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ABSTRAK

Keselamatan adalah aspek paling penting dalam kereta moden, dan akibatnya, ia telah menarik minat ramai pereka dan pakar automotif. Jumlah orang yang maut dalam kemalangan kenderaan kerana tidak memakai tali pinggang keledar telah meningkat secara mendadak. Penggunaan tali pinggang keledar akan mengurangkan kemalangan maut dan tidak maut di penumpang tempat duduk hadapan dan belakang masing-masing sebanyak 60% dan 44%, menurut penyelidikan. mengikut kajian. Dalam hal ini, percubaan telah dibuat untuk mencipta sistem keselamatan kereta di mana kereta itu tidak akan dihidupkan melainkan pemandu melabuhkan pinggang dan pemandu dimaklumkan jika rasa mengantuk dikesan dan sistem pengesan kenderaan. Kertas kerja ini akan lebih memfokuskan untuk sistem pengesan kenderaan yang boleh digunakan untuk mengesan perjalanan kenderaan dari mana-mana tempat dan pada bila-bila masa. Dengan teknologi Sistem Penentududukan Global (GPS) dan Sistem Global untuk Komunikasi Mudah Alih (GSM), sistem pengesanan kenderaan peta Google masa nyata dibina dalam kajian ini. Pada selang masa yang tetap, modul GPS menyampaikan koordinat geografi. Modul GSM kemudiannya menyiarkan kedudukan kenderaan dari segi latitud dan longitud ke telefon pemilik/pengguna sel. Pada LCD, lokasi dibentangkan pada masa yang sama. Akhirnya, pada telefon bimbit, Peta Google memaparkan kedudukan dan nama tapak. Hasilnya, pemilik/pengguna akan dapat menggunakan telefon bimbit mereka untuk terus memantau kereta yang bergerak. Untuk menunjukkan kebolehlaksanaan dan keberkesanan sistem yang dicadangkan. Keputusan eksperimen sistem pengesanan kenderaan dibentangkan dalam kertas ini. Sistem yang dicadangkan adalah mesra pengguna dan menyediakan keselamatan dan pemantauan pada kos operasi yang murah.

ABSTRACT

Safety is the most essential aspect in modern automobiles, and as a result, it has piqued the interest of many automotive designers and experts. The number of people killed in vehicle accidents because not wearing a seat belt has risen dramatically. Seat belt use will decrease fatal and non-fatal accidents in front and rear seat passengers by 60% and 44%, respectively, according to research. according to research. In this regard, an attempt has been made to create a car safety system in which the car would not start unless the driver buckles up and the driver is alerted if drowsiness is detected and vehicle tracking system. This paper will more focus for a vehicle tracking system may be used to track a vehicle's travel from any place and at any time. With Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technologies, a real-time Google map vehicle tracking system is built in this study. At regular intervals, the GPS module delivers geographic coordinates. The GSM module then broadcasts the vehicle's position in terms of latitude and longitude to the owner's/cell user's phone. On the LCD, the location is presented at the same time. Finally, on a cell phone, Google Maps displays the position and name of the site. As a result, the owner/user will be able to utilise their mobile phone to continually monitor a moving car. In order to demonstrate the feasibility and efficacy of the proposed system. The experimental results of the vehicle tracking system are presented in this paper. The suggested system is user-friendly and provides security and monitoring at a cheap cost of operation.

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LIST OF ABBREVIATIONS

GPS	Global Positioning System
GSM	Global System for Mobile Communications
IoT	Internet of things
LCD	Liquid Crystal Display
NMEA	National Marine Electronics Association
SMS	Short Message Service
TCP	Transmission Control Protocol
TDMA	Time division multiple access
WAP	Wireless Access Point
WLAN	Wireless LAN

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CHAPTER 1

INTRODUCTION

1.1 Background

Seat belt is a safety belt for vehicles that has been designed to secure the driver and passenger from unexpected accidents in such a sudden stop situation. Besides that, seat belts as a safety feature can reduce the risk of serious injury for the driver or passenger in accidents. According to Vocabulary.com Dictionary, seat belts are a safety belt used in a car or plane to hold you in your seat in case of an accident and a belt attaching you to some object as a restraint in order to prevent you from getting hurt. As stated in Merriam-Webster, a seat belt is an arrangement of straps designed to hold a person steady in a seat as in an airplane or automobile. Because it can prevent them from being ejected during a crash by reducing the force of the impact on the ejected part of the head and body. Thus, wearing a seat belt will properly help them to keep it held in place.

In several research, people not wearing seat belts will be thrown into various parts of the interior of the vehicle or thrown completely out of the vehicle causing serious injury and death. According to [1] Seat belt use will decrease fatal and non-fatal accidents in front and rear seat passengers by 60% and 44%, respectively, according to research. This article it has been discovered that drivers who do not wear seat belts are 8.3 times more likely to suffer a fatal injury and 5.2 times more likely to suffer a moderate injury than drivers who do wear seat belts. Moreover, the seat belt is made of a webbed fabric that is strong and flexible to allow a small movement when worn properly, but in order for it to protect a person in a crash it needs to be a tight fit. Therefore [2]the use of seat belts was deemed one of the most effective ways in Malaysia and consequently the mandatory seat belt law was enforced in the early seventies.

In our projects we are focusing on safety in seat belt control system usage for the driver of the vehicle. Besides that, vehicles nowadays have a reminder system for those not wearing seat belts. As a result, these vehicle monitoring systems will be created to alert the driver and third party and also develop drowsiness detection systems that can function in various scenarios, as opposed to cars that do not have this system. The system is to reduce the road accidents that cause damage to property as well as life.

1.2 Problem Statement

In Malaysia, road accidents are one of the leading causes of death and injury. Even if the vehicles are in great condition, human errors can often result in fatal results. Driver not wearing a belt, drowsiness, driving in the state of alcohol influence is the main cause of road accidents in Malaysia and as elsewhere in the [3]. In addition, all automobiles have a seat belt system, but only the most recent models include a seat belt Alert System to ensure the driver wears the seat belt while driving. Because the old car does not have such a complex system, some drivers take it easy by not wearing a seat belt, compromising their safety while driving. Furthermore, drivers lose their control of the vehicle when they are feeling sleepy or high alcohol consuming, which may cause of a car collision. Therefore, drivers who are sleepy are also contributing to traffic accidents. Thus, this is more common when the drivers are driving alone. When the heiress has no information where the accident occurred, the scenario becomes even more difficult.

1.3 Objectives

The objectives for these projects are to develop the control system for seat belt usability in a different situation with a system that has been established to a fully monitoring system. This can be achieved through the following objectives:

- To develop a prototype of the system that can detect a seat belt and alcohol level for the driver.
- To develop a real-time eye-detecting system in order to detect the drowsy driver.
- To develop a real-time GPS system for car tracking.
- To develop emergency location tracking system if the vehicle involve with accident.

1.4 Research Scope

The scope of study in this project is focused on the implementation of seat belt control systems and this project required a defined scope of work and a well thought strategy to be completed to meet the objective.

i. To provide a reliable system for the project when the driver is drunk or not fastened the seat belt with the system in the car which connected to the relay and car battery that can open connection of the battery spark plug.

ii. Provide a drowsiness system to be used for multiple humans. It also notifies the user when the drowsiness measure is reached at saturation point.

iii. To provide a monitoring and tracking vehicle system that can be located the vehicle when request from users and auto send location when accident occur.

iv. Combination of selected approaches and coding development of three interconnected components that is seat belt and alcohol detection, drowsiness and vehicular tracking system.

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss the vehicle tracking system and it refers to the article that has been studied.

2.1 Background of tracking system

Based on the fact that with the development in satellite communication technologies, it is now easier to locate vehicles. This system takes the shape of a GPS-enabled auto monitoring device that can monitor in real time and relay data to a mobile app. These technologies keep a moving vehicle under constant surveillance and deliver status updates on demand. In this paper [4], A GPS tracking system can function in a number of ways. GPS component are commonly track the location of automobiles as it travels. There are two types of GPS systems: passive tracking and active tracking. The data from passive tracking devices is stored within the GPS system. The information from active tracking is sent to a database on a regular basis through a modem also GPS system unit. The method automatically delivers real-time information from the GPS system to a tracking system.

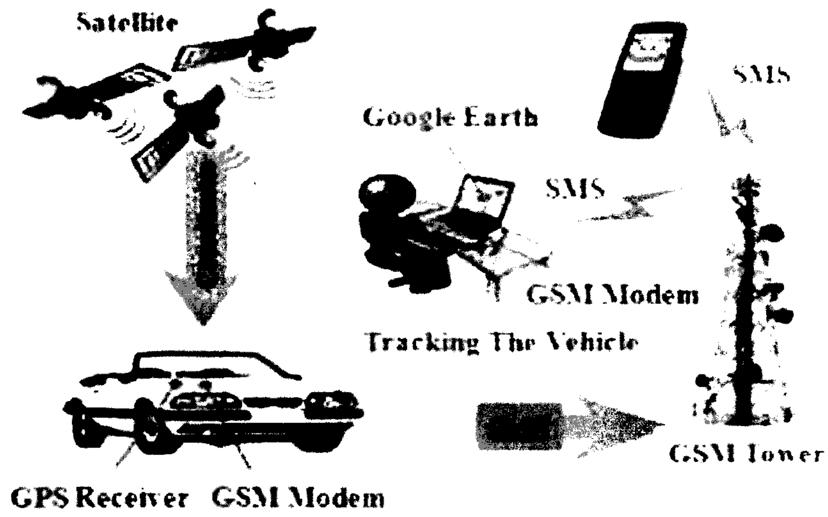

Figure 2.1 Typical block diagram of tracking system working

As indicated in Fig 2.1 show how active tracking works, this makes the tracking system base active system is the better alternative option. It allows vehicle owners to pin the exactly location of a vehicle at any specific time as well as make it quicker to find the vehicle.

