POLITEKNIK
MALAYSIA
SEBERANG PERAI

FIRE FIGHTER ROBOT

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POLITEKNIK SEBERANG PERAI
JABATAN KEJURUTERAAN ELEKTRIK

JUN 2017

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Jabatan Pengajian Politeknik

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ABSTRACT

The security of home, laboratory, office, factory and building is important to human life. We develop an intelligent multi sensor based security system that contains a fire fighting robot in our daily life. The destructive burnt cause by electrical is the highest source. It is because security system can't detect abnormal and dangerous situation and notify us. Besides, user had difficulties to detect the small burnt cause by electrical appliances. User may take a late time to extinguish fire like finding the water source to extinguish fire when want to extinguish the fire. The fire difficulties to detect the small burnt area and location that is hard to be reach by the user Sometimes tough fire extinguished for example spaces are hard to see. This robot also programmed to stop before the robot hit the flame.

APPRECIATION

We are very thankful to Mister for his kindness, thoughtful, patience for guiding us Mr. Norazri Bin Bakhari was always supported us, teach us, give a good cooperation at all times, and also a great advisor for us from beginning project until end of the project.

Appreciate also goes to Mr.Hamadi B.Ahmad that willing to help us to solve, check, manage our circuit to get the precisely results. Kindness is a language which the dump can speak, the deaf can understand.

He will be rewarded thanks. Other than that, I would like to express gratitude towards my parents, and my colleague for kind encouragement, co-operation and their willingness to help me out which help better in completion of this project.

It would not have been possible without the kind support and help of many individuals and organizations. I would like to extend our sincere thanks to all of them.

VERIFICATION

We hereby declare that this report is the effort of our own to make successful project with information retrieved from the sources that were mentioned in the accreditation. This project report titled " FIRE FIGHTER ROBOT " has been submitted, reviewed and confirmed as meeting the conditions and requirements of writing projects as required.

Reviewed and approved by:

Name of supervisor: Mr. Norazri Bin Bakhari

Signature of Supervisor

Date:

"We declare that this is the result of our own except for each of which we have explained the source".

Signature:

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CHAPTER 1

INTRODUCTION

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INTRODUCTION

1.1 INTRODUCTION

Nowadays, machinery and robotic design become important in helping human. This Fire Protection Robot was design to help people in any destructive burnt situation where this robot can extinguish burnt area immediately using autonomous system. This autonomous system will be designed using programming in PIC18F4550 and others additional circuit.
In real life, destructive burnt area often happens without our realization. Therefore, this type of robot will require a high demands in the market because of its usefulness to the human as well and also for the environment. .

1.2 PROJECT BACKGROUND

- This robot is to help people to extinguish the fire.
- With the flame sensor and Bluetooth HC-06, it can control the movement of the robot and to find the fire.
- This project is implement using Arduino Uno and C programming.

1.3 PROBLEM STATEMENT

The security of home, laboratory, office, factory and building is important to human life. We develop security system that contains a fire protection robot using sensor. The security system can detect abnormal and dangerous situation and notify us. First, we design a fire protection robot with extinguisher for the intelligent building. Besides, Human had difficulties to detect the small burnt cause by electrical appliances. The late time user takes to extinguish the fire. User may take a late time to extinguish fire like finding the water source to extinguish fire when want to extinguish the fire. The fire difficulties to detect the small burnt area and location that is hard to be reach by the user. Sometimes tough fire extinguished for example spaces are hard to see. Besides is cost the loss suffered in the event of fire slow to act.

PUNCA KEBAKARAN BANGUNAN NEGERI PULAU PINANG

BULAN JANUARI - OGOS TAHUN 2006

KOD	PUNCA	JUMLAH PANGGILAN	KERUGIAN (RM)	DISELAMATKAN (RM)
PK 1	LETRIK	76	95,584,070.00	180,271,030.00
PK 2	PUNTUNG ROKOK	7	204,000.00	1,234,000.00
PK 3	PERCIKAN API	6	2,542,000.00	51,421,000.00
PK 4	MERCUN / BUNGA API	2	5,000.00	20,000.00
PK 5	UBAT NYAMUK / COLOK / LILIN	21	1,317,700.00	7,387,957.70
PK 6	DAPUR GAS / MINYAK	19	944,460.00	73,061,450.00
PK 7	REAKSI SPONTAN	3	225,000.00	5,105,000.00
PK 8	SENGAJA DIBAKAR - NIAT BAIK	3	200.00	0.00
PK 8	SENGAJA DIBAKAR - NIAT JAHAT	17	900,500.00	2,920,500.00
PK 9	TIDAK DIKETAHUI	7	3,900,000.00	2,798,400.00
PK 10	TINDAK BALAS KIMIA	1	8,000,000.00	10,100,000.00
PK 11	BUDAK BERMAIN MANCIS	2	7,500.00	217,500.00
PK 12	LAIN-LAIN PUNCA	34	3,961,500.00	6,916,200.00
JUMLAH		**198**	**117,591,930.00**	**341,456,037.70**

Figure 1.1 : Destructive burnt source for Penang

From figure 1.1, the destructive burnt cause by electrical is the highest source. From this table, the designing of Autonomous Fire Protection Robot with Notification must be suitable with this type of destructive burnt

1.4 OBJECTIVES OF PROJECT

The objectives for this project are:

i. To design a robot moves towards the fire and can resist the fire.

ii. To build a robot which can control by using Bluetooth module.

iii. To analyze how the robot performance to detect the angle of burnt area in front of the robot.

