

# HUMAN MOTION DETECTION

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*Specially dedicated to  
My beloved father and mother,  
To my family and friends,  
Thanks for all the encouragement and support*

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## ABSTRACT

In the real life, there are many types of warning system that had been designed in order to overcome emergency problems. The main objective of Human Motion Detection is to construct a home security system and motion detector by using Pyroelectric Infra-Red (PIR) Sensor. The output of this system is a buzzer as the warning signal to owner if the owner is in the house, and also a GSM (Global System of Mobile Telecommunication) device as it sends a notification to the owner. This system is mainly for home security. With the system that provides a real-time notification, it increases the response time of the owner. This will provide the immediate solution to avoid the bad situation occur. PCW CCS Compiler (IDE) software has been adopted in this project and C language is selected for programming methods. This system consists of with the microcontroller to control the interface. The project has been divided into two main phases which are software development and hardware development. In the software development, it is involved with the design entry, simulation process and downloads process. Meanwhile, the hardware development covers sensor circuit and GSM device. The system has function properly when the Pyroelectric sensor triggered, the buzzer and LED will be activated and the GSM as a transmission medium will send a warning message to mobiles phone owner.

## ABSTRAK

Dalam kehidupan kita yang sebenar, terdapat banyak jenis sistem amaran yang telah direka dalam usaha untuk mengatasi masalah kecemasan. Objektif utama Pengesanan Pergerakan Manusia adalah untuk membina sistem keselamatan rumah dan mengesan pergerakan dengan menggunakan Infra-Merah (PIR) Pyroelectric pengesan. Hasil dari sistem ini adalah penggera sebagai isyarat amaran kepada pemilik jika pemilik ada di dalam rumah, dan juga peranti GSM (Sistem Global Telekomunikasi Mudah Alih) digunakan untuk menghantar pemberitahu mesej amaran kepada pemilik. Tujuan sistem ini digunakan adalah terutamanya untuk keselamatan rumah. Dengan sistem yang menyediakan pemberitahu masa sebenar, ia meningkatkan masa tindak balas pemilik. Ini akan memberikan bantuan segera jika keadaan itu berlaku. PCW CCS Pengkompil (IDE) perisian telah digunakan dalam projek ini dan bahasa C dipilih untuk kaedah pengaturcaraan. Sistem ini terdiri daripada mikropengawal untuk mengawal penyambungan yang lain. Projek ini telah dibahagikan kepada dua fasa utama, pembangunan perisian dan pembangunan perkakasan. Dalam pembangunan perisian, ia terlibat dengan kemasukan reka bentuk, proses simulasi dan proses muat turun. Sementara itu, pembangunan perkakasan meliputi litar pengesan dan peranti GSM. Sistem ini akan berfungsi dengan betul sekiranya pengesan Pyroelectric dicetuskan, penggera dan LED akan diaktifkan dan GSM sebagai medium penghantaran akan menghantar mesej amaran kepada pemilik telefon bimbit.



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## LIST OF ABBREVIATION

CCTV	-	Closed-Circuit TV
SMS	-	Short Message Service
PIR	-	Passive/Pyroelectric Infra-Red
GSM	-	Global System for Mobile
LED	-	Light Emitting Diode
FM	-	Frequency Modulation
PC	-	Personal Computer
PIC	-	Peripheral Interface Controller
CPU	-	Central Processor Unit
FET	-	Field Effect Transistor
IC	-	Integrated Circuit
I/O	-	Input/output
UV	-	Ultraviolet
DIP	-	Dual-in-package
TTL	-	Transistor–transistor Logic
MCU	-	Microcontroller Unit
PCB	-	Printed Circuit Board
AT	-	Attention
Vcc	-	Voltage at the common collector



## **CHAPTER I**

### **INTRODUCTION**

This chapter will explain on the project background, objective of project, problem statement, scope of project, methodology and report structure.