2.2 Overview of technology involved

In order to build a system, studies on major technologies are needed. There are several technologies and components that are implemented in this project.

2.2.1 IoT(internet of thing)

IoT refers to a network of physical items with inbuilt sensors and communication capabilities that may be controlled or monitored remotely via an internet-like framework. Location data was collected using GPS[5]. Data from GPS is routinely sent to a gateway through a data connection while the vehicle moves. The data send through gateway to the network server, which gathers information such as speed, position, and direction before transferring it to a cloud-based. The application server[6]. sends mobile information and notifications about the vehicle's movement and safety to drivers and supervisors.

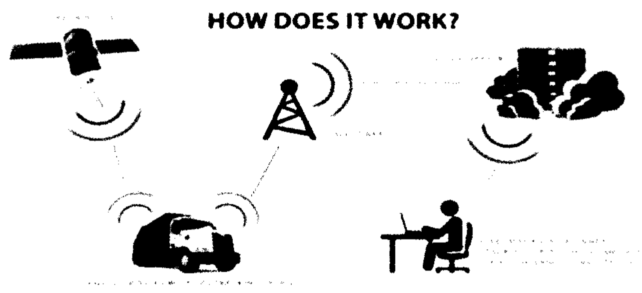

Figure 2.2 Flow of IoT base tracking system work

IoT platform is a collection of linked and cooperating technology-enabled elements. In most cases, an IoT act as place for captures and processing enormous amounts of data in real time to improve system functions. This has been recognised by research, which suggests that IoT development should be approached through the engineering life environment[7].

2.2.2 Overview of Wi-Fi

Wi-Fi is a wireless networking technology that allows user to connect to the internet. Such as computers, mobile devices, and other equipment to connect to the Internet without requiring a physical connected connection. Wi-Fi is a phrase developed by a branding firm in 1999 as a moniker that would be readily remembered because of its resemblance to the then-popular word "hi-fi." The technology transmits data between Wi-Fi capable devices and the internet using radio frequencies, allowing the device to receive information from the web in the same manner that a radio or mobile phone gets music.A wireless transmitter, sometimes known as a hub, is necessary; this device gether information from the internet via home broadband connection. This transmitter called as a Wireless Access Point, or WAP then turns this data into radio waves and broadcasts it, essentially establishing a tiny, local region within which your devices may receive these radio signals if they have the appropriate wireless adapter. A Wireless Local Area Network, or WLAN for short, is a name used to describe this type of network [8].

Figure 2.3 Wi-Fi symbol

2.2.3 Overview of GSM

In 1991, a new Pan-European Digital Mobile Cellular Telephone system will go live in 16 European nations at the same time. This ceremony will mark the completion of a coordinated development and implementation effort that began over ten years ago: When the European Conference of Post and Telecommunications Administrations (CEFT) suggested that the frequency ranges 890-915 MHz and 935-960 MHz be reserved for mobile radio, it was in 1982. This provided the primary pre-requisite for launching a multi-national mobile service in Europe. Simultaneously, the CEPT established the "Groupe Special Mobile" (GSM) to define the standards for a unified public mobile radio communications system[9].

2.3 Hardware overview

In order to build a system, studies on hardware are needed. There are several hardware and components that are implemented in this project.

2.3.1. Overview of GSM Module

In [10], The European Telecommunications Standards Institute (ETSI) produced the Global System for Mobile Communications (GSM) standard to specify the protocols for second-generation (2G) digital cellular networks. In December 1991, it was initially created in Finland. [10] GSM technology was designed as a digital system employing the time division multiple access (TDMA) approach. The digital system speeds ranging from 64 kbps to 120 Mbps.

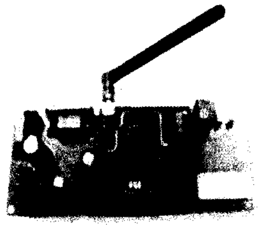

Figure 2.4 GSM modem

2.3.2 Overview of Microcontroller

The creation of the MOSFET (metal-oxide-semiconductor field-effect transistor), also known as the MOS transistor. Mohamed M. Atalla and Dawon Kahng designed it at Bell Labs in 1959, and it was first exhibited in 1960. A microcontroller that controls other elements of an electronic system using a microprocessor unit (MPU), memory, and numerous peripherals[11].

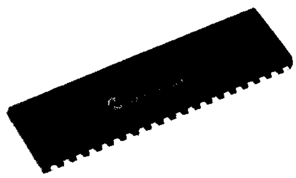

Figure 2.5 Microcontroller

2.3.3 Overview of GPS

The first GNSS, GPS (Global Positioning System), was built and issued by the US Department of Defense (DoD) in the 1970s [12]. Although it was initially designed for military usage, it became accessible to civilians in the early 1980s [13]. The GPS provides worldwide time and location data for both military and civilian users through the utilisation of several carrier frequencies [14]. Personal navigation, aircraft navigation, automotive navigation, maritime navigation, mapping, survey, and infrastructure.

2.4 Related work of tracking system

In [15], proposed vehicles identified used GPS and GSM which both integrated. This design will be used indefinitely monitoring a Vehicle and send the status of the Vehicle on real time. System is installed in a vehicle to enable the user or a third party can track the location. The GSM network is used for transmission of distant signals. This system consist a mobile unit and a control station are the first two components. This tracking system is based on cloud infrastructure. The vehicles embedded with a GPS antenna to know the place and its data was send to a cloud server trough a GSM device. The system works by sending SMS messages to the microcontroller AT89c52. After receiving SMS, the microcontroller send the message of location about the location of the vehicle.

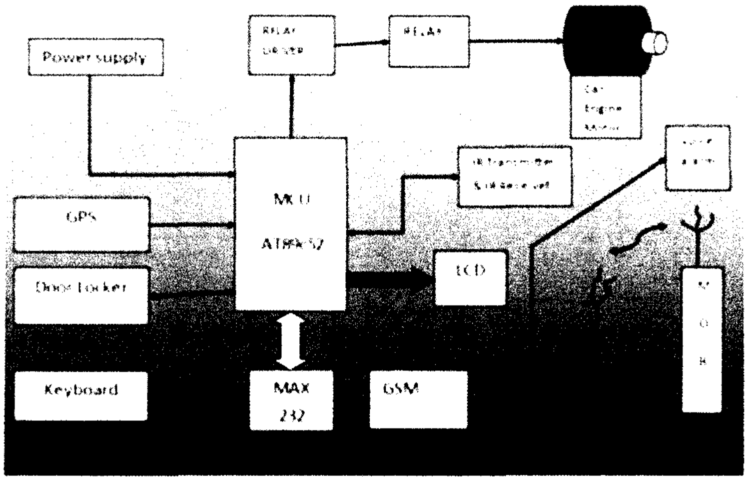

Figure 2.6 Block diagram of Vehicle tracking system based

The project is a program that will continually tacking a vehicle and provide on-demand status reports. A GSM modem and GPS receiver are serially connected to an AT89C51 microprocessor. The vehicle's Latitude and Longitude is sent via a GSM modem. The GPS modem will continually transmit data of the vehicle's location. The GPS modem outputs a variety of characteristics, but the NMEA data is the only one that is delivered to the phone, when the vehicle's location is requested. When a user sends a message to the modem's telephone number, the system responds[16].

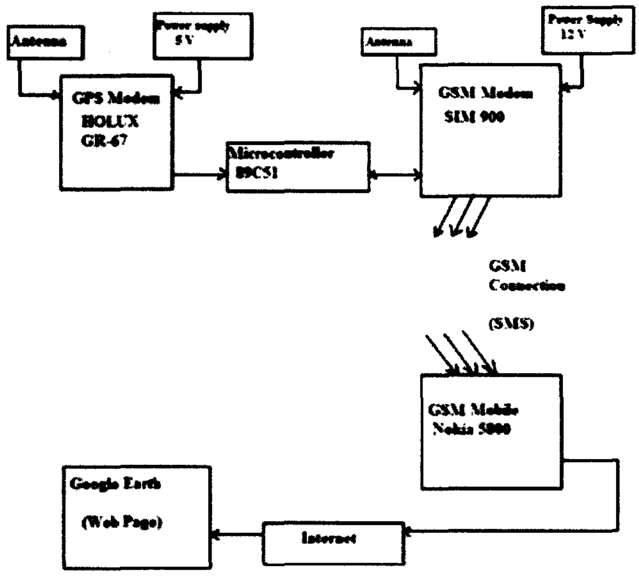

Figure 2.7 Block diagram of the concept of system

AT89C5 is the microcontroller utilized. The GPS pin TX is linked to the microcontroller, while the GSM pins TX and RX are linked to the serial ports of the microcontroller. Serial communication is used to communicate between microcontrollers. Different satellite GPS readings are supplied to the AT89C51 microcontroller, which processes and forwards them to GSM. Only $GPRMC data are received by GPS, and the microcontroller only gets latitude and longitude data from these values, ignoring time and altitude. It receives data from the GPS receiver and delivers the information to the owner as an SMS.

In [17], Design and implement a system that captures multiple real-time vehicle characteristics and transmits via GSM to a central station. This data monitoring system is a device that captures the vehicle's position as well as a zone designated by GPS. This method by which the central station examines the vehicle parameters and stores them in the central station database. The ARM7 microprocessor is utilized as an embedded microcontroller with GPS, GSM, and an LCD display. All sensors that used in this system such as GPS, GSM, and LCD displays are connected to the controller, which processes sensor readings and displays them on the LCD display before sending them to the central station.