1.5 PROJECT SCOPE

The project scopes for this project are:

i. The robot detecting burnt area surrounding.

ii. Robot detect fire event, and use extinguish to fight the fire source and the modem connected to the
programmable device.

iii.. The robot can extinguish fire from petrol, gasses and electrical appliance

CHAPTER 2

LITERATURE REVIEW

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter are discussing about a study on the previous project based on fire fighter robot project and thesis. The entire project had been studied and analyzed their principles, method and applications.

2.2 ROBOT

Robot is a machine that looks like a human being and performs various complex tasks. Now, let's have a good look at existing fire fighting robots.
Virtual Reality Simulation of Fire Fighting Robot is a virtual adaptation of competition robot, that took part in Panitia Kontes Robot Cerdas Indonesia competition in 2006. This system was developed in MATLAB/Simulink with the help of plug-in. It is oriented for initial testing of controlling algorithms. It important to notice, that even the robot itself doesn't have enough level of functionality, because of low-detailed formalization of environment.

The robot could operate only in corridor-room environment, without strange objects. Only one fire source is meant and there are auxiliary marks on floor, that mean for example room entrance. Pokey the Fire-Fighting Robot (USA) is the firefighting robot, that made its way out of competitions, and became more "serious" than other systems. In there are detailed description of used equipment and basic algorithms of operating. Robots operating environment is a building, so the robot is equipped with necessary sensors, for example, with a line sensor, that could be unuseful in conditions of dense smoke.

a) The main advantages of robot are:

i. using of two types of fire sensors, working in different ways;

ii. using of complex firefighting tool

b) The main disadvantages are:

i. short distance of sensor's work. the fire could be recognized at the distance not more than 1.5m. at longer distances the sensors works bad, ad developers say

ii. low efficiency of onboard computer, able only to carry main tasks, without its extension and complexization;

iii. absence of optical means of environment perception

The device is described as autonomous mean of firefighting in houses and any civil buildings. Fire Protection Robot (USA) – another competition project, developed for «15th Annual Trinity College Fire Fighting Robot Competition». Robot has more complex organization, than one, shown above and is oriented for solving larger variety of tasks.

a) The main system's advantages are:

i. more complex algorithms, used for fire detection.

ii. using of sound sensor for activating

iii. presence of some additional navigation sensors.

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b) The main disadvantages are:

i. low-efficiency computer

ii. low-power chassis;

iii. absence of home-return algorithm;

iv. absence of mapping;

Firefighting Robot [12] is an American Trinity College development, that was only on early-prototype stage (in 2008). It was supposed to this robot to be an autonomous device, with 15 minutes limited working time, after which it will return to the supply station. This approach is one of the best variants for firefighting in houses and non-industrial buildings.

a) The main disadvantages are:

i. the little working time

ii. low-stock of "water

The planning low-cost is a system's main advantage. In special order it's necessary to notice firefighting robots, included in Russian Ministry of Emergency Situations. Among them are "ABR-ROBOT", "El-4", "El-10". These models are far away from competition projects, they armed with a real armour and firefighting tools, but their main disadvantage consists in remote controlling. They aren't autonomous. The others history of robot development was shown in table 2.1 below:

DESIGNER	YEAR	DESCRIPTION
Archytas	(347 BC)	A bird-shaped model propelled by a jet of what was probably steam, said to have actually flown some 200 yards. This machine, which its inventor called The Pigeon, may have been suspended on a wire or pivot for its flight.
Al-Jazari	(1206)	A boat with four automatic musicians that floated on a lake to entertain guests at royal parties.

Leonardo da Vinci	(1519)	Further analysis of the plans has led some to believe that the robot would have been able to sit up, wave its arms and move its head and jaw. It is not known whether he attempted to build the robot.
Jacques de Vaucanson	(1782)	A mechanical duck that was able to eat and digest grain, as well as flap its wings. Vaucanson gained celebrity across Europe for his constructs.
Pierre Jaquet-Droz	(1790)	Animated dolls, or automata, to help sell watches and mechanical birds. He and his son created three dolls, each with a unique function. One can write, another plays music, and the third draws pictures. Some consider these devices to be the oldest examples of the computer.
Hisashige Tanaka	(1881)	Array of inventions including automatic gas lamps, clocks, and extremely complex mechanical toys, some of which were capable of serving tea, firing arrows drawn from a quiver, or even painting a Japanese kanji character.
Karel Čapek	(1938)	The word robot was introduced by Czech writer Karel Čapek in his play R.U.R. (Rossum's Universal Robots) premiered in 1920.
George Westinghouse	(1914)	A humanoid robot known as Elektro, exhibited at the 1939 and 1940 World's Fairs. Seven feet tall, weighing 265 pounds, humanoid in appearance, it could walk by voice command, talk (using a 78-rpm record player).