#### **1.1 Background Project**

Security is an essential issue for a country as well as home. It is the level of protection against danger, loss and criminals. In order to get the first degree of protection, people are getting security system installed within their premises in order to prevent or stop incidents from happen. A basic security system is capable of detecting smoke, fire and intruders. An advance security system may include Closed-Circuit TV (CCTV), door lock with finger print detection and etc. In this project, a modular design concept of an integrated security system is developed to help monitoring or preventing undesirable event taking place. When something happen such as intruder, the system will trigger a Short Message Service (SMS) to the owner. With the system that provides a real-time notification, it increases the response time of the owner. This will provide the immediate aid to the situation occur. This security system is created using microcontroller technology as the brain of the system where Pyroelectric or known as

Passive Infra-Red (PIR) sensor is connected to the system. This sensor acts as a motion detector respectively. Once the sensor is triggered, the system will sound the alarm and send an SMS using the Global System for Mobile (GSM) modem. Hence, the owner will also be employed for patrolling service so that immediate action is taken in the incident outbreak. With such services, immediate response will help to prevent any loss of valuables or properties.

## **1.2 Objectives Project**

The idea of this project comes from the widely increment of burglaries. A simple security system is basic and only offers simple password lock and sensors. Hence this project would like to enhance the simple security system with a special sensor that quickly detect human motion and is built in with GSM device that can send an SMS to the owner. The project is known as Human Motion Detection. And the objectives of the project are:

- i. To construct a home security system and motion detector by using Pyroelectric Infra-Red (PIR) Sensor.
- ii. To develop software codes and alert user via SMS notification when the security system is breached by using GSM system.

## **1.3 Problem Statement**

When people need to go to work or upon leaving the house, it is important to assume that the house is protected from any harm. To be able to have a security into the houses, it is encouraged to look into home security system. Human Motion Detection is a project which could give assurance for user to protect their homes from burglars, thieves and criminals. This idea was acquired after intensive observation based on local news nowadays which reveals crime case due to recklessness and carelessness of the residence.

Home security systems nowadays are using the system as a common IR sensor. This system requires a complex circuit (transmitter and receiver). While home security systems using PIR sensor motion detection can offer a wide array of protection, and do not need to invest in one to toughen up the home for intruders. In addition to that, cable security system is in high risk to malfunction due to damage or disconnected wire.

A number of cheap home security tricks can enhance your home security, or build upon the effectiveness of any professionally installed system. PIR sensor motion detection works fast, accurate and users will not worry about disconnected wire anymore. So, it is important to be aware that crime can occur in any form at any time.

Therefore, taking action to reduce the chance of it happening is most vital. In this crime, prevention is a key to stop the ability and opportunity available for a criminal. Everyone has felt the incident and an emergency case such as fire, being rob and injured. Therefore, quick action from the neighbourhood or resident is needed to overcome all these problems. This system tries to draw attention to their neighbourhood & police. Thus, a Human Motion Detection system will be developing to convey the emergency case or warning message.

#### **1.4 Scope of Project**

In order to achieve the objective of this project, a scope of work had been divided into two parts which is software and hardware. Before fabricate the circuit, the circuit that had been designed will be simulate using the suitable software. In this project, Proteus 7 Professional software had been used to simulate the circuit designed. Proteus 7 professional is a smart software tool which can be used extensively in a hardware design.

For the hardware part, the circuit that has been designed, it will be fabricated. The circuit is using PIR sensor, buzzer, GSM device and other components. The PIR

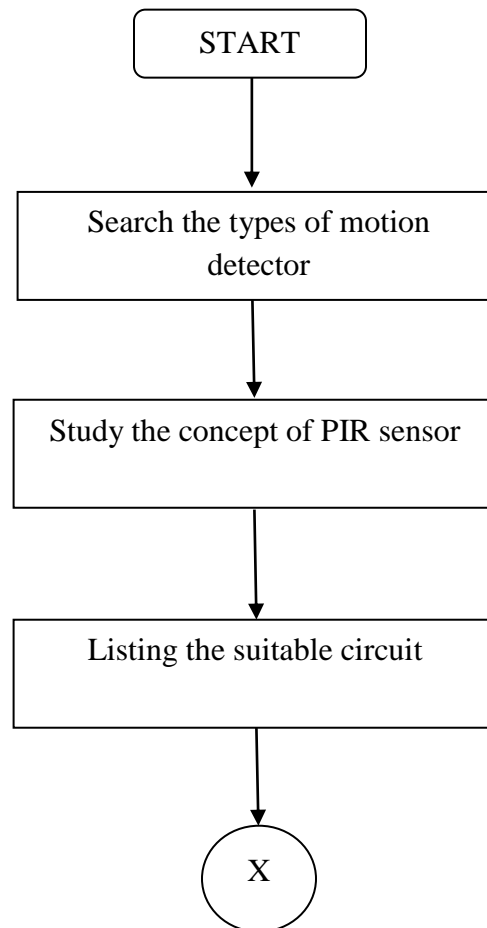
sensor is controlled by the microcontroller provided by the Microchip Company which is PIC16F877A. The microcontroller controls other interface which includes buzzer and GSM device.

