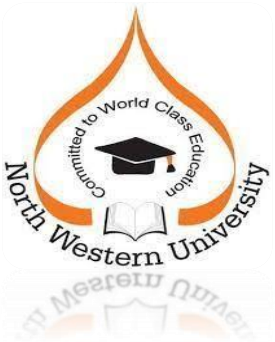
A PROJECT ON

GSM AND GPS BASED VEHICLE ACCIDENT NOTIFICATION SYSTEM



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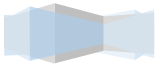
A project report submitted to

Department of Electrical and Electronic Engineering
North Western University
Khulna - 9100, Bangladesh
10th March, 2023

Dedicated
To
Our Beloved Parents
And
Teachers



DECLARATION

This is to certify that the project work entitled “GSM AND GPS BASED VEHICLE ACCIDENT NOTIFICATION SYSTEM” has been submitted to North Western University's Department of Electrical & Electronic Engineering for partial fulfillment of the degree of Bachelor of Science in Electrical & Electronics Engineering. In this project the outcome of the work is done by us under the supervision of Mr. Md. Ayaj Uddin Khan, Lecturer, department of the Electrical and Electronics Engineering, North Western University, Khulna-9100, Bangladesh. We hereby affirm that the theoretical and practical research results were conducted solely by us and have not previously been presented for award of any degree or diploma evaluation elsewhere. Materials from the project study and other people's work have been properly referred to and acknowledged.

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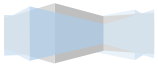
ACKNOWLEDGEMENT

Our utmost gratitude to God, the Almighty, without his mercy and blessing this work would not been possible. We are also highly grateful to our supervisor Mr. Md. Ayaj Uddin Khan, Lecturer, Department of Electrical and Electronics Engineering, North Western University for his crucial guidance, stimulating encouragement many ways throughout this project on "GSM AND GPS BASED VEHICLE ACCIDENT NOTIFICATION SYSTEM" to coordinate and complete the perplexing task. We also learned and enriched by her vision, experience, and support throughout this project which came to us with greater help to write this paper. We are also thankful to our teammates and classmates for their support to make this project successful. We must acknowledge the guidance provided by other supervisors as well as the panels, particularly in our project presentation, which has improved our presentation skills as a result of their comments and advice. Finally, we convey our heartily gratitude to our parents and family members for their moral support.

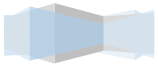
ABSTRACT

This project is designed for tracking the location of vehicles. Most of tracking systems are made by using GPS. This is very simple and cheap. Tracking systems are mostly used by fleet operators for tracking a vehicle location, routing and others. A GPS and GSM based electronic vehicle tracking device installs in a car, or fleet of vehicles. The Global Positioning System (GPS) is a frequent technique utilized by modern car tracking systems to locate the vehicle, but other automatic vehicle location technologies may also be employed. We can view vehicle information on electronic maps with the internet or specialized software. They are typically simple to steal because the typical motorist knows very well about them. We are going to put in place a mechanism that gives the car more security to prevent this kind of theft.



ABBREVIATIONS

Abbreviations	Meaning
IC	Integrated Circuit
MCU	Microcontroller Unit
RAM	Random Access Memory
ROM	Read-Only Memory
CP	Clock Positive
V	Voltage
I/O	Input Output
SRAM	Static Random Access Memory
EEPROM	Electronically Erasable Programmable Read Only Memory
USB	Universal Serial Bus
IDE	Integrated Development Environment
MOSI	Master Out Slave In
SCK	Seat Control Keypad
AVR	Automatic Voltage Regulator
SPI	Serial peripheral Interface
VPE	Vero Precision Engineering
PIC	Programmable Interface Controller



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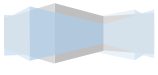

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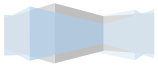

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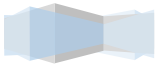
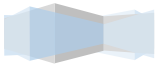


CHAPTER 1

INTRODUCTION

1.0 Introduction

In this urban life, transportation is very common. A lot of accident befall on the road every day. Therefore, the need for security and monitoring is developed. To resolve such problems, a system is developed using GPS and GSM technologies and an application is initiated in this project work. Various problems that we face in a critical condition (when the vehicle is in Accident Condition), then it will help to locate the car easily when the car is involved in an accident. All these problems are overcome by the system. This system has a Global Positioning System (GPS) which will receive the coordinates from the satellites among other critical information. The tracking system is very important in the modem world. This can be useful in warrior monitoring, tracking of the theft vehicle and various other applications. The system is microcontroller based that consists of a global positioning system (GPS) and global system for mobile communication (GSM). This project uses only one GPS device and a two-way communication process is achieved using a GSM modem. GSM modem, provided with a SIM card uses the same communication process as we are using on a regular phone. The system is not limited to finding the target's location but also the distance traveled b/w two stations. This system is user-friendly, easily installable, freely accessible and can be used for different other purposes. After installation system will locate the target by the use of a web application in Google map. The system allows tracking the target anytime and anywhere in any weather conditions. Some Vehicle tracking Systems can even detect unauthorized movements of the vehicle and then alert the owner. This gives an edge over other pieces of technology for the same purpose. This accident alert system in it detects the accident and the location of the accident occurred and sends GPS coordinates to the specified mobile, computer, etc. The accelerometer sensor, which is additionally interfaced with the microcontroller, is used to detect the car's standing position; in any case, if any mishap occurs then its warning will be directly sent to the intended receiver. When an accident occurs the system automatically sends a return reply to that particular mobile indicating the position of the vehicle. A Program has been developed which is used to locate the exact position of the vehicle and to navigate track of the moving vehicle on Google Maps.



1.1 Background Study

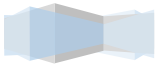
The car tracking system is becoming more and more well-liked and relevant throughout the world. It provides a ton of benefits for users, but it benefits car users the most because it makes it simpler for them to track their vehicles. These days, it's difficult to keep someone away from their smartphone. Five thousand people from the United States, the United Kingdom, South Korea, India, China, South Africa, Indonesia, and Brazil participated in a survey conducted by Time magazine. Eighty-four percent apparently believed they couldn't survive without their smart phones, which showed the majority of them are dependent on them. A different survey reveals that the smartphone market held 75% of the market share, and 106 million smart phones were supplied in the second half of 2012. The smartphone overtook other communication devices to take the top spot on the market today, making it the most widely utilized technology ever created. Therefore, it is now evident from the aforementioned survey how crucial and integral smartphone's have become to our modern way of life. For this reason, this vehicle tracking system was designed to be text message-oriented, allowing us to take care of our own vehicle with just a single touch of our hand. We can use smartphones and an internet connection to track the whereabouts of our cars in real-time. This tracking system is created in such a way that users can retrieve their vehicles using a simple and user-friendly interface.

1.2 Proposed System

With 10 m accuracy, the suggested technology is used to locate and navigate the vehicle. On Google Maps, the precise location is shown as latitude and longitude together with the precise navigational path. The system keeps track of a specific vehicle's location and delivers data in the form of messages to users' mobile devices as well as to microcontrollers. The vehicle is located on Google maps using the received data in the form of latitude and longitude, and the result is also visible on the LCD.

