

REPORT PROJECT  
FIRE EXTINGUISHER ROBOT

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SUBMISSION OF THIS REPORT IS TO FULFILL  
THE REQUIREMENT FOR CERTIFICATE OF  
ELECTRONIC ENGINEERING ( COMPUTER ) AT THE  
DEPARTMENT OF ELECTRICAL ENGINEERING  
SEBERANG PERAI POLYTECHNIC

JUNE 2017

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## **AKNOWLEDGMENT**

First of all, I want to thanks to God, because with His permission I have finished doing my Final Project successfully. For my supervisor, Mr. Mohd Huzaimi Bin MD Hussin, I would like to thanks him because he have taught and guide me in this project. He has taught everything that he knows and shares his experience and knowledge to me. And not forget to my lovely family whom had given me support and motivation. To all my fellow friend whom give their time and knowledge to me when I in middle of problem and help me, a bunch of thank for them. Once again, I would like to thank the people who had help me out in the development of this project, I realize most of my project and ideas wouldn't have been possible without them. May God bless your all in everything you do.

## **ABSTRACT**

A robot can be controlled by a human operator, sometimes from a great distance. But most robots are controlled by computer. An autonomous robot acts as a stand-alone system, complete with its own computer (called the controller). Insect robots work in fleets ranging in number from a few to thousands, with all fleet members under the supervision of a single controller. The term insect arises from the similarity of the system to a colony of insects, where the individuals are simple but the fleet as a whole can be sophisticated. Recently, it has sometimes been impossible for fire-fighting personnel to access the site of a fire, even as the fire causes tremendous property damage and loss of human life, due to high temperatures or the presence of explosive materials. Therefore, designing the fire extinguisher robot can overcome this problem with reduce the human injury. This project includes the specification and design for fire extinguisher robot.

## APPRECIATION


We wish to express our sincere gratitude to Mr. Mohd Huzaimi Bin MD Hussin for her guidance and encouragement in carrying this project work. We greatly indebted to Mr. Mohd Huzaimi Bin MD Hussin for providing her valuable guidance at all stages of the study, her advice, constructive suggestions, positive and supportive attitude and continuous encouragement, without which it would have not been possible to complete the project.

Our wholehearted thanks and appreciation to Mr. Mohd Huzaimi Bin MD Hussin for her cooperation and assistance during the course of our project.

We hope that we can build open the experience and knowledge that I have gained and make a valuable contribution towards this industry in coming future.

## PROJECT REPORT COMFORMATION

We hereby declare that the work in this report is our own except for quotations and summaries which have been duly acknowledged.

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Date : 20/3/2017

Signature :  .....


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Date : 20/3/2017

Signature :  .....

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Date : 20/3/2017

Signature :  .....

Supervisor's Name : Mr. Mohd Huzaimi Bin MD Hussin

Date : 20/3/2017

# **CHAPTER 1**

## **INTRODUCTION**

Robotics is one of the fastest growing engineering fields of today. Robots are designed to remove the human factor from labour intensive or dangerous work and also to act in inaccessible environment.

The use of robots is more common today than ever before and it is no longer exclusively used by the heavy production industries. The need Fire Extinguisher Robot that can detect and extinguish a fire on its own is long past due. With the invention of such a device, people and property can be saved at a much higher rate with relatively minimal damage caused by the fire. Our task as engineers was to design and build a prototype system that could autonomously detect and extinguish a fire. Also aims at minimizing air pollution. It is the Robot that can move through a model structure, find a lit candle and then extinguish it with help of a fire extinguisher. Our research paper describes the design of a small autonomous Fire Extinguisher Robot. We have worked on the same project at our college presenting a synopsis showing its basic construction and working.



The Fire Extinguisher Robot is designed to search for a fire in a small floor plan of a house of the specific dimensions, extinguish the fire with the help of the fire extinguisher, and then return to the front of the house. The fire detection to be put into use is relatively free of false alarms, it is anticipated that it will not overreact in non-fire simulations. This mission is divided into smaller tasks, and each task is implemented in the most efficient manner such as self-autonomous start of the robot, navigation of the robot in every room step by step, finds the fire in a specific room, approaches the fire at a very fixed distance, extinguisher it and finally returning to the front of the house.

## **1.0 Research Background**

In today's lifestyle, many of us busy with our career. You might not be able to stop the dangerous coming through you. There is a way that can help to enhance ourselves with our project which is "Fire Extinguisher Robot". It can perform difficult and repetitive works for humans. Furthermore, this "Fire Extinguisher Robot" has capability to move from one location to another location. Besides that, it can have a very risky job and such dangerous job could be done by using Fire Extinguisher Robot. Finally, this projects will be implementing using Arduino software and fire extinguisher..