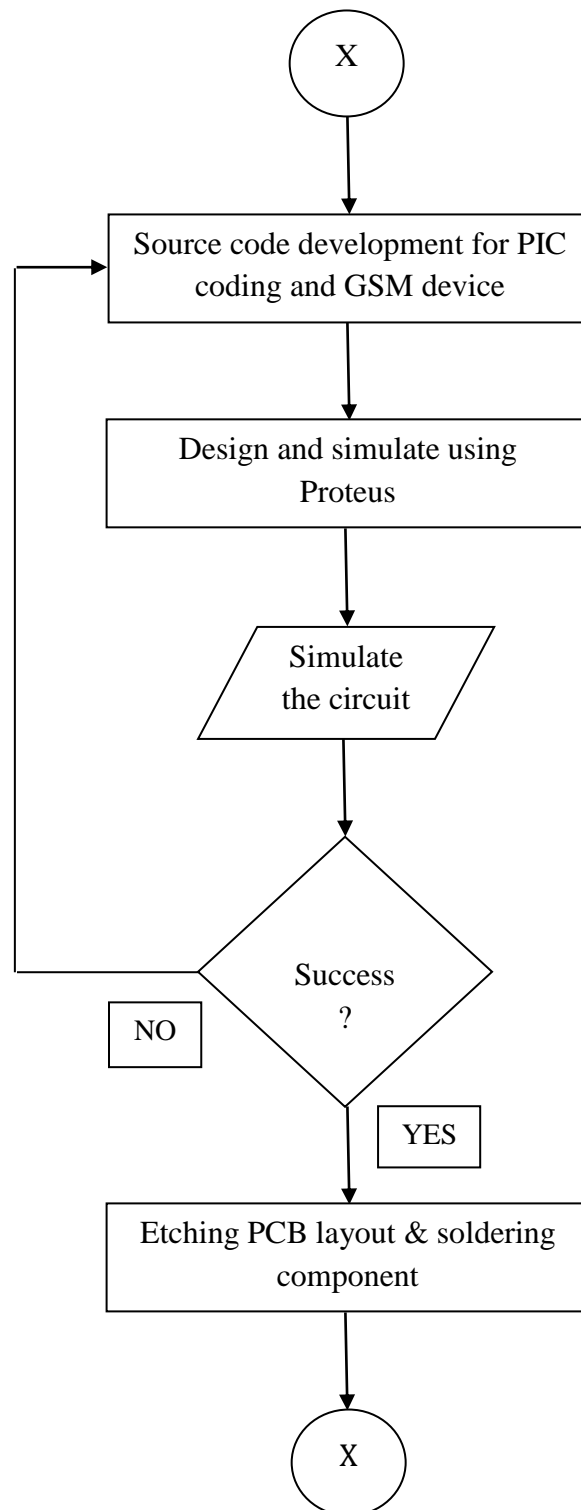
## **1.5 Project Methodology**

This project focuses more on study case and the project development based on PIR sensor technology. When the microcontroller detects a signal from the PIR sensor which is triggered by sensed of human (thermal energy), it will activate the buzzer and Light Emitting Diode (LED) indicator, and at the same time it will send SMS to the owner mobiles number from the GSM modem.

The project methodology shows the step by step taken in order to complete the project. The methodology includes the planning, the development of the design and the management of the project. The flowchart of project is shows on Figure 1.1.