1.3 VEHICLE TRACKING FEATURES

It mostly benefits businesses that rely on the transportation system. As it can display the location of every vehicle in real time, they can produce the desired data as a result. These tracking systems may retain all of the information about the location and movement of the vehicle as well as the time it took at each stop and how long it took overall. It is also used in



buses and trains to calculate how far they are traveling and how long it will take them to arrive at a specific stop. These systems are used to collect data, store it, analyze it, and then transfer it. The system can be made capable of detecting by adding more sensors, such as temperature and infrared ones.

1.4 Objectives

The goal of the "GSM AND GPS BASED VEHICLE ACCIDENT NOTIFICATION SYSTEM" project is to provide an alert system that allows total control over the interface on which it is based. The project's general goals are as follows -

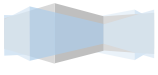
- To build a vehicle tracking system that can be managed by an embedded device, more especially a smartphone.
- To develop and deploy a trustworthy, cost-effective vehicle tracking system.
- To create a safe, user-friendly system for controlling automobiles that is specifically intended to help seniors of all ages.
- Also, it is created in such a way that it can serve multiple purposes, such as locating the scene of a vehicle accident or an accident warning system, as well as being helpful for tracking soldiers or children for purposes of safety or missing persons.
- Women safety purpose Connect the load and testing.

So, as stated before, this embedded system design takes care of every part of its goal.

1.5 USAGE OF VEHICLE TRACKING SYSTEM IN BANGLADESH

The usage of vehicle tracking systems in Bangladesh has been growing in recent years, particularly in the transportation and logistics industry. Here are some ways in which vehicle tracking systems are being used in Bangladesh -

- Fleet Management: Vehicle tracking systems are used by businesses that operate a fleet of vehicles, such as logistics companies, to manage their vehicles more efficiently. By using GPS tracking technology, businesses can monitor the location, speed, and route of their vehicles, and ensure that their drivers are adhering to the predetermined routes and schedules. This helps to increase productivity and reduce costs by optimizing routes

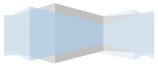


and reducing fuel consumption.

- Security: Vehicle tracking systems can also be used for security purposes, such as preventing theft and unauthorized use of vehicles. By monitoring the location of vehicles in real-time, businesses can quickly detect any suspicious activity and take appropriate action.

- Emergency Response: In emergency situations, vehicle tracking systems can be used to locate and dispatch emergency services to the exact location of the incident. This can be particularly useful in areas where road infrastructure is poor or in remote locations.
- Personal Use: Vehicle tracking systems are also being used by individuals for personal use, such as tracking the location of their own vehicles for security or monitoring purposes.

Overall, the use of vehicle tracking systems in Bangladesh is still in its early stages, but it has the potential to revolutionize the transportation and logistics industry, increase productivity, and improve security and safety on the roads.



CHAPTER 2

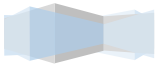
COMPONENTS OF THE PROJECT

2.0 Introduction

The project consists of a GSM modem, a GPS receiver, and a microcontroller. The entire system is fastened to the car. One GSM mobile phone is connected to a computer running a VB application at the other end (primary vehicle station). The GSM Modem will receive the longitudinal and altitude values from the GPS system that correspond to the position of the vehicle. The implementation specifics include the circuit diagram, architectural diagram, microcontroller chip configuration, and overall system operation. The suggested system's flowchart and algorithm are found in Chapter III. The performance review has been detailed, and Chapters IV and V complete this report.

2.1 Theory

With 10m accuracy, the suggested technology is used to locate and navigate the vehicle. On the Google map, the precise location is shown as latitude and longitude together with the precise navigational path. The system keeps track of a specific vehicle's location and delivers data in the form of messages to user's mobile devices as well as to microcontrollers. The vehicle's location on Google maps is determined using the received data, which takes the form of latitude and longitude. This type of vehicle monitoring system project is frequently used to track taxis, stolen cars, school buses, and other vehicles. In essence, this system is embedded. Hardware that is managed by software is referred to as embedded. All the hardware elements in this setup are controlled by software using an Arduino. One essential component of the system is Arduino. Nowadays, with practically everyone in society owning a car, theft frequently occurs in unsafe locations for parking and driving. Vehicle safety is incredibly important for public transportation vehicles. The car has a locking and tracking mechanism to keep track of its location. Using the Global Positioning System (GPS) and Global System for Mobile Communication, the location of the car was determined (GSM). Vehicle and provide a status report as needed. When the theft is discovered, the accountable party texts the microcontroller. This is less expensive, more dependable, and secure.



2.2 L293D Driver

The L293D is a popular 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single L293D IC is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. So if you have motors which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Microcontrollers like Arduino, PIC, ARM etc.

Fig 2.0 L293D Driver

Using this L293D motor driver IC is very simple. The IC works on the principle of Half H-Bridge, let us not go too deep into what H-Bridge means, but for now just know that H bridge is a setup which is used to run motors both in clock wise and anticlockwise direction. As said earlier this IC is capable of running two motors at the any direction at the same time.

2.3 Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.

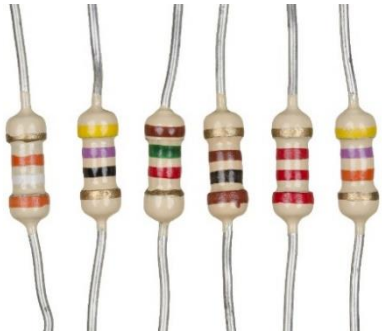


Fig 2.1 Resistor

Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.
Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits.
The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

2.4 Capacitor

Capacitor is an electronic component that stores electric charge. The capacitor is made of 2 close conductors (usually plates) that are separated by a dielectric material. The plates accumulate electric charge when connected to power source. One plate accumulates positive charge and the other plate accumulates negative charge. The capacitance is the amount of electric charge that is stored in the capacitor at voltage of 1 Volt. The capacitance is measured in units of Farad (F). The capacitor disconnects current in direct current (DC) circuits and short circuit in alternating current (AC) circuits.

Capacitance

The capacitance (C) of the capacitor is equal to the electric charge (Q) divided by the voltage (V)
C=Q/V
C is the capacitance in farad (F)
Q is the electric charge in coulombs (C) that is stored on the capacitor
V is the voltage between the capacitor's plates in volts (V)

Fig 2.2 Capacitor

2.5 Voltage Regulator IC LM2596

The LM2596 is known for its high current rating of 3A. It is available in many versions with fixed output voltage like 3.3V, 5V and 12V. But, the most famous one is the LM2596-ADJ which has variable output voltage. The IC is basically a buck converter that operates on 150KHz switching frequency, it takes in an input voltage and uses the internal switching circuit to regulate a desired output voltage. It has high efficiency and in-built Thermal shutdown and current limit functionalities.

Fig 2.3 VOLTAGE REGULATOR IC LM2596

LM2596 Applications

- 3A Step Down Voltage Regulator IC.
- Available as 3.3V regulator, 5V Regulator, 12V Regulator and Variable regulator.
- Input Supply Voltage: 4.5V to 40V.
- Minimum Output Voltage: 3.16V

2.6 IR Receiver

IR or infrared communication is one of the most common methods of wireless communication due to being easy to use and having an affordable price. Infrared light, with a wavelength longer than visible light, is not within the range of human vision. That's why it's a good option for wireless communications. When you press a button on your TV control, an LED on your control turns on and off continuously and causes a modulated infrared signal to send from the control to your TV. The command will execute after the signal is demodulated. IR receiver modules are used to receive IR signals. These modules work in 3, 8 KHz frequency. When the sensor is not exposed to any light at its working frequency, the volt output has a value equal to VS (power supply). With exposing to a 38 kHz infrared light, this output will be zero.