### **1.1 Motivation**

Fire Fighting is a critical operation that currently needs to be performed regularly by humans.

- Even small fires can become serious without timely detection.

- Once a fire breaks out, it is always an emergency that must be addressed immediately.
- We lose several human lives each year in firefighting activity.

## **1.2 Problem description**

Fire Extinguisher Robot is specifically designed for help humans, especially for firemen in the face of extinguishing fire situation. This robot uses can be applied at home or residential depending on how its operation. No matter it is used by firemen or individuals, the goal is only one which is to save lives when against the fire.

National Fire Protection Association has issued statistics on the number of firemen at the normal age suffering from line-duty deaths are due to heart attack by 25 percent, 21 percent die trapped by fire, 18 percent died after falling from a high place and the rest suffer from cancer as a result of direct contact with chemicals and poisonous. Firemen are more vulnerable to death in the course of their daily routine firefighting. The use of robots is one of the alternative medium for reducing firemen casualties and enhancing fireman capabilities.

Small fires from short circuits, gas stoves or other factors in the residence cannot be detected by human's sensitivity while robot design equipped with high sensitivity sensors can detect the presence of heat, smoke and fire. Unlike humans, the robot has a maximum capacity as alert, not tired and is able to perform 24 hours depending on the program of work specified in the robot.

The time factor is a problem in a fire situation. Small fire took just a few minutes before they become large, which may spread to other areas. Information through a phone call about a fire that was reported to firemen need time to determine the location of fire. The information of burning location must be

recorded before the firemen go to that place. Moreover, the vehicle they are driving, large and difficult to pass through the traffic jam. Through the production of fire extinguisher robot, the time can be reduced by placing the robot in a high-risk area of a fire.

Fire that occurred in nature is beyond human expectations. Fire caused by gas leak and chemical oil could cause an explosion, so dangerous to human life. Additionally degrees temperature level heat generated from the fire is beyond the capabilities of the human senses temperature. The fire extinguisher robot is capable doing its job in the area that is exposed to danger and able to perform the tasks at a high temperature.

### **1.3 System objectives**

To archive the goal of this project, there are some objectives that should archive. The objectives of project are:

- i. To design the fire extinguisher robot using Arduino as controller.
- ii. To create the fire extinguisher robot to can control by remote control.
- iii. This can be moved forward and reverse direction using geared motors and can take sharp turning.

### **1.4 System Scope**

This project has been motivated by the desire to design a system that can detect fires and intervention. In the present condition it can extinguish fire only in the way and not in all the rooms. It can be extended to a real fire extinguisher by increasing robot size and configurations. This provides us the opportunity to pass on to robots tasks that traditionally humans had to do but were inherently life threatening. Fire Extinguisher is an obvious candidate for such controller. Given the number of lives lost regularly in firefighting, the system we envision is crying

for adoption. Of course, this project has only scratched the surface. As in the design simplifications and the implementation constraints in suggest, our project is very much a proof of-concept. In particular, a practical controller fire extinguisher system must include a collection of robots, communicating and cooperating in the mission; furthermore, such a system requires facilities for going through obstacles in the presence of fire, and ability to receive instructions on the fly during an operation. All such concerns were outside the scope of this project. However, there has been research on many of these pieces in different contexts.

## **CHAPTER 2**

### **LITERATURE REVIEW**

A literature review is a body of text that aims to review the critical points of current knowledge and or methodological approaches on a particular topic.

Literature reviews are secondary sources, and as such, do not report any new or original experimental work.

Most often associated with academic-oriented literature, such as these, a literature review usually precedes a research proposal and result section. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area. A well-structured literature review is characterized by a logical flow of ideas; current and relevant references with consistent, appropriate referencing style; proper use of

terminology and an unbiased and comprehensive view of the previous research on the topic.

The report that we want to be produced needed a few factor that should be taken consideration until that project implemented. To get a quality project result, we need to study about the type of material, design, components that we used, framework installation, installation method and maintenance, level of project safety, structural strength, and project size and so on that we need make it and consider the result that we get. This is all ensure that no any problems would arise during the completion or even when presenting the project.

Hence, systematic and detailed planning must be arranged for produce a complete and perfect project. First step that we need made it, was design (sketching) to get the real image of machine that we want to be produced. Due to this, the work design and study that we made is a continuing process and it involving problem solving activity creatively namely which is known as literature study.