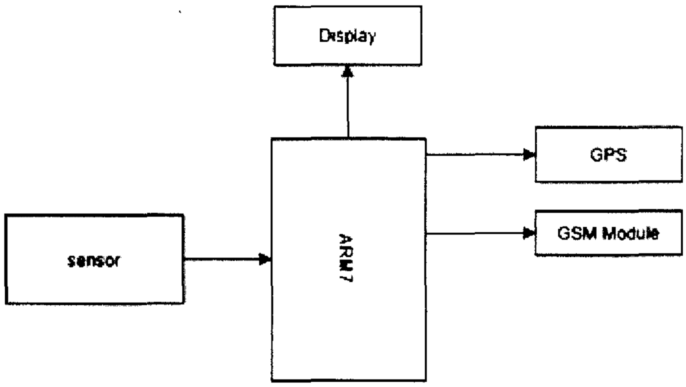

Figure 2.8 Block diagram of Proposed System

GSM is used to send data to the central server database. Sending an SMS to the GSM modem allows a central station user to obtain information from a car at any time. The system will send the location of the vehicle via SMS.

Computer software was designed that allows the user or a third party to follow the coordinate of the car while also gathering data. Information may be displayed on maps through the Internet or specific software. A GSM modem and GPS receiver are serially connected to the AT89S52 microcontroller. A GSM modem is used to link the vehicle's longitude and latitude, of a location. The GPS modem will continually transmit data. The GPS modem outputs consist of variety of parameters, but only the NMEA data is process and display on the LCD. The information is delivered to phone when the vehicle's place is requested. The mobile number is stored in an EEPROM. The modems and the microcontroller communicate in serial. This system employs the RS-232 standard. When person submits a request to the modem's number, the system immediately reply to that mobile phone, revealing the car's position in latitude and longitude. This information may be used to monitor the car[18].

In [19], the technology will employ GPS and GSM modules to determine the vehicle's information. I be submitted to the monitoring station and cloud storage. The GPS module can pinpoint the exact location of the car and determine the sort of route it is traveling on. The monitoring station will be notified of any vehicle inroads identified by the GPS gadget. Any violation be tracked to station, as well as being stored in the cloud. The station would be able to locate the automobile.

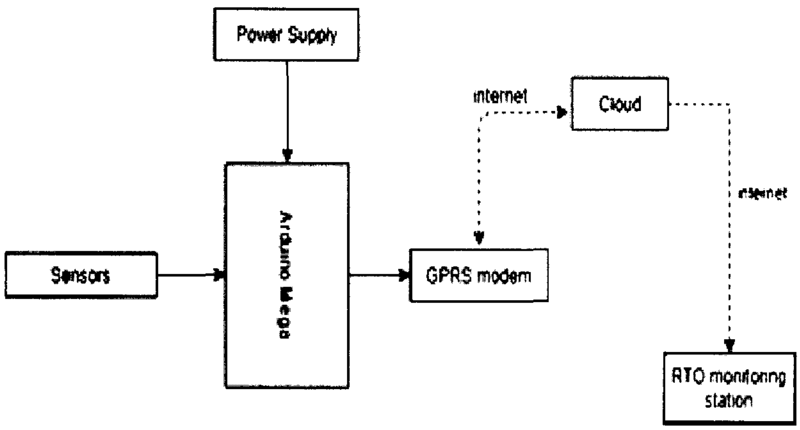

Figure 2.9 Block Diagram of design

In [20], the design includes Global Positioning System (GPS) and Global System for Mobile Communication (GSM) for vehicle location and monitoring purposes using SIM800 module. The GPS shows the vehicle location. The tracking information is sent to the server through GPRS, and the created message is sent to the owner's phone. This technology is installed in the vehicle's interior and is monitored in real time using the web page to identify its position. At the same time display information on LCD monitor that already mounted.

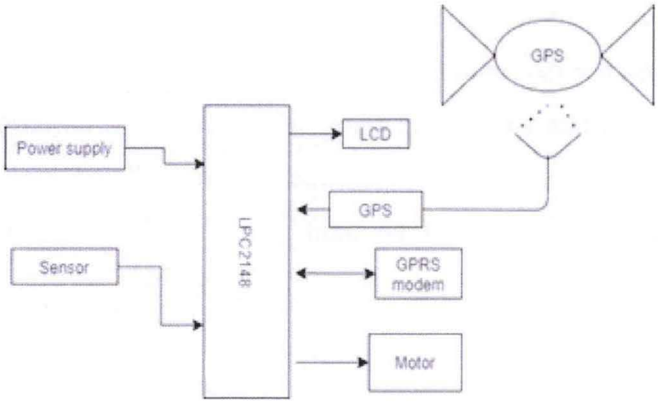

Figure 2.10 Block Diagram of monitoring System using IoT

Tracking system was developed to track and monitoring of vehicle at any time from any place. A technology that combines a Smartphone application with a microcontroller was used to great effect by the system. Smartphone users currently outnumber those who hold basic mobile phones in the general public[21].

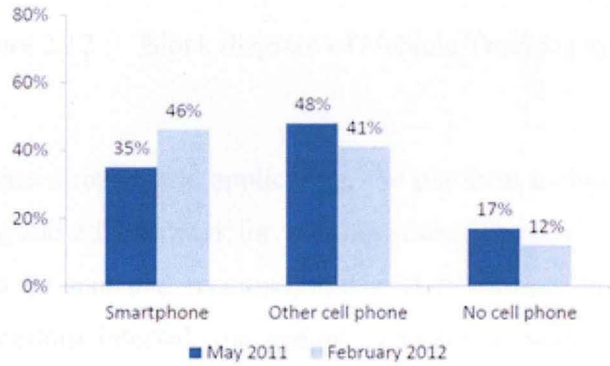

Figure 2.11 Changes in phone user, 2011-2012.

The device is placed in a vehicle that location must be identified and monitoring in real time. The GPS module was utilized to obtain coordinates at regular intervals in this system. The location of car is transmitted and updated to a database via a GSM/GPRS module, and a mobile application is also built to track the car's whereabouts in real time. The position of a smartphone application is constantly monitored and shown using Google Maps API. Users can to use the Smartphone to continually monitor vehicle on demand and can expected distance also time for the vehicle to arrive at the place. The GSM/GPRS module is in charge of this system's operation. After a set time period, send the position information to a cloud. The cloud then stores and manages the received vehicle's position data. Finally, if a user requests the position of a car, it may be retrieved from the database and tracked in real time on Google Maps using a Smartphone application.

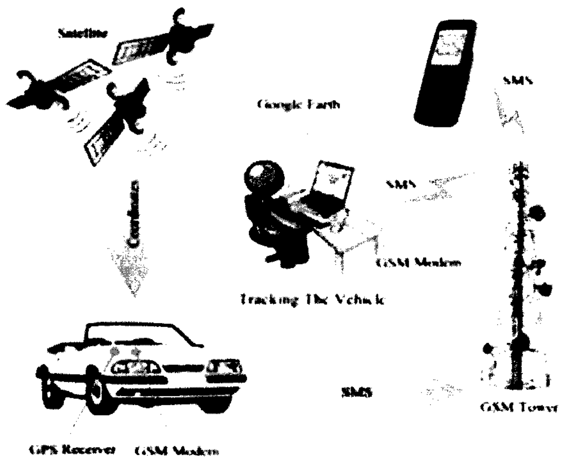

Figure 2.12 Block diagram of Vehicle Tracking system

In [22], create a real-world application, the platform includes an Iot system for location monitoring and a framework for walking sticks. The device GPS signals can be received, SMS can be sent and received, and a TCP connection over GPRS can be established. At a certain interval, the gadget generates location data. These are the location data and other details. Over a TCP connection, the data and timestamps will be sent to the server. These data will be collected and stored by the server. For mobile apps, the server also exposes a RESTful API. The mobile application obtains data from the server via HTTP queries, sends SMS massage to operate the device remotely, and uses the server's API.

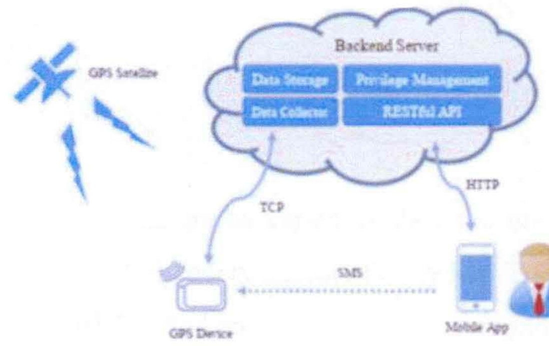

Figure 2.13 Architecture of location tracking system

The system gives real-time information on the vehicles numerous properties, such as its position, and allows the parents to be contacted. Using an ESP8266 microcontroller, this system uses GPS technology to connect to a remote server through Wi-Fi. The Ublox 6M GPS module was apply to determine the coordinates of current vehicle. The ESP8266 used by the system to upload data to a cloud on the web server. Parents may access the information via a smartphone application, which allows them to keep track on their children more efficiently. The tracking is done by reading the coordinates [23].

