



# **UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

## **Automatic Vehicle Accident Alert and Tracking System**

This report submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology  
Bachelor Degree in Electrical Engineering Technology  
(Industrial Automation & Robotics) (Hons.)

by

YUVARAJAN A/L SARAVANAN

B071310559

931213-01-5827

FACULTY OF ENGINEERING TECHNOLOGY

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## DECLARATION

I hereby, declared this report entitled –Automatic Vehicle Accident Alert and Tracking System” is the results of my own research except as cited in references.

Signature : .....

Author's Name : YUVARAJAN A/L SARAVNAN

Date : .....

## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours. The member of the supervisory is as follow:

.....  
(Project Supervisor)

## **ABSTRAK**

Pada masa kini, terdapat banyak kemalangan yang telah berlaku sama ada di bandar atau di kawasan pedalaman. Ia menyebabkan kadar kematian meningkat secara drastik di negara kita dan di negara-negara moden. Tetapi, isu ini boleh dapat mengatasi melalui memberi amaran/isyarat kepada pihak keselamatan atau pihak keluarga pada saat-saat kecemasan. Kemalangan Alert Dan Sistem Pengesanan Automatik Kenderaan dibangunkan dengan menggunakan GSM dan GPS untuk menyelamatkan mangsa kemalangan. Sistem ini adalah tambahan yang disertai dengan pengesan suis perlanggaran, GPS dan GSM. Apabila keputusan yang telah dikesan oleh salah satu pengesan suis perlanggaran, sistem secara semula jadi akan menghantar SMS dan menawarkan bantuan dari pihak keselamatan dan keluarga. SMS yang diperolehi oleh penerima terdiri daripada nombor plat kereta, dan data GPS yang dimana pengesan suis perlanggaran aktif . SMS ini akan membantu golongan penyelamatan untuk mencari kedudukan kejadian dalam jangka masa yang singkat. Akhir sekali, prototaip reka bentuk ini menjadi ujian dan dianalisis pada kecekapan sistem semasa kecemasan untuk memeriksa sama ada ia berfungsi dengan betul atau tidak. Selain itu, dengan memperkenalkan sistem ini, banyak nyawa tidak bersalah dapat diselamatkan dan pemandu tidak lebih akan berasa goyah dan kebimbangan apabila menggunakan jalan raya.

## **ABSTRACT**

At present, there are lots of accidents have been happening either in city or in rustic ranges. It would drastically increase the demise rate in our country and in modernized countries. But, there is still have an answer for take care of this issue whereby the accident would be offers alarm to both crisis offices and our relative at the last possible second. This system is mostly composed and centered to anticipate ascend in death rate because of mishaps in our nation. So that, an Automatic Vehicle Accident Alert And Tracking System is developed by using GSM and GPS in order to save accident victim. The system is additionally being joined with collision switch sensor, GPS and GSM. Once the effect has been detected by one of the collision switch sensors, the system would naturally send SMS and offer caution to crisis offices and relative. The SMS got by a beneficiary comprise of the auto number plate, and above all GPS area organizes. These SMS's eventually get to be simpler for the crisis salvage group to find the position of incident in a brief timeframe. Last but not least, the design prototype is been test and analyzed on efficiency of the system during an emergency to check whether it is working properly or not. Henceforth, with the introduce of this system, numerous blameless lives could be saved and in addition drivers will no more feel shaky and apprehension when utilizing the road.

## **DEDICATIONS**

I am particularly dedicated to my beloved guardians and relatives, whose uplifting statements and conjointly for their unending affection, support and fortification all through the entire time of finishing my composed reports. To my kind and strong undertaking supervisor Ms.Suziana Binti Ahmad who have interminably constantly upheld me and listens to my issues and who is her great cases have taught me to buckle down for the things that I seek to accomplish. I conjointly commit this work to all my kindred companions who have never-endingly given supportive gestures all through the postulation. I will have the capacity to ceaselessly value all they acknowledge oversaw. I confer this work and gives exceptional due to all the general population that have helped all through the complete four year college education venture at direct or in a roundabout way.