### 1.5.1 Flowchart Methodology





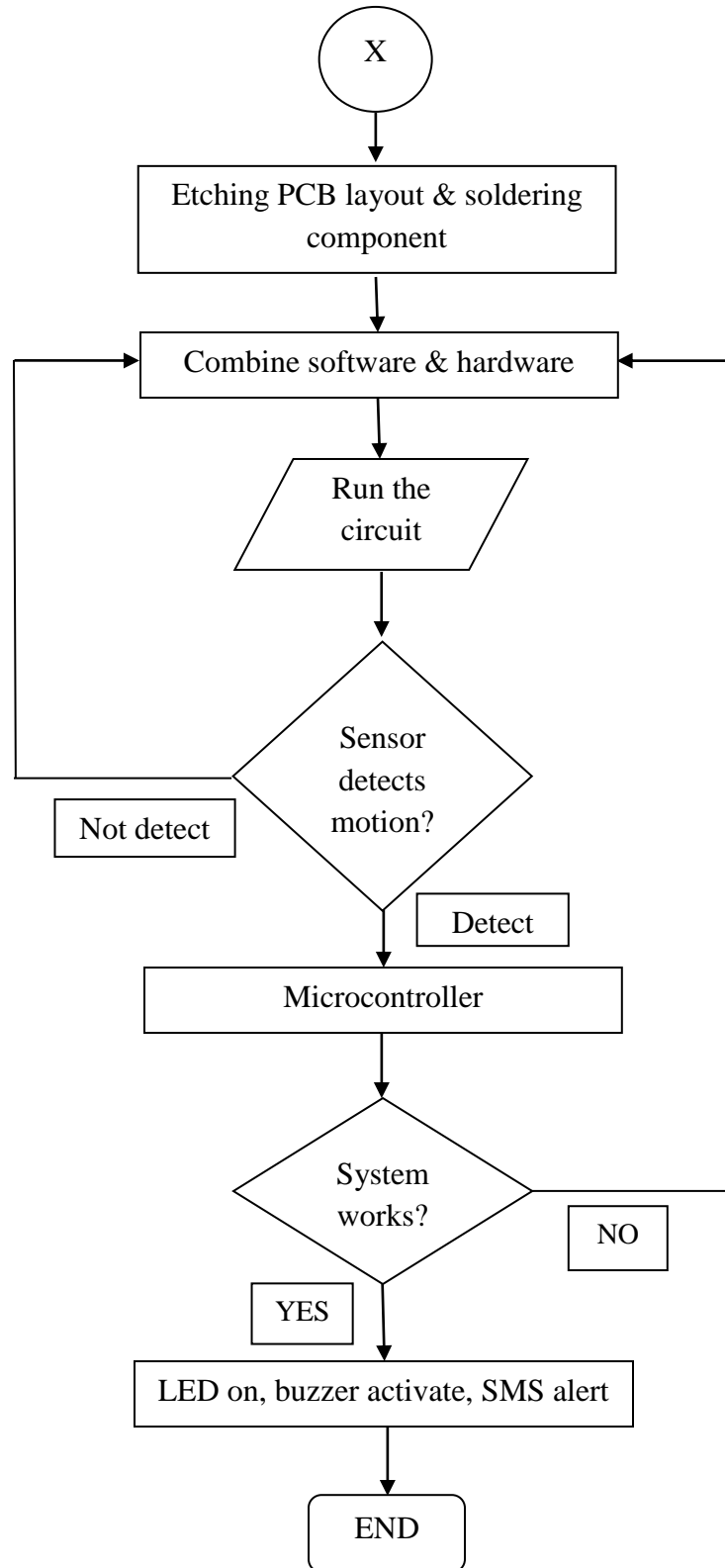


Figure 1.1: Flowchart of project

## 1.6 Report Structure

This report consists of five chapters. The first chapter starts with background study, introduction, problem statement, objective and scope of work. The literature review is presented in Chapter II and project methodology in Chapter III. Chapter IV covers the hardware and software implementation and result. Conclusions and suggestions are covered in Chapter V. In order to successfully implement the project, there are several areas to look into. The following are the main chapters and its short descriptions:

Chapter I: Study the background and scope of work on the project.

Chapter II: Literature review about human motion detection and home security system.

Chapter III: Project methodology includes the planning, development of the design and the management of the project.

Chapter IV: Hardware and Software implementation and result.

Chapter V: Conclusions and suggestions on the project.

Dividing the project into various chapter is to ensure the project to work in a systematic and structural way such that the project able to implement smoothly.

Chapter I: Study the background and scope of work on the project.

The first chapter is the introduction of this project. The aim of this project is to design and develop a Human Motion Detection system that consists of PIR sensor to detect the motion, and microcontroller to control other interfaces.

Chapter II: Literature review about PIR sensor and home security system.

This chapter explained on the relevant topics from sources such as reference book, internet and journal to gain more knowledge for project. Research on similar system in the market and knowing what are the features and capabilities of current products will also provide more information and understanding on the project.