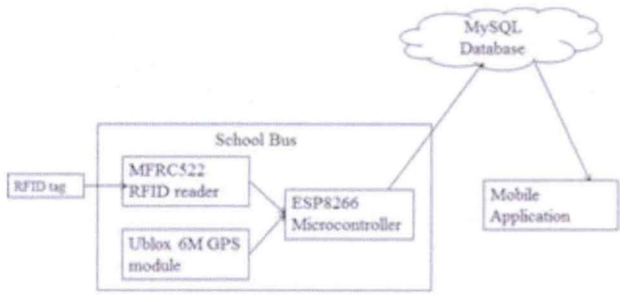

Figure 2.14 Block diagram of tracking

The microcontroller is used to transfer the bus's coordinates from the GPS module to a MySQL database on a distant server using Wi-Fi. The locations were submitted to the database on a regular basis and with great accuracy. The GPS is incorporated into the microcontroller, allowing users to access information via a mobile app that displays the location from the cloud on a map. To map the position, the Application UI uses a Google Map API.

In [24], IoT applications are as varied as they are many, as IoT solutions are progressively being used to nearly every aspect of daily life. The vehicle tracking system is one application where IoT has had an influence. The importance, operation, and use of a vehicle tracking system are discussed. The vehicle tracking system consists of a GPS antenna that generates coordinates, a GSM modem for receiving user requests and sending the coordinates (i.e. latitude and longitude) of the vehicle generated by the GPS antenna via SMS, an Atmega microcontroller as an interface, and a mobile application based on Google Maps to pinpoint the vehicle's location.

In [25], the suggested system is based on the GPS/GSM SIM900A module, which combines the two functions of GPS and GSM. The alert message is sent to the car's owner's mobile phone using the GPS current position of the vehicle and the GSM. The suggested device would be installed inside the car, which would be tracked in real time via the web page.

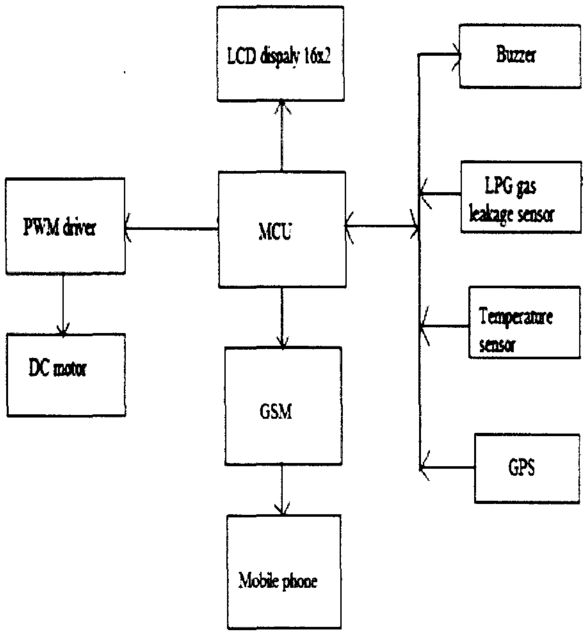

Figure 2.15 The block diagram of system

In [26], a moving car is equipped with a real-time Arduino-based vehicle tracking system with GPS and GPRS shield, allowing the owner/user to follow the vehicle's whereabouts. This suggested technology will constantly monitor and report on the state of a moving vehicle. An Arduino UNO board with an Atmega328 microprocessor is connected to a GSM module and a GPS receiver to do this. In real time, the GPS receiver will provide data showing the vehicle's position in terms of latitude and longitude. The GSM module will broadcast the vehicle's location (latitude and longitude) to a mobile phone from a faraway location on the LCD, the same information is presented.

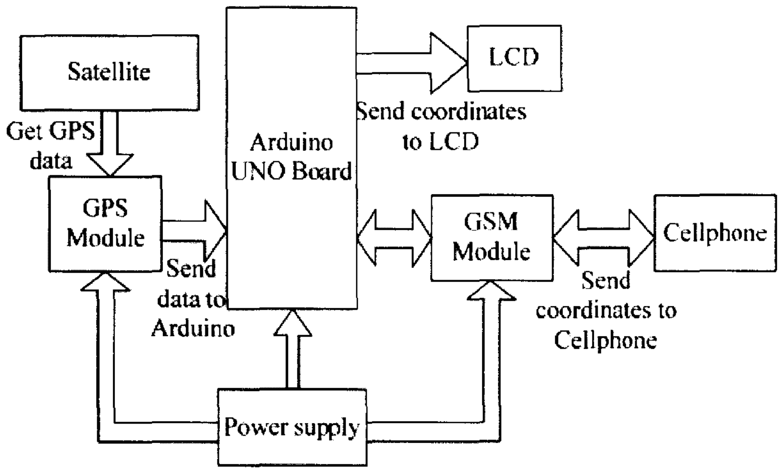

Figure 2.16 Block diagram of Arduino based vehicle tracking system.

The hardware and software specifications for the Arduino-based vehicle tracking system are split into two components. The Arduino UNO board with microcontroller, GPS and GPRS shield, and LCD are included in the hardware specification. Google map is utilised in the programme specification for the Aurdino IDE software.

2.3 Conclusion

The Vehicular tracking system component after comparing the various articles. The GPS module been used for sending information of location such as latitude and longitude. The LCD display used to show the latitude and longitude to the driver. The suitable component for send the data to the used that suitable for this system is GSM compare to used Wi-Fi based as the medium to transfer data to the user because GSM do not need internet connection like Wi-Fi base. This can make system work effectively and more economic to user or owner pf the vehicle.

CHAPTER 3

METHODOLOGY

This chapter describes the design, method and the methodology used in preparation for developing the project. Besides that, it described the process stage of the system. Therefore, this chapter provides ideas towards the objective of the project.

3.1 Block diagram system

In this section, the block diagram has been constructed for the system project.

3.1.1 Block for complete system

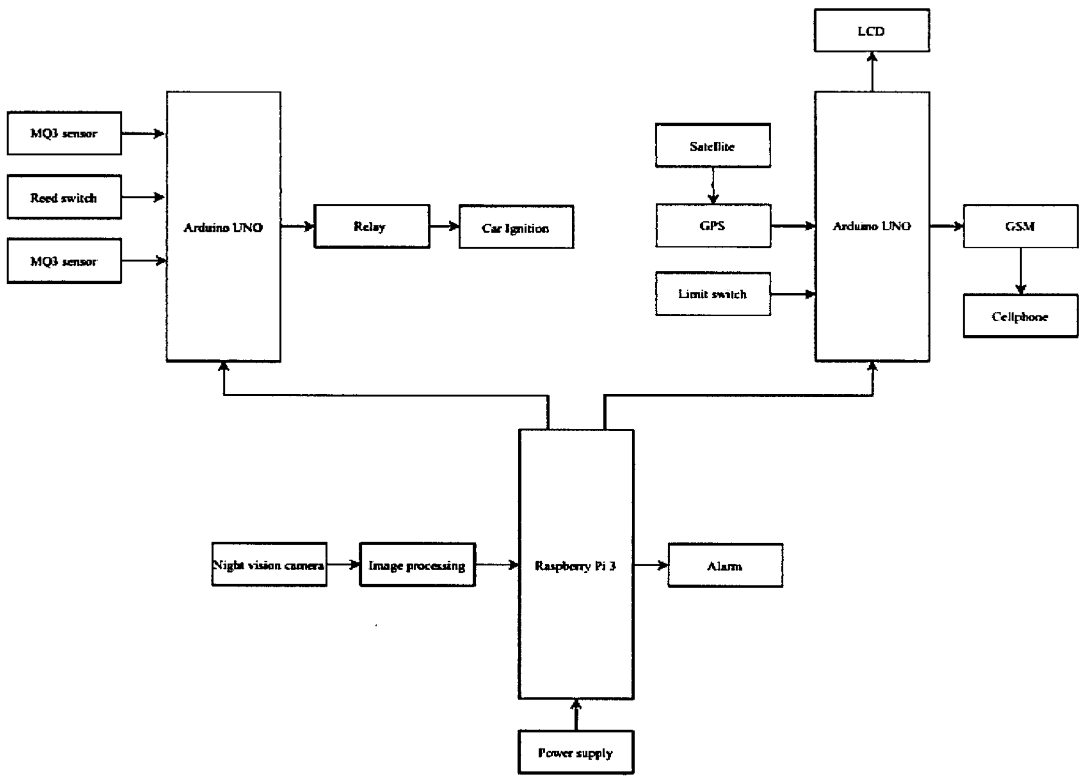

Figure 3.1 Combination system of two Arduino uno and Raspberry Pi Model #3

Figure 3.1 shows the block diagram of combination system for seatbelt control system, consists of alcohol and buckle detection, drowsiness detection and vehicle location tracking system.

3.1.2 Vehicle tracking subsystem

Figure 3.2 present the block of vehicle tracking system is shown. To activate the GSM and GPS module, +5 volt DC power is connected to GSM and GPS module. Power from raspberry pi 3 delivered to the Arduino UNO board with microcontroller. With a GPS receiver and GSM module, Arduino is utilised to control the procedure. To receive data from satellites, a GPS receiver with a 9600 baud rate is utilised. The data is transferred to the Arduino, which extracts coordinates from the GPS receiver using the $GPGGA String and sends them to GSM in terms of coordinates (latitude and longitude). The coordinates are sent to the user/owner via the GSM module. through SMS, allowing user to monitor the vehicle by open on Google Maps and can see the current location. There's also a 16x2 variation. Coordinates are also displayed on LCD.

