CHAPTER -01

INTRODUCTION

1.1 Introduction.

Due to the proliferation in the number of vehicles on the road, narrow roads, and accidents are bound to exist. This is due to the fact that the current transportation infrastructure and current mass technology that applied to vehicle are unable to cope with the influx of vehicles on the road. Traffic management poses many critical challenges in most modern cities. To alleviate the aforementioned problems, the smart highway car control system concept were submitted. With the implementation of the smart highway control concept, traffic jam and vehicular accident can be avoided and the car users are more comfortable with a hassle free autopilot system on the vehicles. This system provides both practically important traffic data collection and control information and can trace criminal or illegal vehicles, stolen cars.

The system architecture consist of GSM module, RFID reader, and GPS navigation. Based on the latest technology, the system collects and calculates average speed and information on each highway in the world. It then shares and synchronizes live traffic data by upstream transmission of messages about the current traffic situation and adjust the speed of car via communication program to the car near to the driver. Through a flooding algorhitm, each server in a distict center exchanges and updates information with all neighbor servers in other distict center so all that the servers in various distinct center can get all the latest traffic data in a highway. Therefore, a dynamic geo-navigation system can find the shortest path that avoid congested highway.

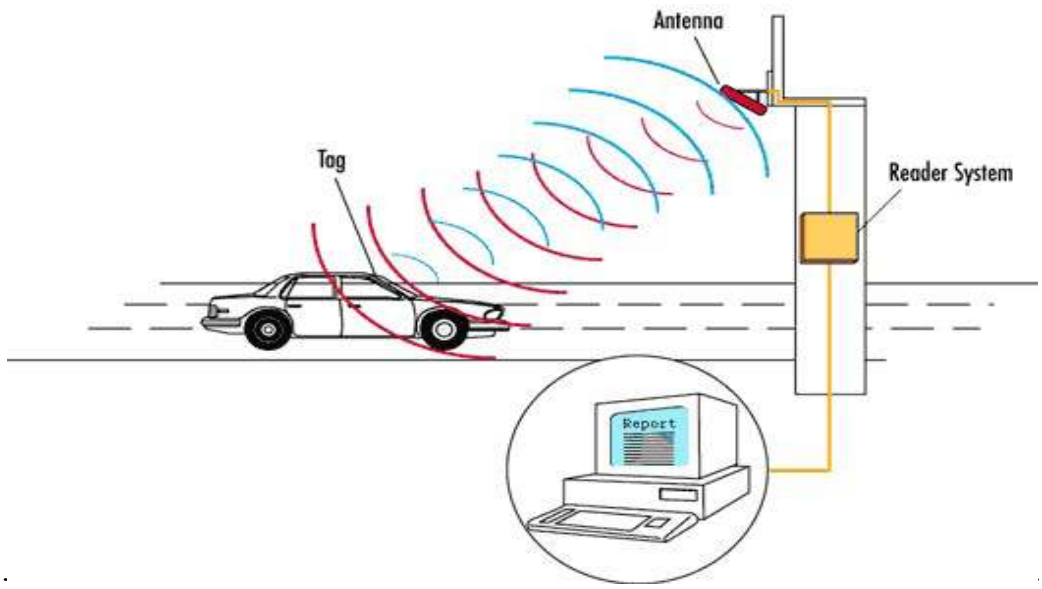

Fig-1.1: Smart Highway on Road

1.2 Objective :

To Reduce Highway Accident Design A Smart Vehicle To Road Communication. Accident Spot Can Be Detected By GSM On SMS Services. Vehicle Speed Detect And Road Status Notification Provide By Display And Speaker Using RFID Technology.