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# LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

AC	-	Alternating Current
App	-	Application
dbm	-	Power ratio in Decibals
DC	-	Direct Current
GPS	-	Global Positioning System
GSM	-	Global System for Mobile Communication
HVAC	-	Heating, Ventilating, and Air Conditioning
I/O	-	Input Output
IC	-	Integrated Circuit
IR	-	Infrared
ISM band	-	Industrial, Scientific, and Medical Radio Band
Kb	-	Kilobytes
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MAC	-	Media Access Control
MHZ	-	Mega Hertz
PC	-	Personal Computer
PCB	-	Printed Circuit Board
PIC	-	Peripheral Interface Controller
PWM	-	Pulse Width Modulation
RAM	-	Random Access Memory
RM	-	Ringgit Malaysia
SMS	-	Short Messaging Service
TCP/IP	-	Transmission Control Protocol/Internet Protocol
TCR	-	Temperature Coefficient of Resistance
uF	-	MicroFarad
V	-	Voltage
V2O5	-	Vanadium oxide

# CHAPTER 1

## INTRODUCTION

### 1.0 Introduction

The Automatic Vehicle Accident Alert and Tracking System is designed to suit the requests of vehicle organization to build security and well being on the passenger. It is necessary for all the vehicle, because it will cover the vehicle position and deliver SMS to authority whenever the vehicle involved in an accident. Other than that, one manual switch will add in every vehicle and it would assist during emergency use. When an accident occurred or been pressed the emergency button, the system automatically delivers SMS to an emergency service centre with the location of the incident which obtained from the GPS receiver. This chapter is described in the introduction of this project, objective, problem statement, scope and methodology.

### 1.1 Project Background

In the blink of an eye, our country has endlessly advanced in technology and efficient commercial ventures. The transportation system is one of the divisions that have been improved with current advancement. Nowadays, transportation is becoming a necessary factor to move from one place to another. It makes the world become shorter and reduced the time period to reach the destination. But, there has been a risk to human lives as the measure of transport as of now rising, bringing about a sudden increment in the quantity of mischances in our nation. Numerous lives could have been ensured if emergency service could get accident data and scope in time. These days, GPS has turned into an indispensable part of a vehicle system[1], [2]. This paper proposes to use the ability of a GPS collector to recognize

mischance in view of sending mishap area to an Alert Service Center which is hospital or police [3].

The quantity of fatalities can be diminished, just if increase the emergency response. The current system emphasizes the number 999 to response emergency purposes. These number bring up emergency service from different bodies uniform like police, fire division, hospital and public defence [4]. So that, this number will be used in these project to contact alert service centre whenever the microcontroller is activated.

Other than that, one manual switch will add in every vehicle and it would help during emergency purpose like car breakdowns in middle highways, occurrence grazing incident as such more. Whenever the collision switch sensor detects collision from an obstacle, it decides that an accident has occurred. The framework will then send the mischance area gained from the GPS by utilizing the GSM system. This will achieve the salvage administration in time and spare the significant human life. It same goes to when a man press manual emergency switch, the framework will send the incident area to an Alert Service Center to get assistance from the authority.

## **1.2 Problem Statement**

In Malaysia, engine vehicles recorded the most elevated rate which recorded at 20188565 in year 2010[5]. According to [6], each year around 1.3 million individual involve in street accident cause of speeding and obey traffic rules and regulation. The number of death cause by accident can be reduced if improved the emergency reporting system. In [7], it was expressed that 1 moment of time, the death rate can be diminished to 6% when have an efficiency amongst mishap and first responders. As expressed by [8], every moment that a harmed mishap casualty does not get therapeutic consideration, it can enlarge the hole of their survival rate. Therefore, it is necessary to give the fast crisis salvage push to the casualties.



For the most part, the reason for vehicle mishaps is dictated by certain components, for example, driver's condition during a mischance, weather condition, paces, heedlessness and different element. These days, it turned out to be exceptionally hard to realize that where a mishap has happened and find the position where it happened. There is no arrangement of ID and hint with respect to a mischance in Malaysia. Sometimes, people do not know the exact location where an accident occurred or a person need emergency service. So it lead to give wrong information to an alert service center and it takes them time to reach that place. Other than that, in that respect is no assist system in the vehicle and it would make difficulty on passenger when they find help from emergency service.

