

**DESIGN AN INTELLIGENT TRAFFIC INDICATOR SYSTEM USING  
ZIGBEE FOR  
ACCIDENT FROM LOCATION (HAWK EYE)**

**THENMALAR D/O RAJASEKARAN**

**This Report Is Submitted In Partial Fulfillment Of The Requirements For The  
Award Of Bachelor Degree Of Electronic Engineering (Telecommunication)**

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**BORANG PENGESAHAN STATUS LAPORAN  
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**Tajuk Projek** : Design an Intelligent Traffic Indicator System using Zigbee for Accident from Location" (Hawk Eye)

**Sesi Pengajian** : 

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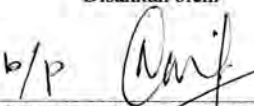
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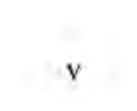
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**Special thanks to my family, project supervisor and friends**

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## ABSTRAK

Kebelakangan ini terdapat beberapa isyarat telah dicipta dan dilaksanakan di seluruh dunia untuk mengelakkan kemalangan diselekeh tajam. Ia direka dalam pelbagai cara untuk menyediakan amaran awal bagi pemandu yang menggunakan jalan raya seperti tanda Chevron, Stud jalan yang menggunakan kuasa solar, Cermin dan lampu trafik yang berwarna amber. Projek ini bertemakan lampu isyarat yang menggunakan Zigbee ditempat kemalangan iaitu selekoh tajam, yang memaparkan isyarat awal bagi pemandu yang menggunakan jalan itu. Projek ini akan menggunakan cahaya yang cerah dengan menggunakan komponen (LED), yang menyediakan isyarat cerah untuk siang dan malam. Untuk projek ini, ia menggunakan solar kuasa bagi penjimatan kuasa. Solar kuasa ini menyerap haba dari matahari untuk mengecas bateri. Bateri ini berfungsi sebagai bekalan kuasa untuk lampu. Ia adalah sistem penyelenggaraan yang rendah mempunyai sambungan wayarles antara sensor yang menggunakan ZigBee (medium penghantaran). Sistem ini membawa nilai komersial yang tinggi kerana pembuatan, pelaksanaan dan penyelenggaraan kosnya yang rendah.

## ABSTRACT

For many years there are many early warning systems that have been invented and implemented all over the world. They are designed in such a way to provide an early warning for motorists at various traffic positions and situations such as Chevron alignment signs, Solar Road Studs, Road convex Mirrors and Solar Traffic Warning Lights. An Intelligent Traffic Indicator System using ZigBee for Accident from Location (Hawk Eye) is a system that provides an early warning to motorists approaching at blind spots. It warns the motorist to reduce speed due to obstructions created at the blind spot. This project will optimize full bright light emitting diodes (LED), which provides a bright signal for day and night or any weather condition. It is an energy saving system; it optimizes individual solar panels as a power source for each light. This solar panel absorbs the heat from the sun to charge the integrated battery. This battery serves as the power supply for the lights. It is a low maintenance system having a wireless connection between sensors that is using Zigbee (wireless transmission medium). This system carries a high commercial value due to its low manufacturing, implementation and maintenance costs.



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**LIST OF ABBREVIATION**

PLC	-	Programmable Logic Controller
I/P	-	Input or Output
PCB	-	Printed Circuit Board
PIC	-	Peripheral Integrated Circuit
UART	-	Universal Asynchronous Receiver Transmitter
LED	-	Light Emitting Diode

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## CHAPTER I

### INTRODUCTION

#### 1.1 Project Overview

This project is designed to prevent accidents by using the concept of modes of very sharp eyes. This system is supported by solar panels and its charge the regulator insures proper charging of the battery, in order to obtain a stable signal. In order, to detect vehicle an induction loop system is apply which uses a moving magnet to induce an electrical current in a nearby wire. This project Peripheral Interface Controller is applied to processes the signals and sends through the Zigbee system. This system used Zigbee as a transmission signal from the controller to the indicator, to operate the traffic indicator.

#### 1.2 Problem Statement

Driving at high speeds and not realizing the severity of a turn can cause drivers to lose control of their vehicles, leave the road and slam into a barrier, tree or accident with the vehicle comes forward.



Figure 1.0 :Accidents with a car come forward

The drivers may be concentrated to the road but will misjudge the danger of an approaching curve.



Figure 1.1: Danger of approaching Curve      Figure 1.2: Up hill road from the front

The vehicles that drive behind someone who loss controls on the curve, it can make risk of spinning out as well. If the driver coming from the front is swerving to avoid something on the road, such as debris or trash, it could be also hit by this driver who is spinning towards from opposite.

The vehicles which follow up and hill road, does not knows about the dangers that come forward in front of the vehicles fast or take over the vehicles. It can cause an accident and the victim died.