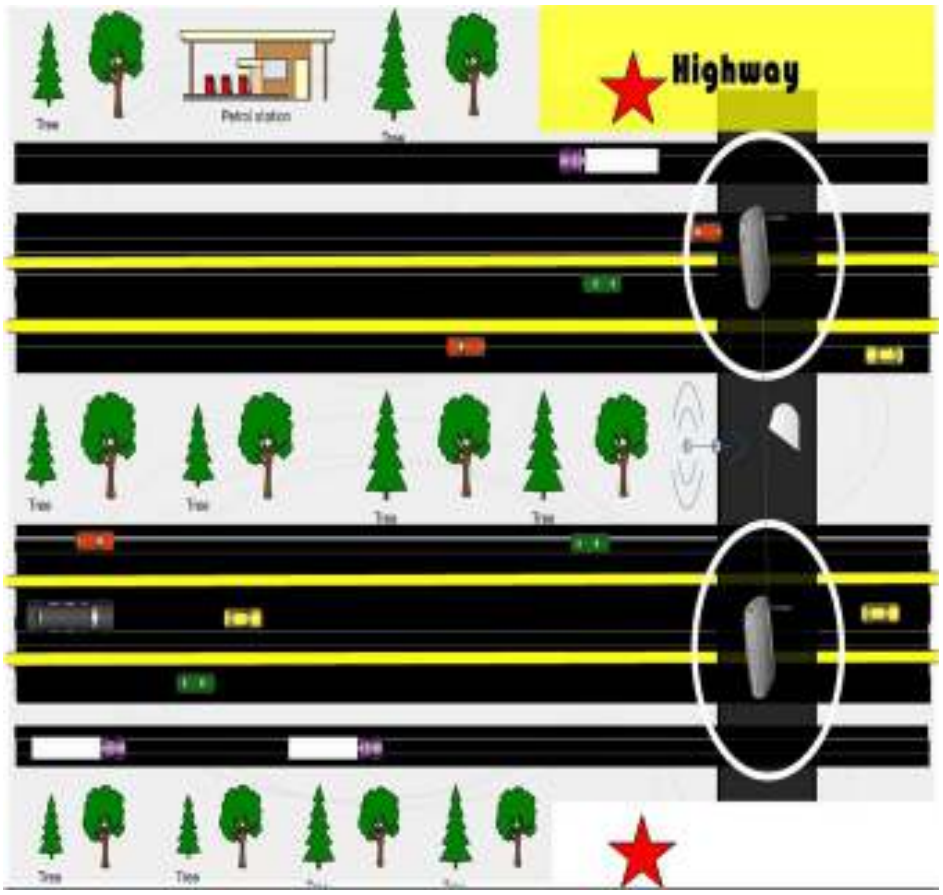

Fig-1.2: The System in the Highway View

1.3 Background.

Road traffic accidents, the leading cause of death by injury and the tenth-leading cause of all deaths globally, now make up a surprisingly significant portion of the worldwide burden of ill-health. An estimated 1.2 million people are killed in road crashes each year, and as many as 50 million ar1 injured occupying 30 percent to 70 percent of orthopedic bc4s in developing countries hospitals. I And if present trends continue, road traffic injuries are predicted to be the third-leading contributor to the global burden of disease and injury by 2020. Developing countries bear a large share of the burden, accounting for 85 percent of annual deaths and 90 percent of the disability-adjusted life years (DALYs) lost because of road traffic injury. 3 And since road traffic injuries affect mainly males (73 percent of deaths) and those between

15 and 44 years old, this burden is creating enormous economic hardship due to the loss of family breadwinners.

This project represents design a circuit to Smart Highway vehicle to avoid accident and increase the security of vehicle & passenger. Radio frequency identification (RFID) technology is a non-contact method of item identification based on the use of radio waves to communicate data about an item between a tag and a reader. This system is used by vehicle owners' system administrator. In this paper we will discuss RFID and GSM based Smart high way for vehicle notification system as a solution now a day to solve the Highway Accident such as the number of accidents caused by over speed because it is much more efficient than Radar automatic over speed control. Finally we will discuss how we can track and stop the vehicles by notifying RFID reader and RFID tag. Basic knowledge needed about RIID and GSM technology Radio Frequency Identification), its basic components and applications of RFID, how we can interface it, work on C program, Proteus, At the end of this paper we will end up with a good understanding of RFID system, why it is better and efficient than others system, how we can apply it, what its drawbacks are and how we can advertise the system.