Fig 2.4 IR Receiver

2.7 IR Remote

The dominant remote-control technology in home-theater applications is infrared (IR). Infrared light is also known as plain-old "heat." The basic premise at work in an IR remote control is the use of light to carry signals between a remote control and the device it's directing. Infrared light is in the invisible portion of the electromagnetic spectrum.

An IR remote control (the transmitter) sends out pulses of infrared light that represent specific binary codes. These binary codes correspond to commands, such as Power On/Off and Volume Up. The IR receiver in the TV, stereo or other device decodes the pulses of light into the binary data (ones and zeroes) that the device's microprocessor can understand. The microprocessor then carries out the corresponding command. To get a better idea of how the process works, let's take a look inside a typical remote control -- the universal remote that came with the author's digital cable box. The basic parts involved in sending an IR signal including -

- Buttons
- Integrated circuit
- Button contacts
- Light-emitting diode (LED)

To find out more about the parts on a remote-control circuit board, check out Inside a TV Remote Control.

Fig 2.5 IR Remote

2.8 Crystal

A quartz crystal exhibits a very important property known as the piezoelectric effect. When a mechanical pressure is applied across the faces of the crystal, a voltage which is proportional to mechanical pressure appears across the crystal. That voltage causes distortion in the crystal. Distorted amount will be proportional to the applied voltage and also an alternate voltage applied to a crystal it causes to vibrate at its natural frequency.

Uses of Crystal Oscillator

In general, we know that, in the design of microprocessors and microcontrollers, crystal oscillators are used for the sake of providing the clock signals. For instance, let us consider 8051 microcontroller, in this particular controller an external crystal oscillator circuit will work with 12MHz that is essential, even though this ATMEGA328P microcontroller (based on model) is capable to work at 40 MHz (max) have to provide 12MHz in most of the cases because for a machine cycle 8051 requires 12 clock cycles, so that to give effective cycle rate at 1MHz (taking 12MHz clock) to 3.33MHz (taking the maximum 40MHz clock). This particular crystal oscillator which is having cycle rate at 1MHz to 3.33MHz is used to generate clock pulses which are required for the synchronization of all the internal operations.

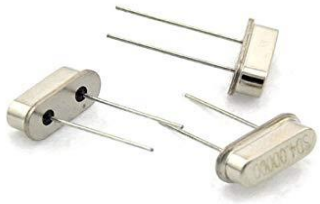


Fig 2.6 Crystal

2.9 ATMEGA328P

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D

converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8 - 5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Fig 2.7 ATMEGA328P

2.10 MPU6050

The MPU6050 module is a Micro Electro-Mechanical Systems (MEMS) which consists of a 3-axis Accelerometer and 3-axis Gyroscope inside it. This helps us to measure acceleration, velocity, orientation, displacement and many other motion related parameter of a system or object.

Fig 2.8 Printed Circuit Board

The MPU6050 is a Micro Electro-Mechanical Systems (MEMS) which consists of a 3-axis Accelerometer and 3-axis Gyroscope inside it. This helps us to measure acceleration, velocity, orientation, displacement and many other motion related parameter of a system or object. This module also has a (DMP) Digital Motion Processor inside it which is powerful enough to perform complex calculation and thus free up the work for Microcontroller. The module also have two auxiliary pins, which can be used to interface external IIC modules like an

magnetometer, however it is optional. Since the IIC address of the module is configurable more than one MPU6050 sensor can be interfaced to a Microcontroller using the AD0 pin. This module also has well documented and revised libraries available hence it's very easy to use with famous platforms like Arduino. So if you are looking for a sensor to control motion for your RC Car, Drone, Self-balancing Robot, Humanoid, Biped or something like that.

2.11 SIM800L (GSM Module)

The SIM800L is a GSM module from Simcom that gives any microcontroller GSM functionality, meaning it can connect to the mobile network to receive calls and send and receive text messages, and also connect to the internet using GPRS, TCP, or IP. Another advantage is that the board makes use of existing mobile frequencies, which means it can be used anywhere in the world.

Fig 2.9 SIM800L

SIM800L Applications

- Full modem serial port
- Two microphone inputs and speaker output
- SIM card interface
- Supports FM and PWM
- Sleep mode with 0.7mA current

The SIM800L is a GSM module with a serial interface. It can send and receive text messages and receive phone calls. It can also connect to the internet and receive FM signals. The SIM800L can be connected to a microcontroller using the serial UART interface.

2.12 NEO-8M (GPS Module)

The NEO-8M GPS module is a highly accurate and sensitive GPS receiver module designed for various applications, including navigation, geolocation, tracking, and mapping. It is developed by u-blox, a leading provider of GPS technology.

Here are some features of the NEO-8M GPS module -

- High sensitivity: The NEO-8M module is highly sensitive, which means it can receive weak GPS signals and provide accurate location data even in challenging environments like urban canyons or indoors.

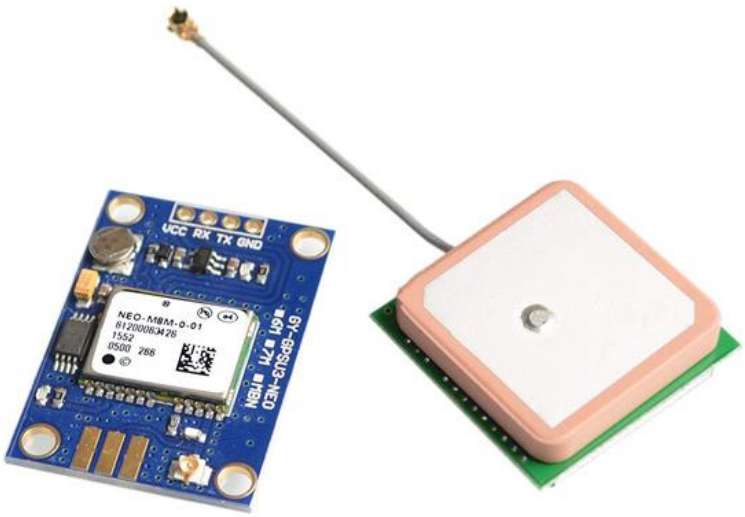


Fig 2.10 NEO-6M

- Multiple constellations: The module can receive signals from multiple satellite constellations, including GPS, GLONASS, Galileo, and BeiDou, providing more accurate positioning and faster acquisition times.
- Fast time-to-first-fix: The NEO-8M module has a fast time-to-first-fix (TTFF) of just a few seconds, which means it can quickly start providing location data after being powered on.
- Low power consumption: The module has low power consumption, making it suitable for battery-powered applications.
- Small size: The NEO-8M module has a compact size, making it easy to integrate into various devices.

- UART interface: The module communicates over a standard UART interface, making it easy to integrate with microcontrollers or other devices.

Overall, the NEO-8M GPS module is a reliable and accurate GPS receiver module with multiple constellations support, fast TTFF, low power consumption, and compact size, making it suitable for a wide range of GPS applications.