### **1.3 Objective**

The objectives achieved throughout this project are:

- i. To describe an automatic vehicle accident alert and tracking system.
- ii. To develop an automatic vehicle accident alert and tracking system by using GSM and GPS system.
- iii. To analyse the efficiency of the system during an emergency.

### **1.4 Scope of project**

The automatic vehicle accident alert and tracking system is developed in prototype form using Arduino, GPS and GSM. Global positioning system(GPS) is used to track and locate an accident vehicle or emergency service needy people. While global system mobile communication is used for to send short message service(SMS) to specific people. Arduino is an important part of this system which interface with GPS and GSM. Coding of the system burns into Arduino through Arduino IDE software. GSM is used to deliver a SMS to an emergency contact number which that already saved in GSM coding part. Then, test and analyze the efficiency of the system during an emergency. It carries out through calculating the

time period to send SMS during an emergency. In this system, 4 collision switch sensor which installed on each side of the vehicle is used to increase efficiency of the system.

## **1.5 Methodology**

The task will be proceeding with the improvement of both equipment and programming advancement, for example collision switch sensor, Arduino microcontroller, GPS and GSM usefulness, SMS deliverance. At that point, both programming and equipment are incorporated as one system. Then again, if there are any deficiencies or flawed on the system, legitimate testing and investigating are mandatory with a specific end goal until the system work perfectly.

## **1.6 Structure of the project**

Basically, chapter 1 describes the necessary of this project in introduction, problem cause by increment in engine vehicle, objectives to overcome the problem and scope. Chapter 2 explains on the review has been done before starting the project, which mainly about alert system, brief on the components theory, wireless data communication and microcontroller. Chapter 3 pushed on the intelligent and sorted out methods utilized as a part of building up an automatic vehicle mischance discovery and tracking system. At the same time, find out the electric component that will used in this project and ensure that component suitable and economical. In addition, chapter 4 elaborates on how the overall operation of automatic vehicle accident detection and tracking system is works. Other than that, analysed and discuss the result obtained from this system. Finally, chapter 5 concludes overall the system process and improvement required on automatic vehicle accident detection and tracking system. A point by point explanation is given to the made outline and also a future progression that may be directed under this field is recorded down.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

In this chapter briefly explain on the articles of the alert system, brief on the existing system, component theory, wireless data communication and microcontroller. Below is the explanation about the previous study that had done.

#### **2.1 Existing systems**

According to [9], the panic icon is created in android smartphone app which used to send SMS to alert service centre when a person needed emergency service from hospital, police or security guard. At the same time, it sends the location at where the panic icon is activated. This paper also proposed home security system to alert the owner regarding on safety of the house by using fire sensor and proximity sensor. The same technique is used to alert the owner and alert service centre. The disadvantage of the system is does not operate automatically whenever an accident occurred.

Based on [10], this paper do some research on accident detection algorithm to detect an accident and send alert to alert service centre. This system will do analysis and monitoring of speed,time,position to raise alarm on vehicle. If the speed reduced from specific speed, the system will raise alarm and send SMS and location by using GSM and GPS. According to [11], emergency switch button is introduced into a system to send messages to emergency contact number. So that, the system make easier to contact emergency department or family member whenever a person press

the emergency switch. In this system, various hardware components required such as Arduino UNO, GSM module, GPS tracker and push button.

## **2.2 Alert system**

Alert system is a machine-to-person communication that is important or time sensitive. The function of the alert system is to warn or give a signal to person/microcontroller for prepare action against undesirable situation. For that, we require a sensor to detect some physical parameter of the surroundings. A sensor is a kind of transducer and it might give different sorts of yield, yet ordinarily utilize electrical or optical output signals. The output will undergo further processes to display in data presentation like LCD, led, and oscilloscope.