1.4 Justification.

This Project is intended to uplift the technological standard of road telecommunication system. The overall road support or security of modern days is very poor because a short communication system. Especially, road and others communication system in Bangladesh and others counters is very low. The project on Design and Implementation of Smart Highway Using Arduino, RFID, GSM Technology**.** will help reduction road accident. This inappropriate installation with out enough study gives rise to a great variety of road alarm and vehicles alarming problems. Therefore, the fact that RFID and arduino are designed for long-term use should be considered.

1.5. Methodology.

In this Project, we conduct the following procedure, as shown in figure literature review, Problem finding, , Estimation, Design, Hardware Implementation, Testing and Reporting. In literature review several research report related to transportation system and vehicle management were collected and reviewed. The result of the review was used to make resume analysis and to formulate synthesis. After the synthesize of suggestion for Intelligent

Transport System, proposed idea was produced. The final step was generate conclusion of this research.

Fig-1.3: Procedure of Work

CHAPTER -02

LITERATURE REVIEW

2.1 Introduction

For many of us' using a key to start a car, & card to access a building or room, using sky lifts on a winter sports holiday and validating a bus or underground ticket have become part of our daily routine. Without always realizing it, we use automatic data capture technology that relies on radio-frequency electromagnetic fields. This technology is known as Radio-Frequency Identification or RFID. Just as people use RFID as they go about their daily lives, objects also use this technology, as they transit from manufacture to storage and finally the point of sale. Like us, they also carry RFID tags. The difference between objects and ourselves is that they don't "voluntarily" present their RFID tag or card when asked. These tags axe the RFID (Radio Frequency identification) can be defined as follows: Automatic identification technology which uses radio-frequency electromagnetic fields to identify objects carrying tags when they come close to a reader. Reform read in very different conditions and often requires greater detection distances. Data (identification number for instance) included in the electronic chip of the RFID label can be collected by the reader. This reader can also change the content of the label's memory. However, RFID cannot be reduced to one technology. RFID uses several radio frequencies and many types of tag exist with different communication methods and power supply sources. RFID tags generally feature an electronic chip with an antenna in order to pass information onto the interrogator (also known as a base station or more generally, reader). The assembly is called an inlay and is then packaged to be able to withstand the conditions in which it will operate. This finished product is known as a tag, label or transponder. The information contained within an RFID tag's electronic chip depends on its application. It may be a unique identifier (UII, Unique Item identifier or EPC code, Electronic Product Code, etc.). Once this identifier has been written into the electronic circuit, it can no longer be modifie4 only read. (This principle is called WORM Write Once Read Multiple) Some electronic chips have another memory in which users can write, modify and erase their own data. These memories vary in size from a few bits to tens of kilobits.

2.2 Road traffic injuries

400 people die on the world's roads every day and tens of millions of people are or disabled every year. Children, pedestrians, cyclists and older people are among the vulnerable of mad users. WHO works with partners - governmental and nongovernmental - around the world to raise the profile of the preventability of road. traffic injuries and promote good practice

related to addressing key behavior risk factors – speed, driving, the use of motorcycle helmets, seat-belts and child restraints.

2.3 Global status report on road safety 2015

The Global status report on road safety 2015, reflecting information from 180 countries, indicates that worldwide the total number of road traffic deaths has plateaued at 1.25 million per year, with the highest road traffic fatality rates in low-income counties. In the last three years, 17 countries have aligned at least one of their laws with best practice on seat-belts, drink-driving, speed motorcycle helmets or child restraints. While there has been progress towards improving road safety legislation and in making vehicles safer, the report shows that the pace of change is too slow. Urgent action is needed to achieve the ambitious target for road safety reflected in the newly adopted 2030 Agenda for Sustainable Development halving the global number of deaths and injuries from road traffic crashes by 2020. Made possible through funding from Bloomberg Philanthropies, this report is the third in the series, and provides a snapstrot of the road safety situation globally, highlighting the gaps and the measures needed to best drive progress"