2.13 Battery

A battery can be defined as an electrochemical device (consisting of one or more electrochemical cells) which can be charged with an electric current and discharged whenever required. Batteries are usually devices that are made up of multiple electrochemical cells that are connected to external inputs and outputs. Batteries are widely employed in order to power small electric devices such as mobile phones, remotes, and flashlights. Historically, the 'term' battery has always been used in order to refer to the combination of two or more electrochemical cells. However, the modern definition of the term 'battery' is believed to accommodate devices that only feature a single cell. Batteries are broadly classified into two categories, namely primary batteries and secondary batteries. Primary batteries can only be charged once. When these batteries are completely discharged, they become useless and must be discarded. On the other hand, secondary batteries are the batteries than can be charged and reused for many charging-discharging cycles. The electrochemical reactions that take place inside these batteries are usually reversible in nature. Therefore, secondary batteries are also known as rechargeable batteries. When discharging, the reactants combine to form products, resulting in the flow of electricity. When charging, the flow of electrons into the battery facilitates the reverse reaction, in which the products react to form the reactants.

Fig 2.11 LCD 16X

CHAPTER 3

WORKING PRINCIPLE

3.0 Introduction

In this chapter fully cover with discuss design and fabrication of this project. Here we will discuss about developed block diagram and briefly describe about the circuit description and also learn about working principle. Total project flow chart is also available in this chapter.

3.1 System design and implementation

Here is a block diagram of the vehicle tracking system. The system's comprehensive view is depicted in the block diagram. The following building pieces are linked together: Microcontroller, Accelerometer, GPS, GSM, and Power supply. will be continuously monitored by an embedded application, which will provide status updates as needed.

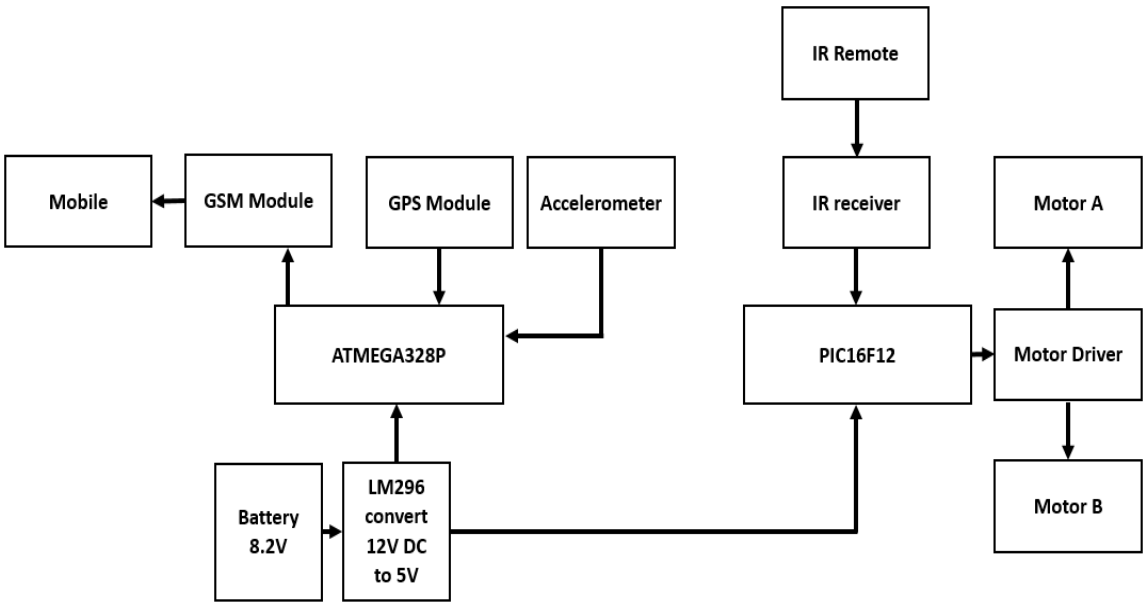
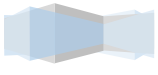


Fig 3.0 Basic System Architecture

This project proposes to develop an embedded system that uses the Global Positioning System (GPS) and the Global System for Mobile Communication to track and position any vehicle (GSM). The microcontroller in this project is utilized to interface with numerous hardware

peripherals. A moving vehicle will be continuously monitored by an embedded application, which will provide status updates as needed. To do this, a microcontroller is connected serially to a GPS receiver, GSM modem, and accelerometer. The position (Latitude and Longitude) of the vehicle is transmitted using a GSM modem from a distant location. The latitude and longitude, which indicate the position of the car, are continuously provided by the GPS modem. Many characteristics are generated by the GPS modem, however only the NMEA data is read and presented on mobile devices. The identical information is transmitted to the mobile device at the other end, where the location of the car is required. The information a GPS receiver receives is stored in an EEPROM. The accelerometer, GSM modem, and GPS receiver are the hardware interfaces to the microcontroller. A MUX is utilized to connect the GSM modem and GPS receiver to the controller. The modems and microcontroller in the architecture communicate serially via the RS-232 standard. TTL voltage levels are transformed into RS-232 voltage levels using a serial driver Chip. many kinds of sensors, such as infrared sensors, and any issue the car might have, such an accident. In this scenario, the vehicle's acceleration is measured by the accelerometer, and GSM modem messages specifying the vehicle's position in terms of latitude and longitude are automatically sent to the specific mobile device. A program has been created that can be used to find the vehicle's precise location and navigate the path of a moving vehicle on a Google Map



3.2 Flowchart

This flowchart is a regular routine for our project. It's a chart for execution.