In this part we will explain about our components from the fire extinguisher robot. The main component is the PIC L293D where it will control the movement of the stepper motor. The other components for the PIC circuit are DC Gear Motor, Arduino Board, , Fire extinguisher, Resister, transistor, Remote Control.

## **2.0 Concept and theories of existing models**

The main concept of this project is get a protection for help humans, especially for firemen in the face of extinguishing fire situation. This robot uses can be applied at home or residential depending on how its operation. No matter it is used by firemen or individuals, the goal is only one which is to save lives when against the fire. So, it will be useful them.

## 2.1 Advantages and Disadvantages of Fire Extinguisher Robot

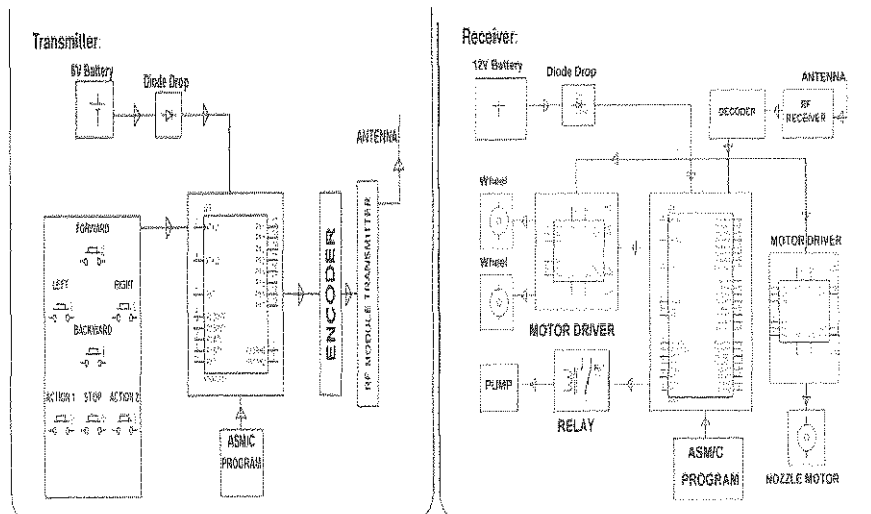
### ADVANTAGES

- To detect the exact direction of the fire source.
- Reduce human effort.
- Not sensitive to weather conditions.
- Reliable and economical.

### DISADVANTAGES

- Communication devices mostly use similar frequency, so interference occurs if the address are not specified.
- High cost.
- It cannot be work beyond the limit.
- It is not used to put out large fires.