2.4 Road Traffic Accidents Increase Dramatically World wide

(Match 2006) Road traffic accidents*the leading cause of death by injury and the tenth-leading cause of all deaths globally*-now make up a surprisingly significant portion of the -worldwide burden of ill-health. An estimated 1.2 million people are killed in mad crashes, each year, and as many as 50 million are injured occupying 30 percent to T0 percent of orthopedic beds in developing countries hospitals. and if present tends continue, road traffic injuries are predicted to be the third-leading contributor to the global burden of disease and 'injury by 2020.

Developing counties bear a large share of the burden for 85 percent of annual deaths and 90 percent of the disability-adjusted life years (DALYs) lost because of road traffic injuy.3 And since road traffic injuries affect mainly males (73 percent of deaths) and those between 15 and 44 years old this burden is creating enormous economic hardship due b the loss of family bread winners Road traffic injuries are predicable and preventable, but data are important to understand the ways in which road safety interventions and can be successfully transferred from developed countries where they have proven. Awareness of the consequences of road

traffic injuries is lagging among and the general public. What's needed is incorporation of comprehensive road programs into national planning in developing counties.

2.5 Road Accidents in Bangladesh: An Alarming Issue

There has been an alarming rise in road accidents, significantly highway accidents, in Bangladesh over the past few years. According to a study conducted by the Accident Research Centre (ARC) of BIJET, road accidents claim on average 12,000 lives annually and lead to about 3a000 injuries According to World Bank statistic annual fatality rate from road accidents is found to be 85.6 fatalities per 10,000 vehicles. Hence, the roads in Bangladesh have become deadly. But these statistics, numerically shocking as they may be, fail to reflect the social tragedy related to each life lost to road accidents. One accident that remains afresh in my memory is the death of 44 school children last July, after the truck they were travelling in skid and fell into a pond. 44 young dreams and hopes lost due to reckless driving.

Only a month after this tragedy, Bangladesh lost two brilliant citizens, filmmaker. Tareqmasud and journalist MishukMuier, to yet another road accident in August" We, the people were shocked, angered and many led protests to the streets demanding immediate action to bring justice for those killed and to ensure road safety. But as from the lines quoted hare beginning from a daily newspaper, one can see that the most recent fatality figures express no progress! A high growth in urbanization and motorization can be identified as one of the factors leading to the higher number of road accidents. Recent studies claim that the annual urban growth rate in Bangladesh stood at 4% in 2010, whereas the present growth in motor vehicles stands at 8%. Consequently, the mad systems are experiencing greater congestion, physical deterioration and safety problems According to a WB only 40% of the main roads (National Highways and the Zila Roads) are in good state.

2.6 Highway accident in globally

Nearly 1.3 million people die in road crashes each year, on average 3287 deaths a day globally. An additional 20-50 million are injured or disabled. Road crashes cost USD $518 billion globally, costing individual countries from l-2% of their annual GDP. Road crashes cost low and middle-income countries USD $65 billion annually, exceeding the total amount received in developmental assistance.

Road Accident and casualties Statistics Globally-Years (2009-2015)

Name	Number of Accidents	Death	Injury
2009	18795	7896	11657
2010	19876	6789	12765
2011	26875	9872	17564
2012	43475	12538	31765
2013	67478	16785	49058
2014	68695	23456	49567
2015	70643	23673	47856

2.7 Highway accident in Bangladesh

In Bangladesh, road accidents and injuries &re now a growing and serious problem and safety situation is very severe by international standard. Nearly about 37% accidents occurred on national highways. 12% on regional roads and 15% on feeder roads.