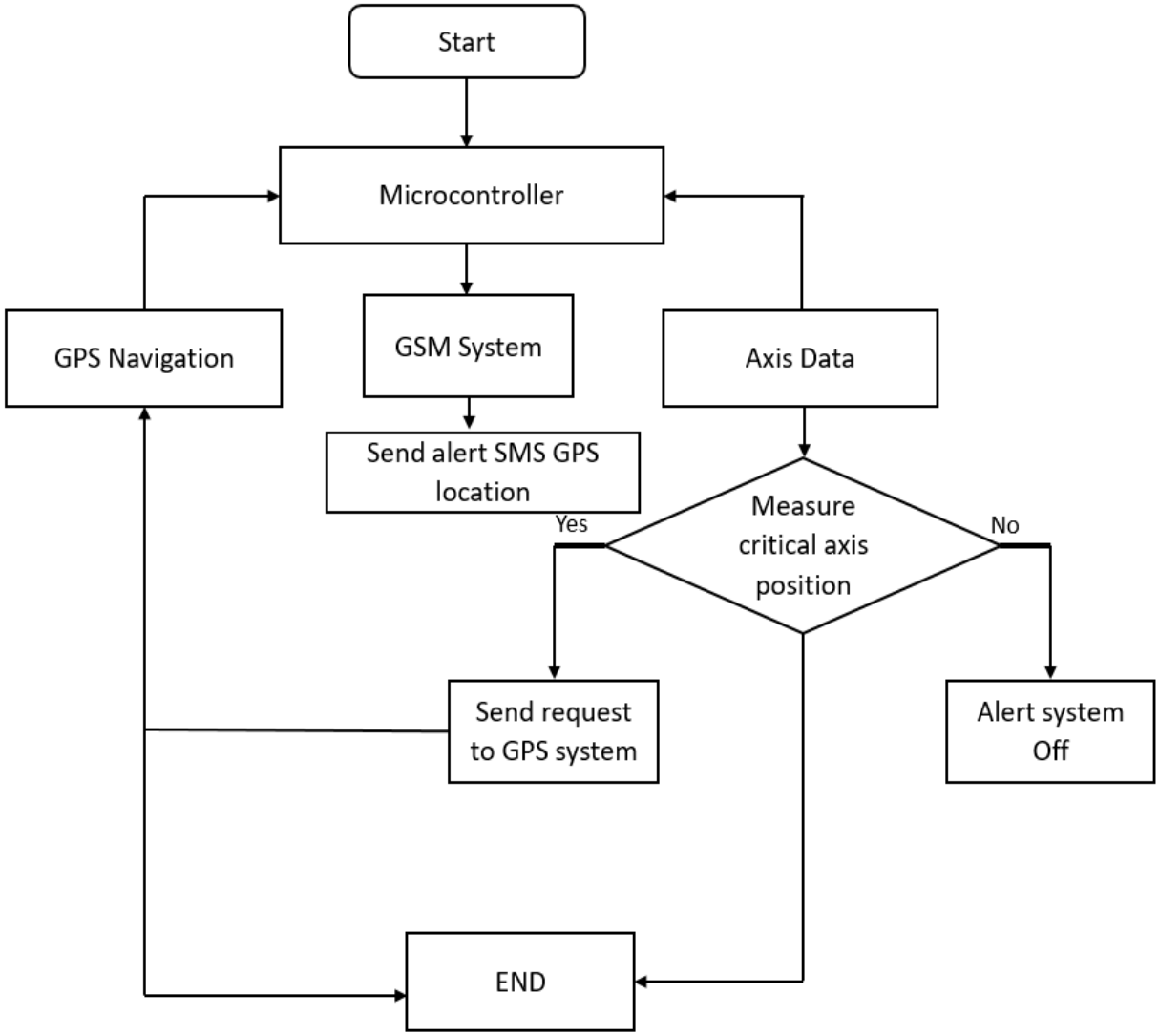
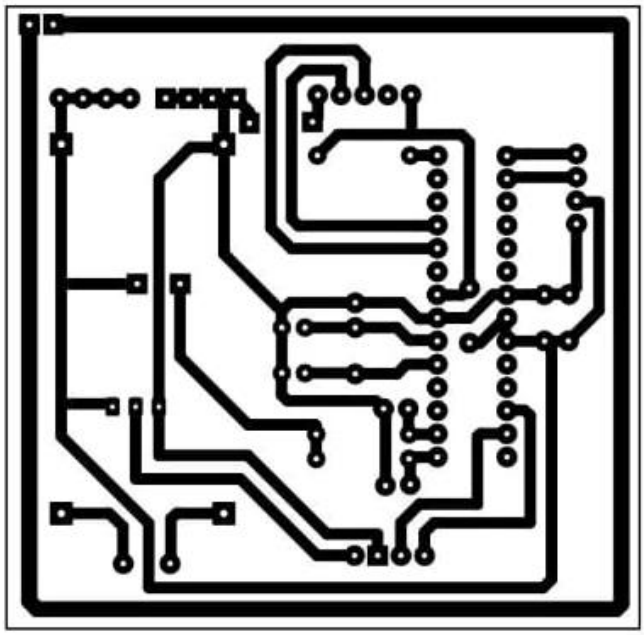