### **2.2.1 Crash Sensor**

In this new era, a crash sensor is becoming common sensor that used in airbag system on every vehicle as shown in Figure 2.1. It brings up safety & security of both drivers and passanger. Airbag frameworks have turned into a fundamental wellbeing device for ensure the physical prosperity of drivers and their travelers. Not at all like other security gadgets, airbags are utilized as the a last strategy in an impact, and in light of the fact that they are specifically connected to the life of the driver and travelers[12].

As of now, a few organizations are attempting to accomplish best arrangement time for airbags in impacts by expanding the sort and position of accident sort sensors. In any case, is that various confinements stay, to a degree that mischances have been brought on by the inadequate of airbag frameworks [13]–[15]. For example, when a vehicle works rough terrain or when the sensor inside the airbag control unit gets an intense impact, the vehicle's airbags may accidentally convey, although no impact has happen, in

light of the fact that an accident like sign is conveyed to the airbag control unit. Then again, in an impact circumstance that requires airbag arrangement, the accident strategy may make an incorrect judgment with respect to the crash design and setback the time allotment for airbag organization or neglect to send the airbags[16]. So, the crash sensor in airbag system in vehicle can be adapt in my project in term of detection on collision and send signal to main module for further process. But this type sensor is very expensive and cannot reuse when it crash with obstacle.

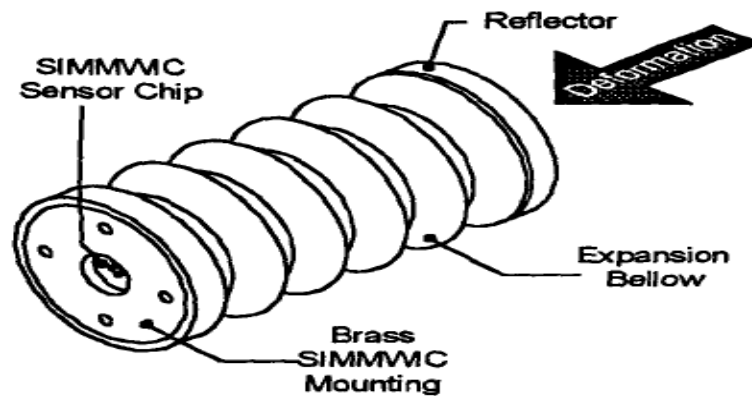


Figure 2.1: Shielded crash sensor[17]

### 2.2.2 Shock Sensor

Passive shock sensors are low-cost comparing with crash sensor or impact sensor. For example [19] depicts a semiconductor shock sensor, which includes a course body and a portable mass associated together by the suspension springs having debilitating areas. On the off chance that the speeding up surpasses a given limit, the debilitating locales break, experiencing an extensive dinner. Different instances of shock sensors, as reported in [18], are based upon a chamber containing a conductive fluid and holding a very much arranged to come up short because of an impingement. In either case, the structures are fairly entangled and scarcely good with

standard ICs process. Each of the four bistable components comprises of a couple of doubly-braced shafts unbendingly associated with each other in the focal part by a cinch keeping in mind the end goal to forestall turn as appeared in Figure 2.2.

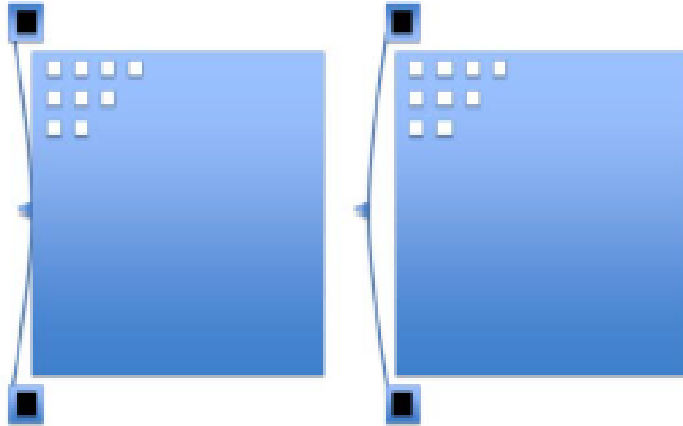


Figure 2.2: Stable configurations for one bistable element[20]

### 2.2.3 Magnetometer

Magnetometers are sensors measuring the strength of the Earth's magnetic field at a broken level. They are every now and again utilized as a part of compass application, for example, in cell telephones. Metallic items, for example, vehicles, cause nearby contortions, and they can be surveyed by a magnetometer and abused for target following [21]. Determining is the most minor change in an attractive field the magnetometer can resolve. A magnetometer ought to have a determination significantly less than the slightest change one wishes to remark, to evade quantization error [22].