### 1.3 Objective Project

To develop an intelligent road traffic indicator system that capable in sending signal to the driver regarding impending danger. Furthermore, these design a low-cost single display intelligent traffic system indicator equipped with more technology and advance. Finally, it's to analyze the performance indicator of intelligent systems designed to reduce traffic accidents and fatalities

### 1.4 Work Scope of Project

This project will focuses on hardware design (communication, sensor, type, method) and software design (PIC) to implement intelligent traffic indicator system for road accident and alert drivers of impending danger. Develop a new method to enhance the road hazards for impending signal control system existing at blind spot. For this project a new method of communication is used, that is Zigbee. The function of Zigbee is to send and receive data from one traffic indicator to another traffic indicator. This communication is a network with no centralized control or high-power transmitter / receiver that able to communicate between intelligent traffic indicator systems. For setting the Zigbee, software X-CTU is used to make a communication point to point two way communication. Once both this Zigbee modules are setup and linked together, powered, they are paired. It will send data via UART to one of the Zigbee module will automatically being transmitted wirelessly to the other Zigbee module and further transmit out from the UART, and this apply for both ways.

The PIC that used is PIC16F877A that capable to interface with the software. The process continues withsimulation and designing a circuit construction to ensure proper operation and allows the solution of problems before fabrication can be done. A breadboard is used to assemble the components on the circuit designed to keep components and circuits function properly. Therefore, the PCB layout is designed to change the schema design using the software before the etching process. For the software part, it consists of MicroC PRO for PIC is used to program the PIC.

## 1.5 Overview

Conclusively, this report is inclusive of 5 main chapters which are Introduction, Literature Review, Methodology, Results & Analysis and Conclusion & Recommendation. In Chapter 1, Introduction briefly describes an overview of the project and the need for it to be implemented in real life. It highlights the background, objectives of the project, problem statement, and the scope of operation of an Intelligent Traffic System Indicator. In Chapter II, Literature Review discusses the background of the project and some of the specifications on the market products associated with this project. The methods used to achieve the goals described in Chapter III. Instead, this chapter also describes concisely the development of the project. It includes the integration of hardware and software used in this project. Chapter IV is Results & analysis, and this chapter explains the analysis of the circuits under designed. Conclusions & Future work is covered in Chapter V regarding the completed project and recommendations to improve the project's inception.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Literature Overview

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. 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.<sup>[1]</sup> This chapter will explain the comparison between Market ready warning systems that is Chevron Alignment Sign, Solar Road Stud, Road Convex Mirror, and Solar Traffic Warning Light. For this project, this chapter describes the explanation of the warning system, a basic understanding of the transmission signal using Zigbee and a brief description about the software tools that are going to be used in this project. A comparison between Zigbee and other wireless transmission device consists along with this title. Switching to a microcontroller, microprocessor, and it varies with PIC16F877A pin description included. Relevant information gathered from past research online journals, reference books, websites, research papers, and the last experiment.

## 2.2 Market ready Warning System

There are so many warning systems available in the market. Mostly the warning systems were categorized in four types. This four system types are used in special circumstances, it is applied by a need to use the road conditions, weather, and the place. Following subtopics will describe and compare a number of warning systems market available.

### 2.2.1 Chevron Alignment Sign

Chevron Alignment signs used instead of or in addition to standard delineators on curves or to the One-Direction Large Arrow sign. The single-sided Chevron sign side be used where only one direction of travel is impacted, such as on an expressway. If used, Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic.



Figure 2.0: Chevron Alignment Sign

Chevron Alignment signs shall be installed at a minimum height of 5 ft., measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way. This will place the sign at approximately the driver's eye height.<sup>[2]</sup>

### 2.2.2 Solar Road Stud

Solar Road Stud is flashing solar cell powered LED maintenance-free lighting devices used in road construction to delineate road edges and center lines. Embedded in the road surface, they are an electronic improvement on the traditional cat's eyes in that they may give drivers more than a thirty-second reaction window compared with about 3 seconds for conventional reflective devices.<sup>[3]</sup>



Figure 2.1: Solar Road Stud

The intense brightness of the LEDs makes them easily visible at distances of about 900m under favorable conditions. Averaging about 100mm square or 100mm diameter and about 40mm thick, units are extremely robust to avoid damage by passing vehicles and are normally constructed of engineering plastics and polycarbonates. Use of solar road studs reduces the necessity of headlight main beams and the accompanying hazard of dazzling oncoming drivers. They are also more visible in rain and fog conditions where the old type retro reflectors and road markings are problematic. The solar cells charge batteries or capacitors during sunlit hours, over which period the flashing LEDs are turned off by a photo switch.<sup>[4]</sup>

### 2.2.3 Road Convex Mirror

Mirrors can increase visibility round blind bends and at road curve. All convex mirrors reduce the image size to achieve the wider view. Note that a mirror is always a compromise, it is better to remove obstructions to the view if possible. Stainless steel mirror is vandal resistant but it has the additional benefit of being self-cleaning. The purpose of the convex mirror is simply to indicate to the road user, the presence or absence of a moving or stationary vehicle.



Figure 2.2: Road Convex Mirror

The convex shape of the mirror results in distortion of the image, speed and distance of any object. The degree of distortion depends on the radius of curvature and size of the convex mirror; the larger the radius of curvature the less the distortion and vice versa. The image appears to be smaller, further away and travelling at a slower speed in a mirror with a smaller radius of curvature. A convex mirror with a small radius of curvature will also provide too much detail in a small area which will hamper road user's driver's ability to discriminate detail. It takes some time for road users to understand and interpret the information provided by a convex mirror.<sup>[5]</sup>