HAZARD LIGHT USING MOVEMENT DETECTOR

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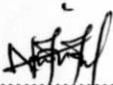
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ABSTRACT

This project presents the model of Movement Detector which able to detect movement and switch on the hazard light along the road side. The hazard light will act as the warning light to the road user. This Movement Detector use passive infrared sensor module technology and a circuit will be constructing to enable the system to be fully functional. The detection range not more than 5 meter and the hazard light will switch on after triggering at least 15 seconds.

ABSTRAK

Projek ini menunjukkan model Pengesan Pergerakan yang mana boleh mengesan pergerakan dan akan mengaktifkan lampu kecemasan di jalan raya. Lampu kecemasan ini berfungsi sebagai lampu amaran untuk pengguna-pengguna jalan raya. Projek Pengesan Pergerakan yang dibangunkan ini menggunakan modul pengesan Infrared Pasif dan litar tersebut akan dibina untuk membolehkan sistem tersebut berfungsi dengan sempurna. Julat pengesanan sistem ini adalah tidak lebih daripada 5 meter dan lampu kecemasan akan aktif selepas 15 saat.

TABLE OF CONTENTS

CHAPTER   **CONTENTS**   **PAGE**

LIST OF APPENDIXS

LIST OF FIGURE

LIST OF TABLE

LIST OF ABBREVIATIONS

IR	-	Infrared
Km/h	-	Kilometer per Hour
LED	-	Light Emitting Diode
PCB	-	Printed Circuit Board
PIC	-	Programmable Intelligent Computer
PIR	-	Passive Infrared
RADAR	-	Radio Detection and Ranging

CHAPTER I

INTRODUCTION

1.1   Introduction

Movement Detector or sometime also known as Movement Sensor is a device that will detect the physical movement in a particular area and integrated with or connected to the other device to alert the user of the occurrence of the moving object in that particular area. The device has the ability of monitoring the motion and transforming movement into the electric signal.

The Movement Detector usually consists of the movement sensor that connected to the particular circuit that depends on the user's application. Normally, the Movement Detector are used as the security application such as, it's act as the burglar alarm and passenger way lighting. The movement sensor is electrically connected to the output stage. The output stage of the movement detector depends on the user's application whether for security function or for lighting system.

There are various types of sensor that can be used to monitoring the movement. Basically they can be dividing in two categories, active and passive sensors. The active sensors such as Infrared sensor (IR), Radio Detection and Ranging (RADAR) sensor,

Ultrasonic sensor and Microwave sensor and for the passive sensors, Passive Infrared sensor (PIR). All these sensors will be used depends on the users applications.

Depends on the used of sensors, the Movement Detector can be implemented in various valuable applications. That's device is not only used for home or building security only, but it can be implemented in other different fields. By exploiting the functionality of the sensors application, the 'Hazard Light Using Movement Detector' will be implemented at the sharp U curve road. The end product will be implementing at the road side as a warning system that could help the motorist to be more aware of the road condition and to minimize the used of the electricity.

The movement detector will be placed at the road side which is dark and have sharp U curve. The used of movement detector integrated with light as the alternative to the conventional signboard. The earliest road signs were milestones, giving distance or direction. Then the innovation made by using the multidirectional signs at intersections, giving directions to cities and towns. This sign is made from the wood with sign painting on that wood. Today the road sign is made from metal and are coated with retroreflective sheeting of various types for nighttime and low-light visibility. It also added by the flashing hazard light at the junction to make the road user more aware of the danger that may be occurs.

Thus the problem is, the technology of hazard light that has been use nowadays was activated all the time. It is not good for the power consumption. Lighting represents a major component of energy consumption, accounting for a significant part of all energy consumed nationwide. By considering this illumination of the electric power, the project 'Hazard Light By Using Movement Detector' was being design to solve the problems.

1.2   Objectives

The objective of this project is to set up a warning system using hazard light and movement detector as a road guide for the road user.

1.3   Scope Of Works

This project is focusing on activating light when the movement sensor sense the occupancy at suggested area. The suggested area is especially at the sharp U shaped bend in a road. Thus, to sense the occupancy in that area, the passive infrared sensor (PIR) module is used. The PIR sensor modules that have been used have a range of detection approximately 5 meter. The PIR sensor can sense object up to120°.