Fig 3.1 Flowchart

3.3 PCB Design



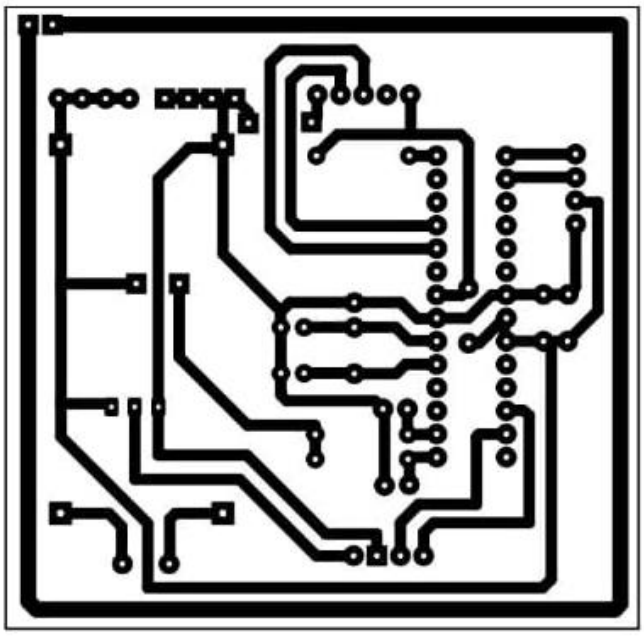


Fig 3.2 PCB Design

3.4 Circuit Diagram

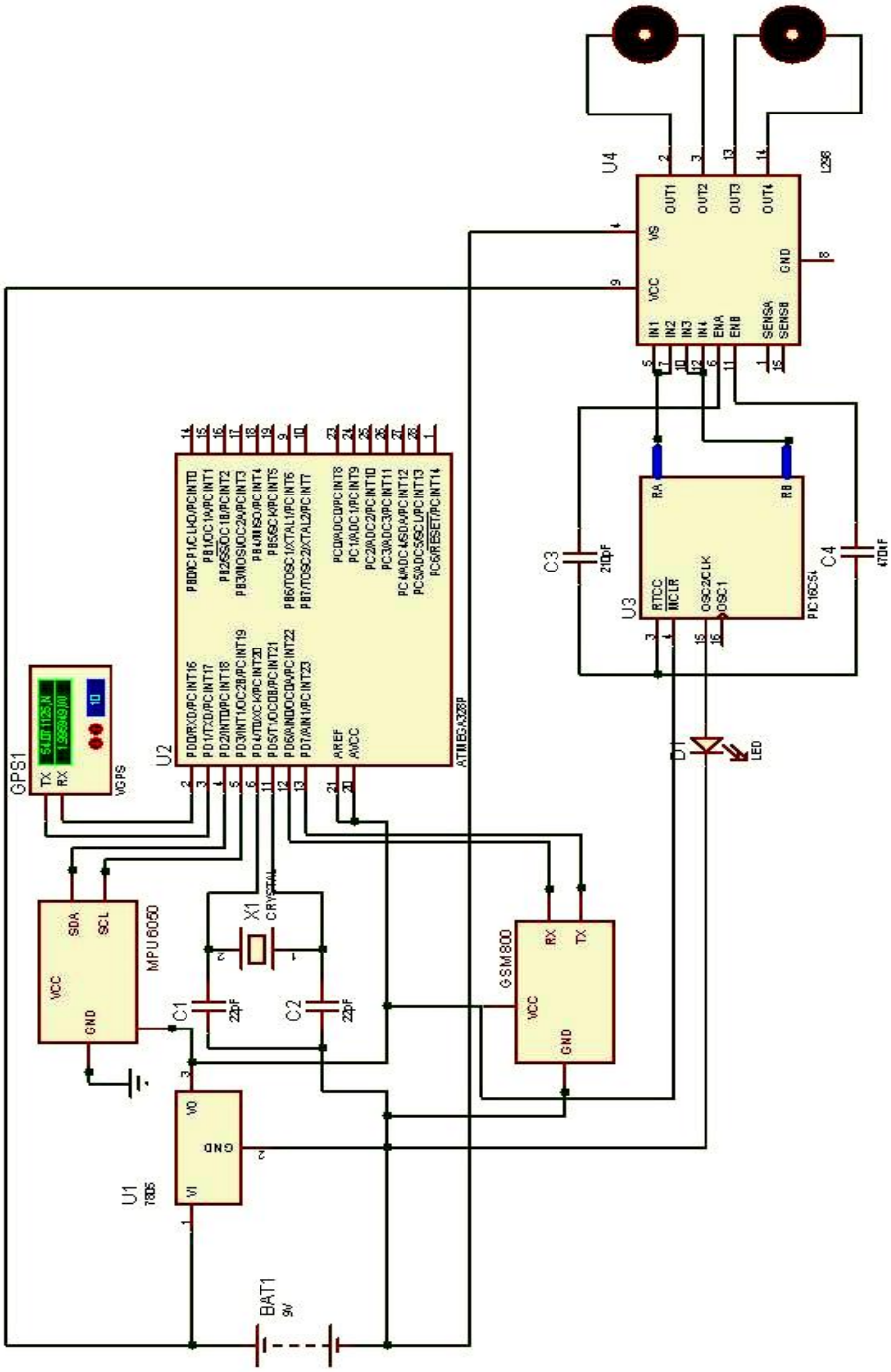


Fig 3.3 Circuit Diagram

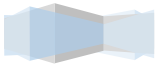
3.5 Working principle

In this project, a GPS receiver and GSM module are utilized to control the entire process using an ATMEGA328P. The vehicle's coordinates are discovered using a GPS receiver, and an SMS alert with the coordinates and a link to a Google Map is sent using a GSM module. For the purpose of detecting an accident or an abrupt shift in any axis, the accelerometer MPU6050 is utilized. Now, if a collision occurs, the car tilts and the accelerometer modifies the values of its axes.

The ATMEGA328P reads these values and determines whether any axis changes. If there is a change, the ATMEGA328P reads the coordinates by extracting the $GPGGA String from the GPS module data (as described above in the section on how GPS works) and sends an SMS to the predetermined number to the police, an ambulance, or a family member with the accident location coordinates. The notification also includes a Google Map link to the accident site, making it simple to track its location.

When we get the notification, all we have to do is click the link, which will take us to a Google map where we can see the precise location of the car. One of the most significant technological developments for monitoring vehicle activity is the vehicle tracking system. The security system locates the monitored or tracked vehicle using the Global Positioning System (GPS), and then transmits the coordinates and location information to the monitoring center by satellite or radio.

Many software programs are utilized at the monitoring center to map the vehicle. The owners of the vehicles are able to track them in real-time in this fashion. Vehicle monitoring systems are becoming more and more common among owners of pricey automobiles due to their real-time tracking capability.



3.6 Outlook and Casing

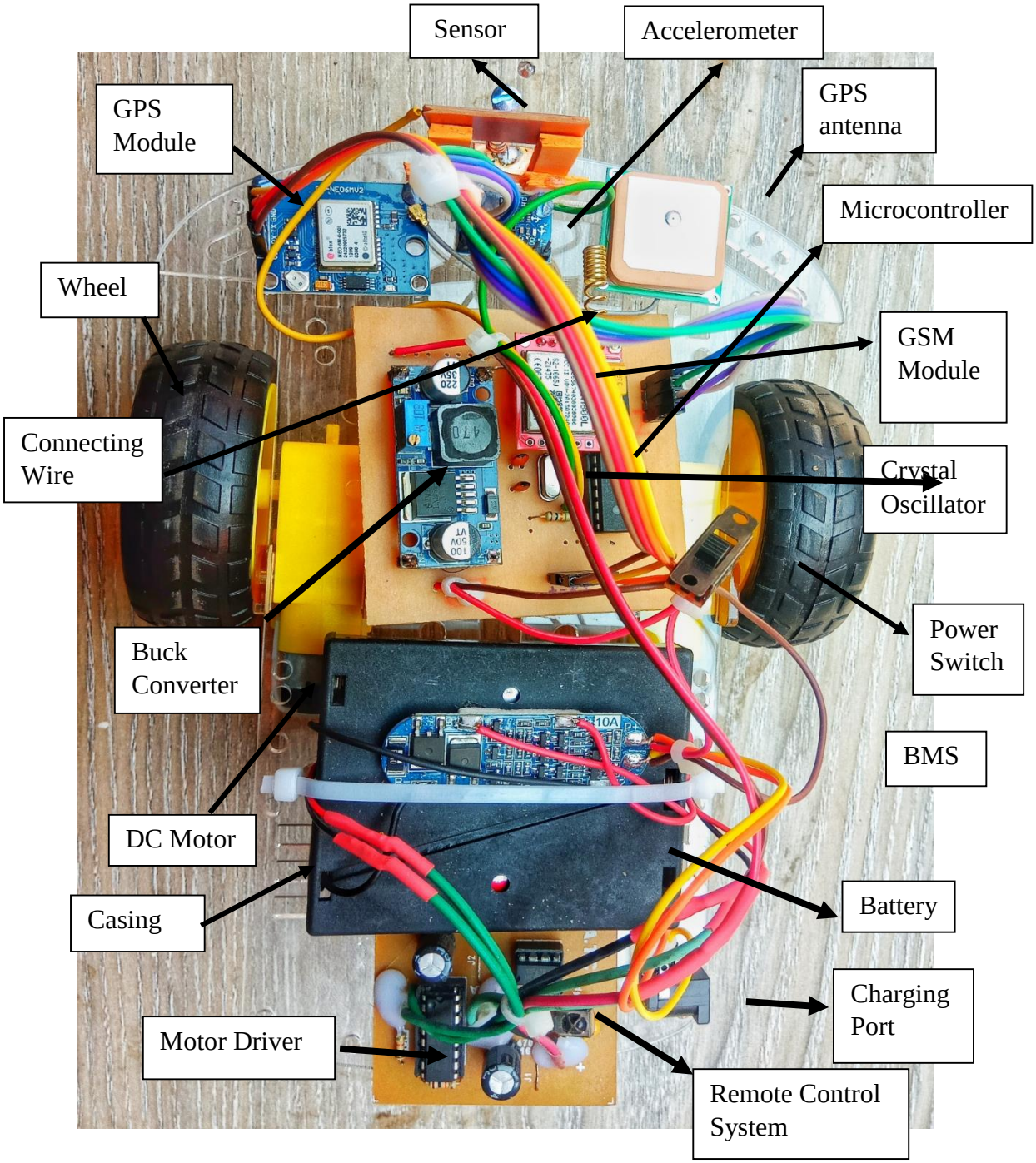
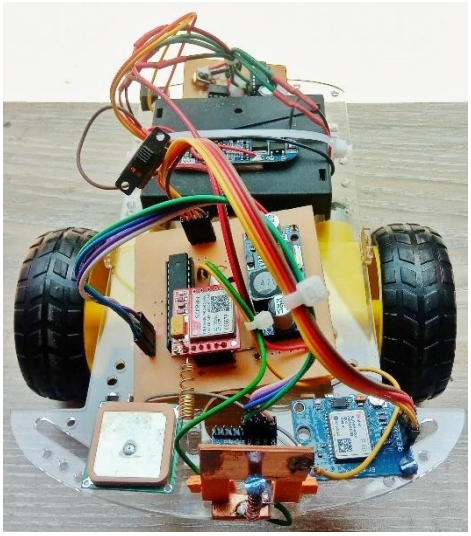