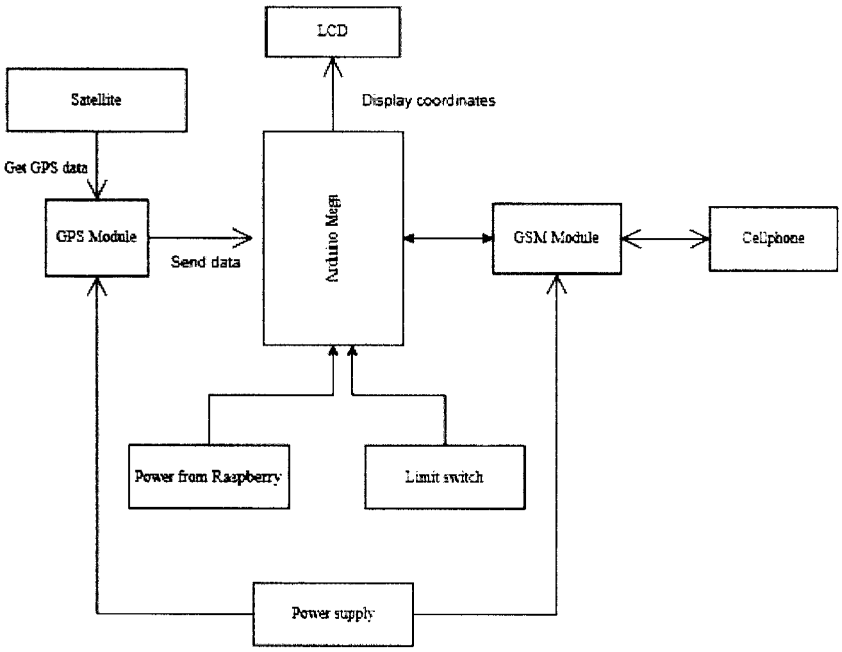

Figure 3.2 Block diagram of Vehicle tracking subsystem

3.2 Flow chart system

In this section, the flowchart diagram has been constructed for the system project.

3.2.1 Main flow chart

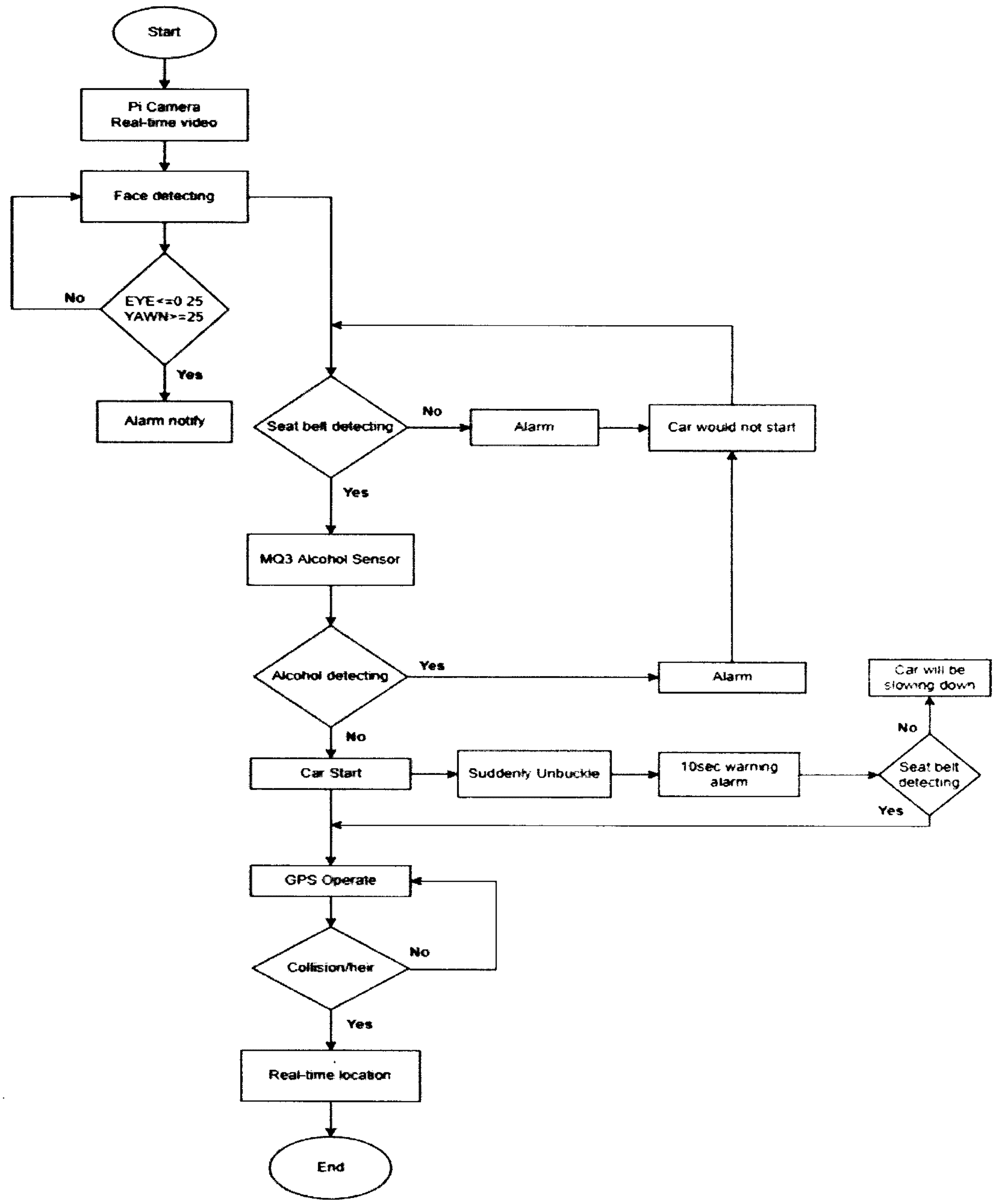

Figure 3.3 Main flowchart of the integrated system

Figure 3.3 illustrated the main flowchart of the seatbelt control system that proposed in this paper.

3.2.4 Vehicle tracking system flow chart

Figure 3.4 shown the block diagram of vehicle tracking subsystem for this project. At first the system get power from the power supply which raspberry pi 3 to Arduino. While for GPS module and GSM module get power from car battery. GPS pin TX is connected to microcontroller of Arduino and GSM pins TX and RX are connected to serial ports to communicate with SIM908. Microcontroller communicates with the help of serial communication. Using satellite service, the GPS receiver determines the vehicle's latitude and longitude. If GPRS is available, positional data is provided to the owner through SMS to his or her phone number. At the same time, the position is displayed on the LCD in the form of latitude and longitude.

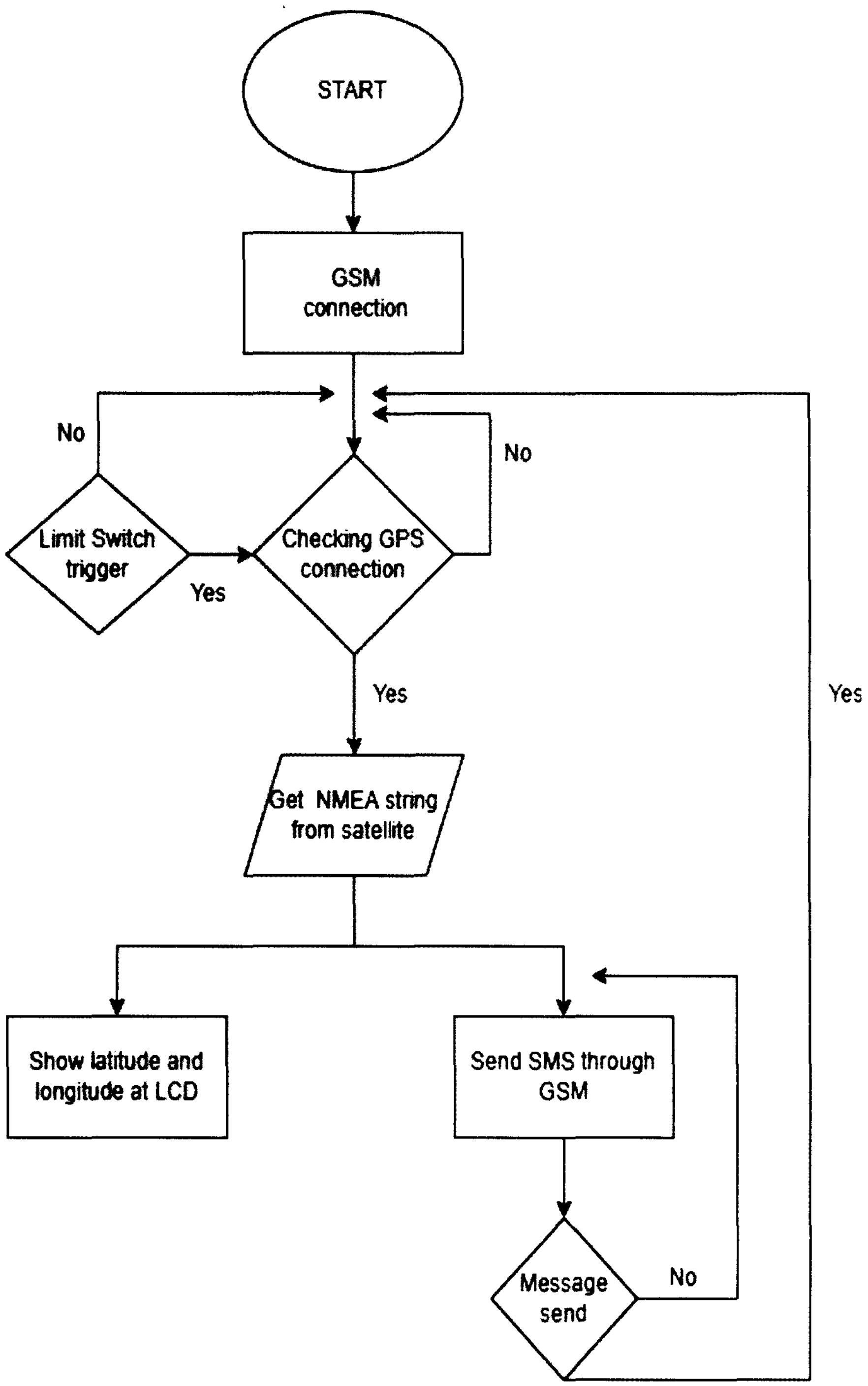

Figure 3.4 Flowchart Vehicle Tracking system

3.3 Project Design

In this section, the arrangement of the components in the project were proposed with this design.