Nikola Tesla	(1943)	Tesla discovered remote control and patented a radio controlled robot-boat/submarine in November 8, 1898. Tesla used radio waves to move the craft in a small pool of water in Madison Square Garden, New York City during the Electrical Exhibition in 1898.
William Grey Walter	(1977)	The first electronic autonomous robot was created by William Grey Walter at Bristol University, England in 1948. It was named Elsie, or the Bristol Tortoise. This robot could sense light and contact with external objects, and use these stimuli to navigate.

2.3 FULL SYSTEM BLOCK DIAGRAM

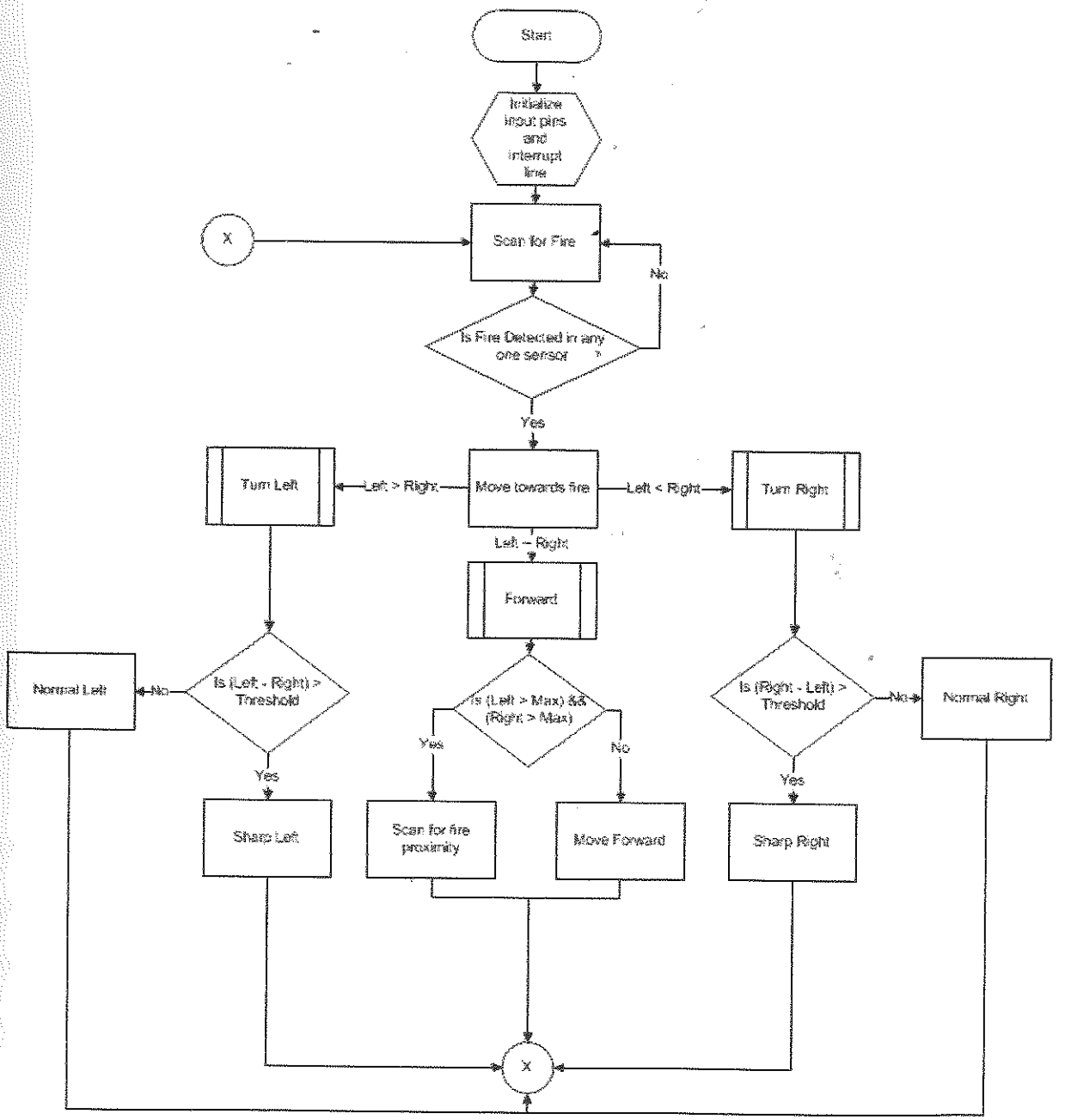

Diagram 2.3.1: Block Diagram of Circuit