Fig 3.4 Outlook and Casing

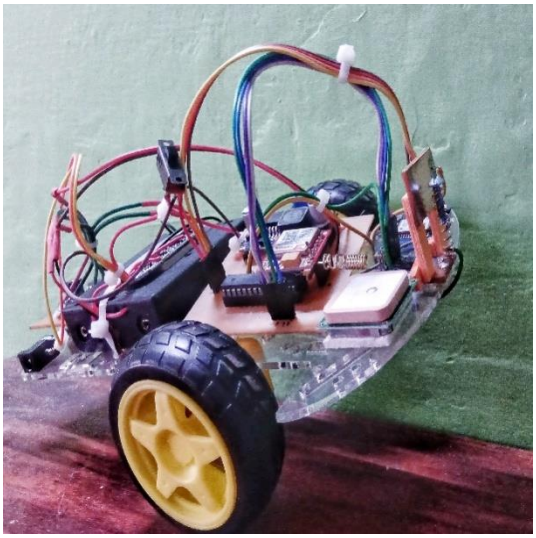
CHAPTER 4

RESULT AND COSTING

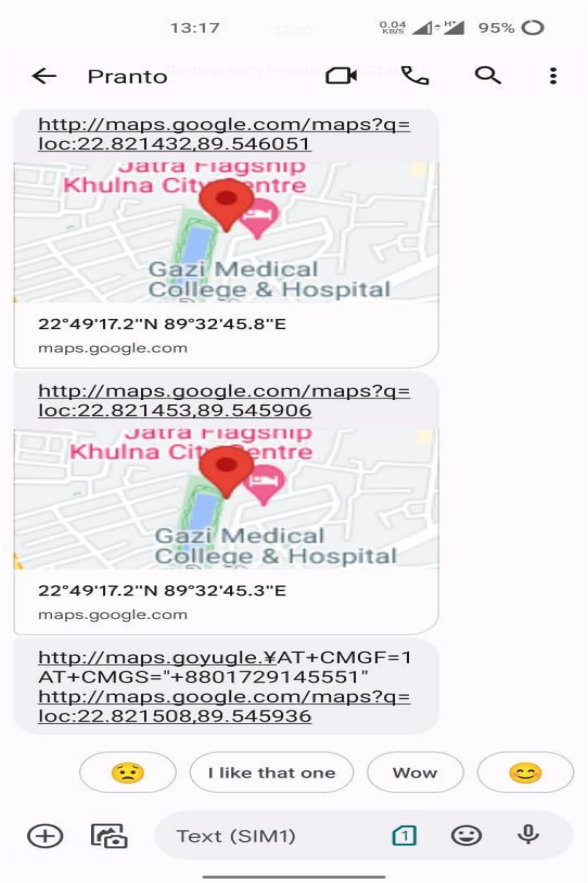
4.0 Result



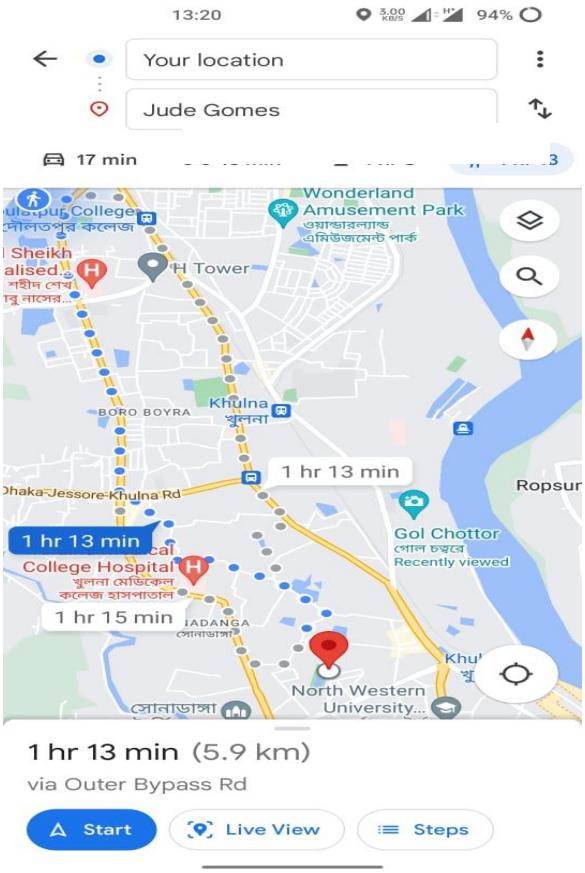
No Accident Condition



Accident Condition



Accident Alert Get by SMS



Get accident Location and Shorter Path by Google Map

Fig 3.5 Result Snap

The result was positive and the system responded well. The diagram below shows the complete prototype implementation of the proposed system.

4.1 Costing Estimation

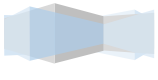
SL No.	Name of apparatus	Ratings	Quantity	Unit Price (BDT)	Total Price (BDT)
01	Diode	1N4007	3	2	6
02	Capacitor	220µF	1	15	15
03	Capacitor	0.1µF	6	3	18
04	Voltage Regulator	LM7805 IC	2	30	60
05	Resistor	10kΩ	4	2	8
06	Motor	5V	2	2	300
07	Motor Driver		1	1	500
08	IR remote		1	5	300
09	Variable Resistor	10kΩ	4	8	32
10	Connector	Male	12	1	12
11	Crystal Oscillator	16MHz	1	35	35
12	IC Base	14 Pin	2	5	10
13	Zener diode	5V	1	8	8
14	IC Base	8 Pin	1	5	5
15	IC (Microcontroller)	ATMEGA328P U	1	1500	1500
16	GPS		1	1300	1300
17	PCB		1	250	250
18	GSM	SIM800L	1	1200	1200
19	Plastic Board		1	360	360
20	Battery 12V	12V	1	1000	1000

4.2 Advantage

- The most commonly available device.
- Relatively low cost.
- Easily can monitor the vehicle position.
- Can be found the shorter path from the accident area.
- Long range communication.

4.3 Limitations

- The limitations encountered in this project are listed below -
- This system is microcontroller based and therefore must be handling with care to prevent shifting of the microcontroller.
- It is controlled by only DC power source system.
- In accident situation it can be damaged.



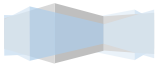
4.4 LIMITATION ANALYSIS

GPS Data sometimes Little Inaccurate

There are several reasons why GPS data can be inaccurate sometimes. Here are some of the most common ones:

- Signal Blockage: GPS signals are transmitted by satellites, and they need a clear line of sight to reach your GPS receiver. Buildings, trees, and other obstacles can block or reflect the signals, which can cause inaccuracies in your GPS readings.
- Atmospheric Conditions: GPS signals can be affected by atmospheric conditions such as ionospheric and tropospheric delays. This can cause errors in the estimated distance between the satellite and the receiver, resulting in inaccurate location data.
- Multipath Interference: When GPS signals bounce off buildings or other surfaces, they can create multiple paths for the signal to reach the receiver. This can cause the GPS receiver to receive the same signal multiple times, leading to errors in the estimated distance between the satellite and the receiver.
- Receiver Error: The GPS receiver itself can introduce errors into the data due to factors such as clock drift, signal processing, and software bugs.
- Satellites in View: The accuracy of GPS readings can also depend on how many GPS satellites are in view at a given time. The more satellites in view, the more accurate the reading will be.
- Time Delay: GPS signals travel at the speed of light, but they still take a finite amount of time to reach the receiver. This time delay can introduce errors in the estimated distance between the satellite and the receiver.

