and industrial IoT (IoT). IoT applications span numerous verticals, including automotive, telecom and energy. In the consumer segment, for example, smart homes that are equipped with smart thermostats, smart appliances and connected heating, lighting and electronic devices can be controlled remotely via computers and smartphones. Wearable devices with sensors and software can collect and analyze user data, sending messages to other technologies about the users with the aim of making users' lives easier and more comfortable. Wearable devices are also used for public safety -- for example, improving first responders' response times during emergencies by providing optimized routes to a location or by tracking construction workers' or firefighters' vital signs at

life-threatening sites. In healthcare, IoT offers many benefits, including the ability to monitor patients more closely to use the data that's generated and analyze it. Hospitals often use IoT systems to complete tasks such as inventory management, for both pharmaceuticals and medical instruments. Smart buildings can, for instance, reduce energy costs using sensors that detect how many occupants are in a room. The temperature can adjust automatically -- for example, turning the air conditioner on if sensors detect a conference room is full or turning the heat down if everyone in the office has gone home. In agriculture, IoT-based smart farming systems can help monitor, for instance, light, temperature, humidity and soil moisture of crop fields using connected sensors. IoT is also instrumental in automating irrigation systems. In a smart city, IoT sensors and deployments, such as smart streetlights and smart meters, can help alleviate traffic, conserve energy, monitor and address environmental concerns and improve sanitation.

5.8 IoT security and privacy issues

The internet of things connects billions of devices to the internet and involves the use of billions of data points, all of which need to be secured. Due to its expanded attack surface, IoT security and IoT privacy are cited as major concerns. In 2016, one of the most notorious recent IoT attacks was Mirai, a botnet that infiltrated domain name server provider Dyn and took down many websites for an extended period of time in one of the biggest distributed denial-ofservice (DDoS) attacks ever seen. Attackers gained access to the network by exploiting poorly secured IoT devices. Because IoT devices are closely connected, all a hacker has to do is exploit one vulnerability to manipulate all the data, rendering it unusable. Manufacturers that don't update their devices regularly or at all leave them vulnerable to cybercriminals. Additionally, connected devices often ask users to input their personal information, including names, ages, addresses, phone numbers and even social media accounts information that's invaluable to hackers. However, hackers aren't the only threat to the internet of things; privacy is another major concern for IoT users. For instance, companies that make and distribute consumer IoT devices could use those devices to obtain and sell users' personal data. Beyond leaking personal data, IoT poses a risk to critical infrastructure, including electricity, transportation and financial services.

5.9 Data analysis from project testing

So from our observation we have done our data collection of our project that we got from the project testing. There are several data that we got from the observation. The data that we got is:

DATA	RESULT
Maximum distance application still have connection with boat	**30M**
Maximum speed of the boat on water	**30KM/H**
The maximum weight of load on boat	**5kg**

5.10 SITUATION ANALYSIS

5.10.1 Strengths

a) Smaller size – hence it name "Mini rescue boat"
b) Easy to use and friendly user – Controlled by android smartphone

5.10.2 Weaknesses

a) Limited distance – cannot travel far
b) New product - this product is the innovation of the product in market

5.10.3 Opportunities

a) It can go through small area to provide the first aid supply such as food, medical kit and so on
b) Government enforcement on innovation product- Innovative product is a proof of advanced country

5.10.4 Threats

a) The limited distance that the device can go through may not support the rescue activity
b) Customer preferences-customer may will to pay more for accurate product

CHAPTER 6

CONCLUSION

6.1 Introduction

This chapter will show the conclusion of the result of the overall project. It will summarize the result of the project.

6.2 Conclusion of the project

As a conclusion, we hope that Rescue boat controlled by android can be one of the most useful invention follow by the rapid development in technology. We also hope that our invention can be promoted to the government agencies so that it can help more people in need especially during the flash flood season which happen in Malaysia almost every year.

Besides, we also learned that in order to develop an invention we have to physically and mentally ready to face problem to get the best outcome that we want to achieve. Moreover, we also can see the determination and hardwork among our partner as the team work is the most important thing in this project, team work has tought us to always respect each ither and be more considerate to others as we have to do everything together. While develop the protect we also learned to be more prepare with lot of questions that will be questioned ; this help us to study more about our project so we will full of knowledge and this may improve our hard skills and so does our soft skills ; it also does boost our confidence level and make us braver than before. There are also many things that we can learned from the final year project and take it as a lesson for our future. We also believe that the future is engineering together to get the better and brighter future.

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7. https://www.google.com/search?q=statistik+mangsa+banjir+di+malaysia&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjRp6eDlqflAhUKinAKHWkKB2wQ_AUIEigB&biw=1355&bih=609#imgrc=ZT1c4n9lSpMNKM
8. http://www.ismakualaterengganu.com/2014/12/jumlah-mangsa-di-kelantan-dan-pahang.html
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