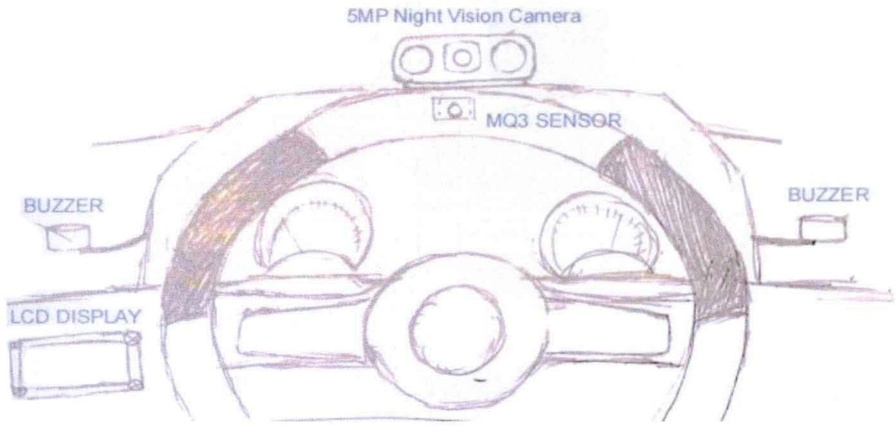

Figure 3.5 From view driver

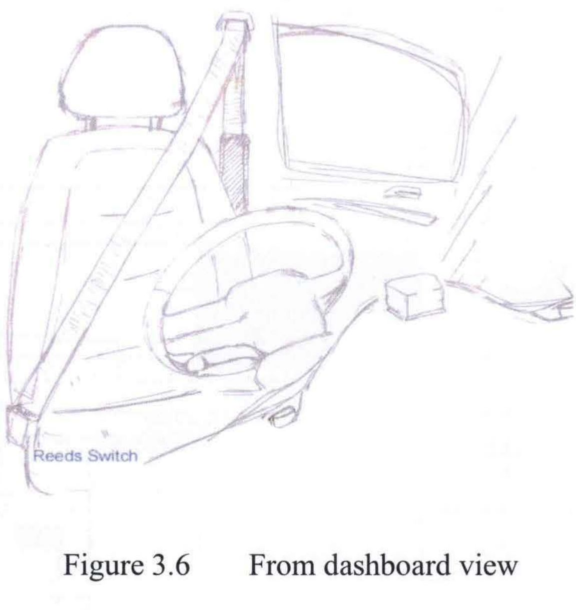

Figure 3.6 From dashboard view

3.4 Circuit Design

In this section, the circuit of each system is designed using fritzing software.

3.4.2 Vehicle Tracking System circuit design

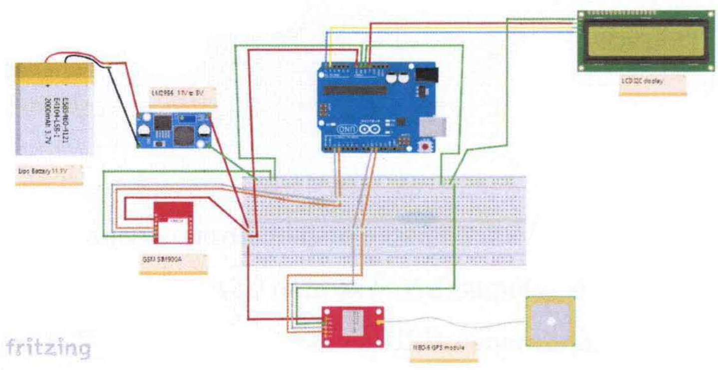

Figure 3.7 Vehicle Tracking System circuit

3.4.4 Full circuit design

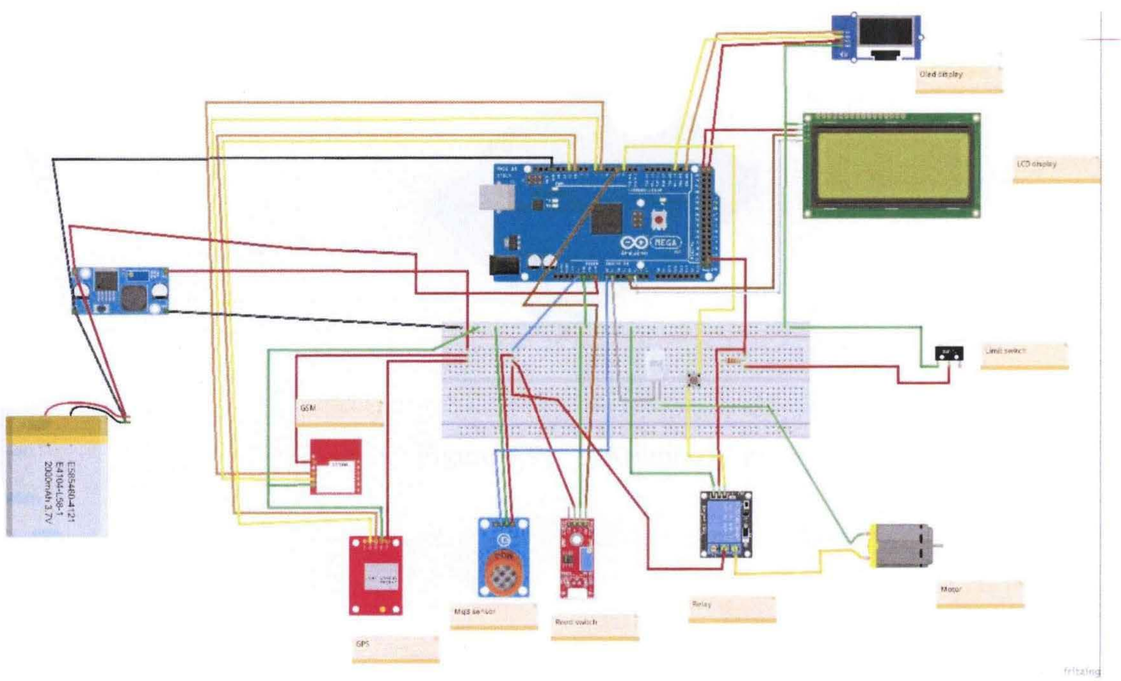

Figure 3.8 Full circuit design

3.5 Hardware and Software of the proposal system

In this section, the components of hardware and software will be used to develop the project.

3.5.1 Hardware

i. Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started., an ICSP header, and a reset button on this board. The flash memory is 128 KB, with the bootloader using 4 KB and a clock speed of 16 MHz. The size of this Arduino is 68.6 mm x 53.4 mm.

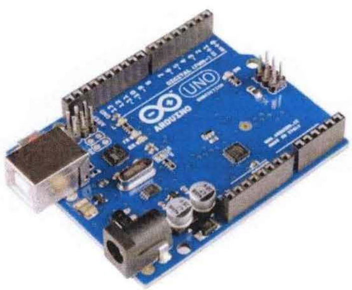

Figure 3.9 Arduino Uno

ii. NEO-6M GPS

A robust satellite search capacity is provided by the Neo-6M GPS's built-in 25 x 25 x 4mm ceramic antenna. A full GPS module with an integrated active antenna and an EEPROM for storing setup parameter data. The power supply range is 3-5V, and the default baud rate is 9600bps. This GPS module interface is RS232 TTL.

Figure 3.10 NEO-6M GPS

iii. Sim900A GSM Module

The SIM900A Modem is based on SIMCOM's Dual Band GSM/GPRS SIM900A modem. It operates over the 900/ 1800 MHz band. SIM900A can automatically search these two bands.

Figure 3.11 Sim900A GSM Module

AT Commands can also be used to change the frequency bands. The baud rate may be changed from 1200-115200 using the AT command. The inbuilt TCP/IP stack on the

GSM/GPRS Modem allows you to connect to the internet through GPRS. SIM900A is a wireless module that is both small and dependable. This is a full GSM/GPRS module in SMT format, featuring a high-performance single-chip CPU based on the AMR926EJ-S core.

iv. 16X2 LCD Display

The operating voltage of this LCD display is 4.7V to 5.3V, and the current used is 1mA without the backlight. It's an alphanumeric LCD display module, which means it can show both letters and numbers. This model has two rows, each of which can print 16 characters. A 588 pixel box is used to create each character. It supports both 8-bit and 4-bit modes of operation. Additionally, the 12x2 LCD Display can display any custom produced characters and comes with a green or blue backlight.

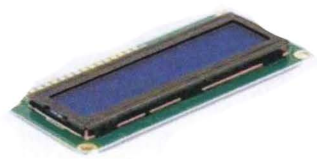

Figure 3.12 16X2 LCD Display

v. Module for character LCD

The I2C communication interface is used by this module. There are just two additional pins for power, VCC and GND, after the I2C pins: SCL and SDA. On an Arduino or any other controller, it saves 4 to 8 pins. The pins are broken out into a conventional right angle header 2.54mm spacing also may be connected directly using female jumper wire. Its size is 82x35x18 mm.