## 2.2.4 Accelerometer

Accelerometers are likewise utilized in various applications. An accelerometer as appeared in Figure 2.3, joined to the street surface measures vibrations in the street brought on by dynamic heaps of vehicles going in its propinquity. The qualities of the motions can be used to gauge vehicle parameters[21].

At the point when these sensor are utilized for tracking purposes, there are a few critical matter that should be tended to precisely. To start with, the sensor estimations are profoundly nonlinear elements of the states. Second, the sum rely on upon an arrangement of obscure target-or material-particular parameters, which, if incorporated into the estimation issue, make the issue considerably all the more difficult. Third, because of the distinctive figuring standards, the sensors have diverse properties, including distinctive examining rates and working timekeepers that generally are not synchronized[21].

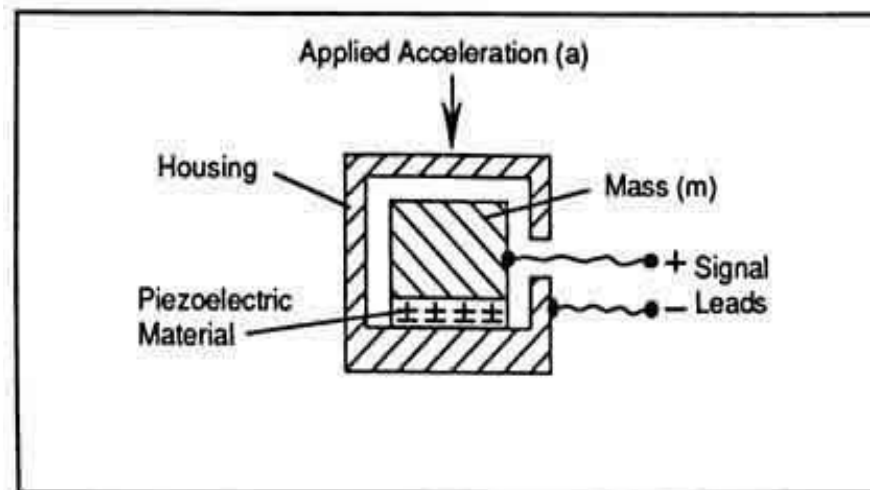


Figure 2.3: Accelerometer[21]

## **2.3 Wireless Data Communication**

Wireless data communication is a sort of correspondence that uses the radio range as opposed to a physical medium range. It might convey simple or computerized flags and can be utilized on LANs or WANs as a part of maybe a couple way arranges. It also known as a communication between two different physical devices.

### **2.3.1 Global System for Mobile Communication**

In the created microcontroller based checking association, there must be a system going about as the data bearer which the information is the pace and area data to and from the observing base station. This character of information bearer is favored in light of the fact that it is nearly the most broad correspondence system in whatever nation furthermore to manufacture the framework adaptable for future developments. One of the exceptionally valuable properties of GSM systems is the Short Messaging Systems as known as SMS [23]. GSM is a cellular system, which implies that mobile phones interface with it via scanning for cell phones in the quick region.

The GSM system utilized by mobile phones gives an ease, long achieve wireless communication channel for applications that call for availability as opposed to high information rates. Hardware, for example, modern ice boxes and coolers, HVAC, candy machines, vehicle administration could profit by being associated with a GSM framework. Built up along the mechanical capability and the given vehicle, custom-made administration interims can be set. A segment of the administration assention is the start of a GSM modem in the vehicle as indicated Figure 2.4. On board administration application can then advise the carport when the vehicle draws close to its administration interim. The administration division will plan an arrangement and advise the client [24]. The client will benefit from a tried