That movement sensor is integrated with the circuit that consists of microcontroller PIC16F876A as a main element. The microcontroller that have 28 of input output pin will be programmed to activated the light whenever the movement sensor sense the occupancy at the suggested area.

1.4   Project Methodology

The project starts with seeking the information and research about the project and each element that have been used. The project can be divided into two parts. It can be hardware and software part. It involves the development of the circuit and the development of source code that will be embedded into the microcontroller. The hardware will be tested in order to determine the functionality. Detail of the research methodology will be explained in Chapter 3.

1.5   Expected Result

At the end of this project, a circuit control of movement detector that can sense the occupancy of movement vehicles and thus will activate the hazard light will be successfully developed.

CHAPTER II

LITERATURE REVIEW

2.1   Movement Detector

A number of the different technologies are used for motion detection. Motion detectors are typically employ ultrasound, passive infrared (PIR), infrared (IR) sensor, or radar detection technique.

Motion detectors, light sensors, microphones, and temperature sensors, all generated an electrical signal in response to the stimulus. The signal that generates from that circuit can be used to turn other thing on and off. For example, the motion detector can turn on the light when it's sense the occupancy of human being.[1]

Movement detector is a device that has been produced by the integrating some electronic elements. The main element of the movement detector is a sensor. The sensor is typically chosen depends on the application of the movement detector. The sensors that usually preferred to integrate with the other electronic component such as ultrasonic sensor and PIR sensor.

2.2   Sensors Element Being Reviewed

The sensing elements such as ultrasonic detector, active infrared detector and microwave detector are being studied. The detail of these sensors are explains as followed.

2.2.1   Ultrasonic Detector

Ultrasonic detector transmits high-frequency sound waves to sense movement within a protected area. The sound wave usually at a frequency over 30 kHz, are inaudible to human but can be annoying by dog.

The sound wave will bounce off the walls and floors until the frequency is stabilized. Thereafter, a movement from the intruders will cause a change in the waves and derived the output condition.

A drawback to ultrasonic detectors is that, the detectors do a poor job of sensing fast or slow movements and movements behind object. The ultrasonic detector not works well in rooms with wall-to-wall carpeting and heavy draperies because those soft materials absorb the sound.

2.2.2   Microwave Detector

This type of detector is easy to hide because they can be placed behind the solid object. It is because of the ability of ultrahigh frequency radio waves. But the big of drawback of this type of detector is that their extreme sensitivity makes them hard to adjust properly. The output can be affected by the fluorescent lights and radio transmission.

2.2.3 Passive Infrared Detector

The PIR sensor is a passive, meaning it does not emit anything. It just monitors whatever infrared energy present. The detectors sense rapidly changes in temperature within a protected area by monitoring infrared radiation (energy in form of heat). This type of detector use less power, generally are more reliable than ultrasonic and the microwave detector.

The PIR detector is effective because all living things emit infrared energy. If an intruder enters the protected area, the device will sense the rapid changes in heat. PIR detector is easier to adjust than microwave and it does not respond to radio waves, sharp sound, or sudden vibration.

Beside the positive thing of PIR sensor, this sensor also has its own drawback. The biggest drawback of this sensor is that it can not see an entire room or area. Its detection area is limited but can be improve by using fresnel lens.

2.2.4 Comparison of PIR and Ultrasonic Detector

The Table 2.1 shows the comparison of the PIR sensor and Ultrasonic sensors. The comparisons have been made for some aspect as listed in the Table 2.1. Finally, after reviewing various types of sensors, PIR and ultrasonic is the most popular used as the occupancy sensor. Thus, for this project, the PIR sensor is being chosen as the sensory element.

Table 2.1: Comparison of PIR and Ultrasonic

Method	PIR	Ultrasonic
Coverage	Line of sight Field of view can be adjusted by user through sensitivity adjustments or masking	Covers entire space (volumetric) Field of view can be somewhat adjusted by user through sensitivity adjustment, but cannot be masked
Maximum coverage area	300-1000 sq.ft.	275-2000 sq.ft.
Highest sensitivity	Motion lateral to the sensor	Motion to and from the sensor
Mounting	Wall switch, wall, ceiling	Wall switch, wall, ceiling
Indoor/Outdoor use	Indoor, outdoor	Indoor
Compatible applications	Smaller, enclosed spaces Spaces where the sensor has a view of the activity Outdoor areas and warehouse aisles	Open spaces Spaces with obstacles Restrooms Spaces with hard surfaces