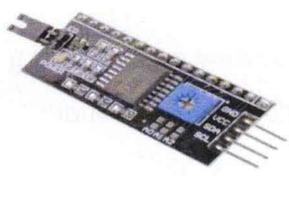

Figure 3.13 12C module for character LCD

vi. Voltage Regulator (LM2596)

In order to step down the 12V supply from the source to power up the GPS B and GSM SIM900A, LM2596 is used. The voltage regulator steps down the 12V to 5V approximately. Basically, the voltage controller keeps up the voltage of a power source inside satisfactory breaking points. The LM2596 is a 5V voltage controller that confines the yield voltage to 5V yield for different scopes of information voltage. It goes about as an astounding segment against input voltage variances for circuits and adds an extra safety to the hardware

Figure 3.14 LM2596 DC-DC

vii. Micro Limit Switch

Micro switches are switching that function with very little force (push/pressure) and at a high pace. The contact of the Common terminal (C) might be Normally Closed (NC) or Normally Open (NO) at first (NO). They are extremely dependable, quick, and efficient to operate. A small snap-action switch is also known as a micro switch.

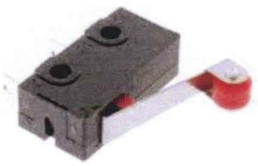

Figure 3.15 Micro Limit switch

- 3A
- Short lever with plastic roller
- Size: 7mm x 20mm x 10mm

viii. Lipo Battery

It is very important to have supply voltage from Lipo battery because easy could powerup GPS and GSM SIM900A easily because the current produce is higher if compare with other batteries (Such as Li-ion batteries, Ni-MH batteries, Ni-cd batteries, and Lead-acid batteries). The other reasons of choosing Lipo batterie 11.1V because of lightweight and having long life.

Figure 3.16 Lipo Battery

Specification:

i. Ordinary Voltage: 11.1V

ii. Fully-charged: 12.6V

iii. Capacity: 2200mAh

3.5.2 Software

i. Arduino IDE

The Arduino Integrated Development Environment or Arduino (IDE) software, Includes a text editor, a massages area, a text console, a toolbar with buttons for basic functions, and a sequence of menu for writing code. It communicates with the Arduino and Genuino devices by connecting with them and uploading code. Support for third-party electronics may be included to your sketchbook directory's hardware directory. Board definitions (which display in the menu), core libraries, bootloaders, and programmer definitions are some of the platforms that can be found there.

Figure 3.17 Arduino IDE

ii. Fritzing software

An open-source initiative to produce CAD software for design of electrical components, with the goal of assisting designers and creators that ready to move beyond prototype and construct a more fixed circuit.

Figure 3.18 Fritzing software

iii. Message (SMS)

Short Message Service (SMS) is a type of text messaging. It is one of the earliest texting systems, having been invented in the 1980s and defined in the 1985 GSM specifications. It's also the most well-known and widely utilised. SMS is sent through a cellular network, and all you need to get started is a wireless plan from a cellular provider. The length of a standard SMS message is restricted to 160 characters.

Figure 3.19 Massages

iv. Google map API

The Google Maps Platform is suite table for SDKs and APIs developers or creator may use to integrated google map into mobile apps or webs that obtained and used data from Google map

Figure 3.20 Google map

3.6 Expected Result

The objective of the project is to provide a reliable system The monitoring for the vehicle is based on GSM and GPS, this system is designed to offer real-time information such as location to users on property. So that we know the exact location of the vehicle and can pinpoint the location if anything happens onwards.

CHAPTER 4

RESULT AND DISCUSSION

The purpose in this chapter is to present the outcome obtained based on the fabrication in this prototype of vehicle location tracking system. Discussion was made based on the results which was obtained through this prototype.

4.1 Circuit build

In figure 4.1 the circuit connection is showed. As it is obvious, TX (Transmitting) of SIM900A is connected with pin 7 in Arduino, RX (Receiving) in SIM808 is connected with pin 6 in Arduino. The ground pin of SIM900A is connected to Arduino ground. Moreover, SIM card is placed for texting messages. The complete setup is connected to the computer for programming and powering the Arduino. The Global Positioning System (GPS) is an important component in this paper. TX (Transmitting) of Neo-6 GPS is connected with pin 10 in Arduino, RX (Receiving) in GPS module is connected with pin 11 in Arduino. The ground pin of GPS is connected to Arduino ground. It always receives the coordinates in every second from satellite.

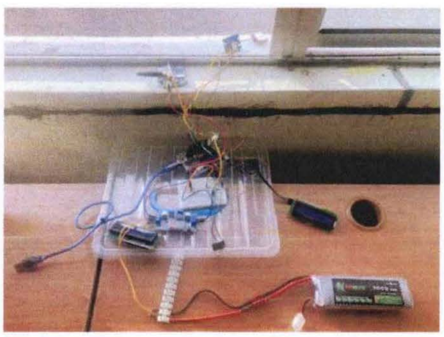

Figure 4.1 Circuit of vehicle tracking system.

The LCD display that used with I2C module to decreased the wire connection from 8 to 4 connection only. The I2C module have Vcc pin, ground pin, SDA pin and SCL pin. The Vcc pin connected to 5V pin of Arduino. The ground pin of I2C is connected to Arduino ground. The SDA pin is connected to A4 pin and SCL pin to A5 of Arduino. Micro limit switch also added in this system. The C pin of limit switch connect to the ground and the NO pin connect to pin 2 of PWM pin of Arduino. The serial connection was made by using the software serial library. Other library like TinyGPS plus and Liquidcrystal_I2C also used in this system.

4.2 Verify the program

The coding program for this system using Arduino IDE, the coding that have been make is verify and upload to Arduino uno board. The result of Arduino IDE was shown in the serial monitor as shown in Figure 4.2 and Figure 4.3.

```
+CMT: "+60175578535","","22/02/03,18:38:55+32"
LOCATION
user send sms to gʕ[CʕD5DʕxʕʕS
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
```

Figure 4.2 The get data of latitude and longitude sixteen time.

```
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
latt:3.533817
long:103.430122
System ready
AT+CMGF=1

ERROR
AT+CMGS="+60175578535"

> Untuk perngetah
+CMGS: 83

OK
```

Figure 4.3 Success sending data from GPS to user when requested the location.

The coding for Automatic location tracking when limit switch active also been verify using serial monitor. The result of Arduino IDE was shown in the serial monitor as shown in Figure 4.4 and Figure 4.5.

```
latt:3.533820
long:103.430114
latt:3.533820
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
second alert
GPS Start
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
```

Figure 4.4 The GPS get data latitude and longitude when limit switch trigger.

```
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:0.000000
long:0.000000
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
latt:3.533821
long:103.430114
AT+CMGF=1

OK
AT+CMGS="+60175578535"

> Untuk perngetahuan
+CMGS: 85

OK
```

Figure 4.5 Success sending data from GPS to user when limit switch trigger.

Figure 4.6 shows the message that was received on the cell phone. When the link in the message is clicked, the result will be shown as illustrated in Figure 4.7 using Google Maps. As a result of this effort, the owner or user may quickly determine the present position of the automobile, which will be extremely useful if problems happen. When limit switch trigger also will send the message to the user but the difference is the message automatically send without the user need to send message "LOCATION" to the GSM. This situation will occur if the vehicle involves in accident that activate the air bag as illustrated in Figure 4.8.

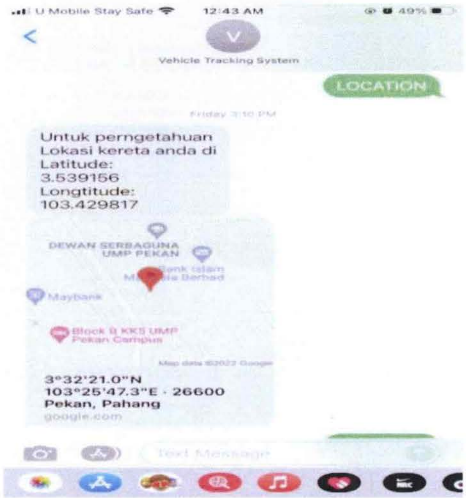

Figure 4.6 Message received in user mobile.

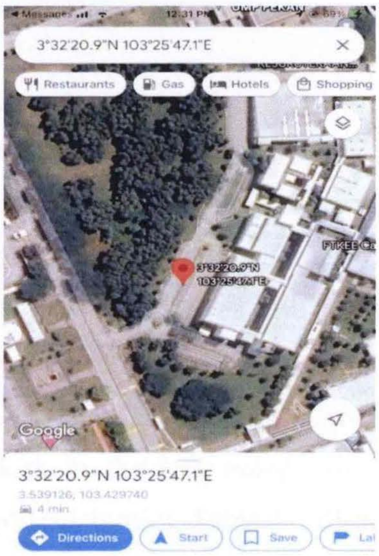

Figure 4.7 Google map result.

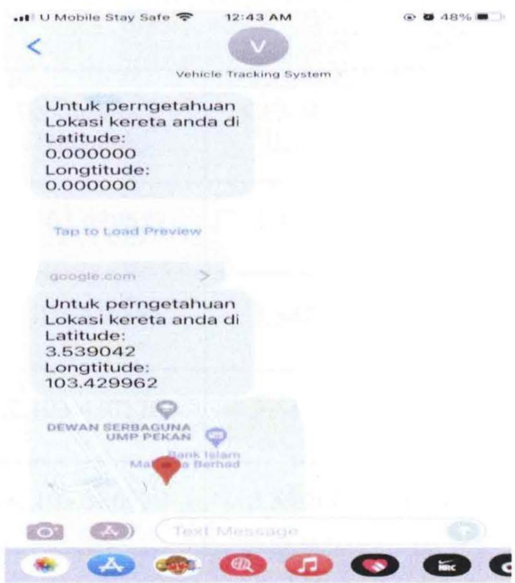

Figure 4.8 Message received in user mobile when limit switch activated.