Overall, GPS accuracy can vary depending on a range of factors, but with modern technology and careful use, GPS can provide very accurate location data.



CHAPTER 5

CONCLUSION AND FUTURE WORK

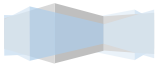
5.0 Future Work

The EEPROM can hold up to 256 previous navigational positions, and by expanding its memory, we can navigate up to N locations. Using GPS and GSM on the same module allows us to make the kit smaller. By raising the price of the GPS receivers, we can boost accuracy to 3m. By connecting to the bomb detector, we may utilize our kit to detect bombs. High sensitivity vibration sensors can be used to find the accident. With the use of a vibration sensor, we can recognize when a car has an accident on the road and relay the location to the owner, the hospital, and the police. We can quickly locate our car anywhere in the world if it is stolen. Through maintaining vehicle location on the vehicle.

5.1 Potentiality of Vehicle Tracking System In Bangladesh

The future potential of vehicle tracking systems in Bangladesh is immense. As the country continues to grow and modernize, there will be an increasing demand for efficient and safe transportation solutions. Here are some potential areas where vehicle tracking systems can play a significant role:

- Logistics and Supply Chain Management: As the e-commerce industry continues to grow in Bangladesh, the demand for efficient and timely delivery of goods is increasing. Vehicle tracking systems can help logistics companies manage their fleets more effectively, optimize routes, and reduce delivery times.
- Public Transportation: Public transportation in Bangladesh faces a lot of challenges, including overcrowding, delays, and safety concerns. By implementing vehicle tracking systems, transportation authorities can monitor the location of buses and trains in real-time, provide accurate arrival times to passengers, and improve overall safety.
- Traffic Management: Traffic congestion is a significant issue in Bangladesh, particularly in major cities like Dhaka. Vehicle tracking systems can be used to monitor traffic flow, identify areas of congestion, and provide real-time updates to drivers and commuters.

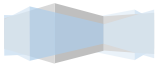


- Emergency Services: In emergency situations, such as natural disasters or accidents, vehicle tracking systems can be used to quickly locate and dispatch emergency services to the affected area.
- Personal Use: As vehicle ownership continues to grow in Bangladesh, more individuals may choose to install vehicle tracking systems in their cars for personal use. This can help to prevent theft and provide peace of mind to vehicle owners.

Overall, the potential for vehicle tracking systems in Bangladesh is vast, and as the technology continues to evolve, we can expect to see even more innovative applications in the future.

5.2 Conclusion

Better fleet management is made possible by vehicle monitoring systems, which results in significant financial gains. You can handle more work within a given time frame with better scheduling or route planning. Automobile tracking enhances safety and security, communication tools, performance monitoring, and productivity when used for personal or corporate purposes. It will therefore have a significant impact on how we live in the following year. The project's main goal is to use a variety of sensors to reduce the possibility of fatalities in accidents that we can't prevent from happening. When an accident is reported, paramedics are dispatched to the scene to improve survival rates. Accidents that happen at night or in deserted areas benefit more from the invention of this technology. Future daily living will place a much more emphasis on this car monitoring and accident alarm capability.



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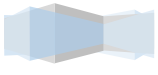
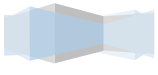
APPENDIX

Program

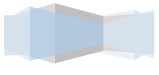
```
int8_t answer;
intonModulePin= 2;
char aux_string[30];
int flag = 0;
char number [20];
char realnumber[9];
char mynumber[9];
int a=0;
int b=0;
int c=0;
//Your phone number
char phone_number[]="9977514948";
char data[100];
intdata_size;
char aux_str[30];
char aux;
int x = 0;
char N_S,W_E;
char url[] = "pruebas.libelium.com";
char frame[200];
char latitude[15];
char longitude[15];
char altitude[6];
char date[16];
char time[7];
char satellites[3];
```

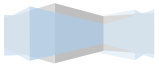
```
char speedOTG[10];
char course[10];
void setup(){
mynumber[0]='9';
mynumber[1]='9';
mynumber[2]='7';
mynumber[3]='7';
mynumber[4]='5';
mynumber[5]='1';
mynumber[6]='4';
mynumber[7]='9';
mynumber[8]='4';
mynumber[9]='8';
pinMode(onModulePin, OUTPUT);
Serial.begin(115200);

power_on();
power_onGPS();
power_onSMS();

 delay(5000);

sendATcommand("AT+CPIN=****", "OK", 2000);

 delay(3000);
 while( (sendATcommand("AT+CREG?", "+CREG: 0,1", 1000)
|| sendATcommand("AT+CREG?", "+CREG: 0,5", 1000)) == 0 );
sendATcommand("AT+CLIP=1", "OK", 1000);

 while ( start_GPS() == 0);
 while (sendATcommand("AT+CREG?", "+CREG: 0,1", 2000) ==
0);
```

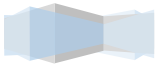
```
// sets APN , user name and password
sendATcommand("AT+SAPBR=3,1,\"Contype\",\"GPRS\"",
"OK", 2000);
sendATcommand("AT+SAPBR=3,1,\"APN\",\"*******\"", "OK",
2000);
sendATcommand("AT+SAPBR=3,1,\"USER\",\"*******\"",
"OK", 2000);
sendATcommand("AT+SAPBR=3,1,\"PWD\",\"*******\"", "OK",
2000);
 // gets the GPRS bearer
 while (sendATcommand("AT+SAPBR=1,1", "OK", 20000) == 0)
 {
 delay(5000);
 }

 delay(1000);
 while(Serial.available() != 0)
 {
Serial.read();
 }
}
void loop(){

 answer = sendATcommand("", "+CLIP", 1000);
 //Detect incomming call
 if (answer == 1)
 {
Serial.println("Incoming call");

 if ( flag == 0){
```

```
for (inti=0; i<19; i++){
 // read the incoming byte:
while (Serial.available() == 0)
 {
 delay (50);
 }
 //Stores phone number
 number[i] = Serial.read();

 }
Serial.flush();
 flag = 1;
 }
 //Stores phone calling number
 for (inti=0; i<=14; i++){
 if(number[i]== ""){
i++;
realnumber[0]=number[i];
i++;
realnumber[1]=number[i];
i++;
realnumber[2]=number[i];
i++;
realnumber[3]=number[i];
i++;
realnumber[4]=number[i];
i++;
realnumber[5]=number[i];
i++;
realnumber[6]=number[i];
```

```
i++;
realnumber[7]=number[i];
i++;
realnumber[8]=number[i];
 break;
 }
 }
//Check phone number
 for (inti=0;i<9;i++){
 if (realnumber[i] == mynumber[i]){
 a++;
 if( a==9){
Serial.println("Correct number");
sendATcommand("ATH", "OK", 1000);
 if(b==1){
 b=0;
 }else{
 b=1;
 c=1;
 }
 break;
 }
 }else{
Serial.println("Wrong number");
 break;
 }
 }
 a=0;
 answer=0;
 flag = 0;
```

```
}
//Send SMS once and position to HTTP
if (b==1){
get_GPS();
send_HTTP();
 delay(500);
 if (c==1){
sendSMS();
 delay(100);
 c=0;
 }
 }
```