### BLOCK DIAGRAM



## 2.3 FLOWCHART OF PROJECT

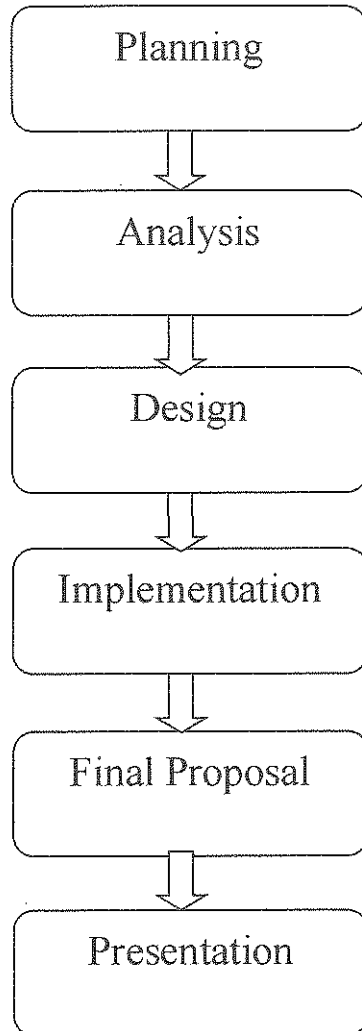


Figure 2.3: Flowchart of project



## 2.4 Component of projects

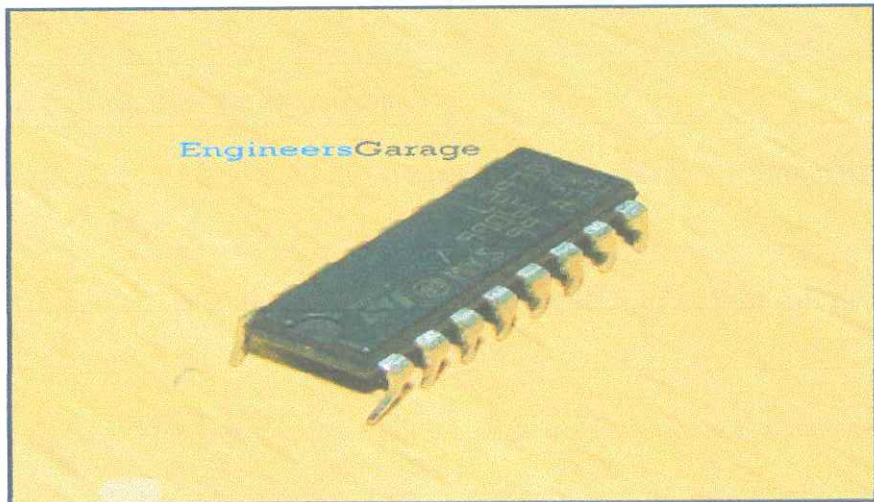
No	Description	Quantity	Price (RM)
1.	RES 10K	13	1.30
2.	CAP	8	1.00
3.	DIODE	1	0.30
4.	9V Battery	2	8.00
5.	1.5v Battery	4	6.00
6.	Arduino uno	2	90.00
7.	Dc Motor	4	320.00
8.	Wheel	4	
9.	Battery Holder	1	2.00
10.	L293D	1	12.00
11.	Inductor 6t	1	0.20
12.	Push Button	6	5.00
13.	Switch	4	4.50
14.	Copper plate	1	5.00

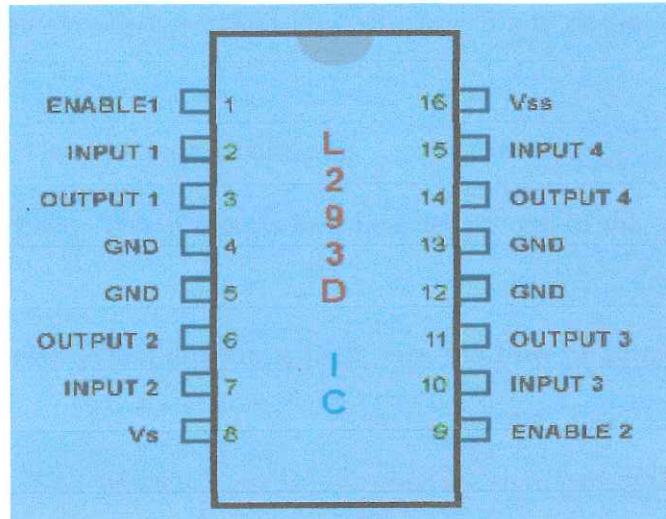
15.	LEDs	8	2.50
16.	Wires	60	30.00
17.	Transmitter	1	45.00
18.	Receiver	1	45.00
19.	Prospek	1	3.00
20.	Board	1	5.00
21.	Fire extinguisher	1	40.00
22.	Servo motor	1	15.00
23.	Remote control	1	45.00
24.	Laser paper	2	2.00
<b>Total</b>			<b>RM 687.80</b>

### 2.4.1 L293D Motor Driver IC

L293D IC is a typical Motor Driver IC which allows the DC motor to drive on any direction. This IC consists of 16-pins which are used to control a set of two DC motors instantaneously in any direction. It means, by using a L293D IC we can control two DC motors. As well, this IC can drive small and quiet big motors.

This L293D IC works on the basic principle of H-bridge, this motor control circuit allows the voltage to be flowing in any direction. As we know that the voltage must be change the direction of being able to rotate the DC motor in both the directions. Hence, H-bridge circuit using L293D ICs are perfect for driving a motor. Single L293D IC consists of two H-bridge circuits inside which can rotate two DC motors separately. Generally, these circuits are used in robotics due to its size for controlling DC motors.





- ✚ Pin-1 (Enable 1-2): When the enable pin is high, then the left part of the IC will work otherwise it won't work. This pin is also called as a master control pin.
- ✚ Pin-2 (Input-1): When the input pin is high, then the flow of current will be through output 1
- ✚ Pin-3 (Output-1): This output-1 pin must be connected to one of the terminals of the motor
- ✚ Pin-4 & 5: These pins are ground pins
- ✚ Pin-6 (Output-2): This pin must be connected to one of the terminals of the motor.
- ✚ Pin-7 (Input-2): When this pin is HIGH then the flow of current will be through output 2
- ✚ Pin-8 (Vcc2): This is the voltage pin which is used to supply the voltage to the motor.
- ✚ Pin-16 (Vss): This pin is the power source to the integrated circuit.
- ✚ Pin-15 (Input-4): When this pin is high, then the flow of current will be through output-4.