4.3 Test of the Proposed Vehicle Tracking System

The accuracy of the coordinates provided by the GPS module was measured under various circumstances or restrictions, including poor weather, enclosures, and high-rise structures. Good weather and clear sky (no tall buildings or enclosures within noticeable distance of the GPS) were examples of situations with no limitations. In this test, the GPS module's coordinates were compared to the real coordinates supplied by Google Map, and the distance difference was calculated. The test was carried out at four separate locations, with the differences in distance noted. The variances in distance were calculated using Google Map's capabilities. Table 4-1 displays the results collected.

Table 4-1 Field test of commercial GPS unit and proposed system

Position	Actual Coordinates (Latitude, Longitude)	GPS Module Coordinates (Latitude, Longitude)	Variation in Distance (m)
1	3.539050, 103.429657	3.539156,103.429817	4.6m
2	3.547135,103.426885	3.547140,103.426902	2.3m
3	3.533821,103.430126	3.533817,103.430122	1.06m
4	3.539114, 103.386539	3.539145, 103.386672	1.1m

The employed GPS module (Neo-6m GPS) is said to have a 1.0m accuracy. The accuracy of the system in relation to the declared accuracy may be estimated using the findings in Table 4-2:

Accuracy (%) =

$$100\% - \left(\frac{Actual\ variation - Stated\ variantion}{Actual\ variantion} \times 100\%\right)$$

where:

Actual variation = Results of the variation obtained

Stated variation = Accuracy of Neo-6m GPS

The results of the comparison of systems accuracy are presented in Table 4.

Table 4-2 Comparisons of system accuracy

Position	Percentage Accuracy (%)
1	21.70%
2	43.47%
3	94.34%
4	90.90%

The precision of the system is affected by a variety of conditions, including bad weather, enclosures, and high-rise structures (constraints). The presence of such limits can cause readings in the system to be inaccurate. Depending on the nature of restrictions, several types of mistakes are created. For example, in an area highly inhabited by high-rise buildings, the system's inaccuracy will be greater than in an area with only a few high-rise structures. Other issues that can impact the accuracy of the developing GPS-GSM system include satellite clock, orbit errors, multipath, and satellite geometry relative to the user. The system, on the other hand, is extremely accurate when there are no limits.

CHAPTER 5

CONCLUSIONS

5.1 Conclusion

The prototype for a vehicle tracking system that uses GPS and GSM technologies to track the exact position of a moving or stationary vehicle in real time was successfully built and tested. For users, the system delivers a better service and a more cost-effective solution. Geographic coordinates of a car retrieved through an in-vehicle gadget. The position of the car was displayed on a Google map using a cell phone. The suggested automobile tracking system demonstrates the capabilities of near-real-time vehicle tracking, which may be used for personal vehicle protection, driver and passenger safety, and security.

5.2 Recommendation

There are few improvements can be done for future development on this prototype:

i. Travelling distance can be calculated and recorded using database.

ii. connecting a more sensitive GPS shield to provide the exact location.

iii. Adding speed sensor which can also know the speed of the car.

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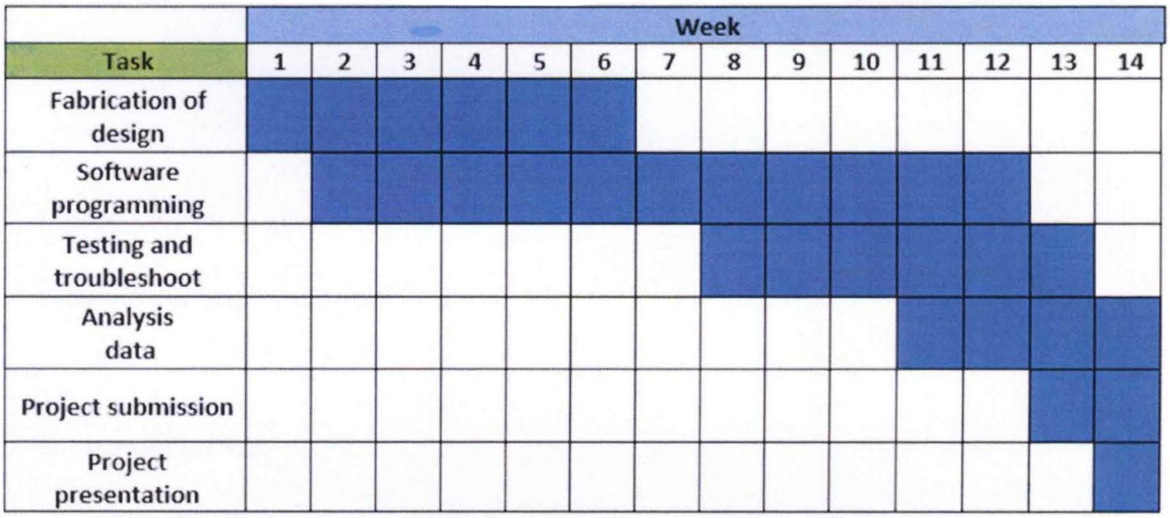
APPENDICES

Appendix A: Gantt Chart of project



Appendix B: PROGRAMMING (GPS and GSM)

```
#include <TinyGPS++.h>

#include <LiquidCrystal_I2C.h>

#include <SPI.h>

#include <Wire.h>

#include <SoftwareSerial.h>


LiquidCrystal_I2C lcd(0x27, 16, 2);

SoftwareSerial SIM900A(7, 6);  // 7 = TX, 6 = RX


String incomingData;

String message = "";

float a, d;


int LEDRED = 4;


int Lswitch = 2;

int flag = 0;


void setup()

{

  Serial.begin(9600);
```

```
pinMode(Lswitch, INPUT);


Serial.println("RED LED READY");
pinMode(LEDRED, OUTPUT);


Serial.println("system start");
lcd.init();
lcd.backlight();
lcd.setCursor(0, 0);
lcd.print("VEHICLE TRACKING");
lcd.setCursor(1,5);
lcd.print("   SYSTEM");
delay(3000);
lcd.clear();
lcd.print("System activated");
delay(2000);
lcd.clear();
SIM900A.begin(9600);
Serial.println("Sets the GSM Module in Text Mode");
SIM900A.print("AT+CMGF=1");
delay(100);
Serial.println("Read SMS in text mode");
SIM900A.print("AT+CNMI=2,2,0,0,0");
```

```
 delay(100);
}

void loop()
{
 lcd.setCursor(0,0);
 lcd.print("System Ready");
 delay(1000);

 receive_message();
 if (incomingData.indexOf("LOCATION") >= 0)
 {
  Serial.println("user send sms to gsm");
  send_gps();
  Serial.println("System ready");
 }

 if( (digitalRead(Lswitch) == HIGH))
 {
 ;
 }
 else
 {
```

```
send_gps();
lcd.print("Second alert");
delay(300);
Serial.println("second alert");
digitalWrite(LEDRED, HIGH);
delay(300);
digitalWrite(LEDRED, LOW);
  digitalWrite(LEDRED, HIGH);
delay(300);
digitalWrite(LEDRED, LOW);
  digitalWrite(LEDRED, HIGH);
delay(300);
digitalWrite(LEDRED, LOW);
  digitalWrite(LEDRED, HIGH);
delay(300);
digitalWrite(LEDRED, LOW);
send_gps();


}
}
```

```
void receive_message()
{
 if (SIM900A.available() > 0)
 {
  incomingData = SIM900A.readString();
  Serial.print(incomingData);
  delay(100);
 }
}

void send_message(String message)
{
 SIM900A.println(message);
 delay(200);
}

void send_gps()
{
 lcd.print("find location");
 SIM900A.end();
 SoftwareSerial serial_gps(10, 11); //10 = TX, 11 = RX
 TinyGPSPlus gps;
 Serial.begin(9600);
```

```
serial_gps.begin(9600);
Serial.println("GPS Start");
for (int i = 1; i <= 16; i++)
{
 while (serial_gps.available())
 {
  gps.encode(serial_gps.read());
 }

 a = gps.location.lat();
 d = gps.location.lng();
 Serial.print("latt:");
 Serial.println(a, 6);
 Serial.print("long:");
 Serial.println(d, 6);
 lcd.setCursor(0, 0);
 lcd.print("latt:");
 lcd.print(a, 6);
 lcd.setCursor(0, 1);
 lcd.print("long:");
 lcd.print(d, 6);
 delay(100);
 lcd.clear();
```

```
}
serial_gps.end();
SIM900A.begin(9600);
SIM900A.println("AT+CMGF=1");
delay(400);
SIM900A.println("AT+CMGS=\"+60175578535\"");
delay(400);
SIM900A.println("Untuk perngetahuan Tuan/Puan");
SIM900A.println("Lokasi kereta anda di");
SIM900A.println("Latitude:");
SIM900A.println(a, 6);
SIM900A.println("Longtitude:");
SIM900A.println(d, 6);
SIM900A.print("http://www.google.com/maps/place/");
SIM900A.print(a, 6);
SIM900A.print(",");
SIM900A.println(d, 6);
SIM900A.write(0x1a);
delay(1000);
}
```

Appendix C: Schematic diagram