Road Accident and casualties Statistics Bangladesh (2009-2016)

Year	Number of Accidents	Death	Injury
2009	3381	2958	2686
2010	2827	2646	1803
2011	2667	2546	1641
2012	2636	2538	2134
2013	2029	1957	1396
2014	2027	2067	1535
2015	2394	2376	1958
2016(Up to July)	1489	1422	1289

2.8 Some Examples of RFID project

2.8.1 Project Name: Toll collection and stolen vehicles detection using RFID

This project deals with the simplification of procedure followed by passengers to pay toll at toll collection booths, like making h automated, vehicle theft detection etc- AII these activities are carried out using single smart card (EFID tag), thus saving the efforts of carrying money and records manually. Whenever any, person buys a vehicle, one first needs to get his or her vehicle registered at the RTO office. RTO Officials will not only assign a number plate to it but also will give a RFID enabled smart card or a tag. This card will have a unique ID feasible to use with that vehicle only. They will also create an account for the me of that particular smart card and maintain transaction history in database. User needs to deposit some minimum amount to this account. Every time a registered vehicle approaches

Fig-2.1: Toll collection using RFID

the toll booth first the Infrared sensors will detect the presence of the vehicle. It will in turn activate the RFID circuit to read the RFID enable smart card fixed on the windscreen of the vehicle. Transaction will begin depending upon the balance available toll wilt be deducted directly or the vehicle will be directed towards another lane to pay tax manually. The

software further updates the details in the Centralized database server. It also triggers mechanism to generate the bill and will be sent to user as a text message.

This paper gives many advantages, such as waiting time of the vehicles, no traffic congestion, assured and accurate collection of toll amount free from cash, minimum emissions which are harmful for living. This paper investigates how to use GUI for collection of toll, the real time management and monitoring is done. It has expanded capacity for vehicle without building the big infrastructures. It has improved efficiency and reliability of tool plazas and traffic abilities of Highways.

2.8.2 Project Name: RFID Based Library Management system

RFID technology is being implemented in a number of industries. Supply chain implementation is perhaps one of the most frequently mentioned applications or RFID tags and equipment. Retailers such as “Wal-Mart” and grocery stores such and “Albertson’s” have begun to make it mandatory for their suppliers to tag merchandise destined for their stores.

Fig-2.2: RFID Based Library Management system

There its, however, a key difference to the library’s inventory as compared to that of a warehouse or a retail outlet. In the warehouse and retail supply chain, goods come in and leave. Only occasionally are they returned. The retail sector is looking at RFID as a “ throwaway” technology that hands an item to a customer which gets discarded. Yet the item wise unit cost of including and RFID tag is much more than the cost of printing a barcode on a package. In libraries, items are taken out and returned many times. Thus the same RFID tag

is re-used many times. The libraries across the globe started to use RFID to speed up the self-check in/out processes, to control the theft and to ease the inventory control in library. The barcode technology is slowly getting replaced by the RFID technology. The RFID tag does no have to be visible for detection. It can be read even when it is embedded in an item, such as in the cardboard cover of a book or in the packaging of a product. It can also store data such as stack number, accession number, book number, author information etc., but barcode is limited to just an identification number. The paper presents the study taken and corresponding experiments conducted for integrating RFID to existing LMS of CDAC. The remaining sections of this paper are organized as follows: Section II describes about Library, the tasks involved in that, problems faced by librarians and RFID's role in automating some the tasks of library, Section III describes about are technical specification of the hardware and tags used in project GFID based LMS), Section IV describes about the modules in project, Section V describes about the experiments conducted to find out the proper tag position in book and Section VI describes about the benefit of the project.

2.8.3. Project Name: RFID based security and access control system using ARDUINO with GSM module

Radio frequency-identification (RFID): This paper provides knowledge on radio frequency identification (RFID) technology' Initially RFID tags were made to eventually replace barcodes in different chains. Their advantages are that they can be read wirelessly and with on line of sight, contain more data than barcodes, and are stronger. As the paper describes the recent technology, include the frequency ranges used and standards required. With the increase in ubiquity of RFID tags, however, privacy became unease. The paper outline probable attack that can go against one's privacy and it also describes contradict measures.

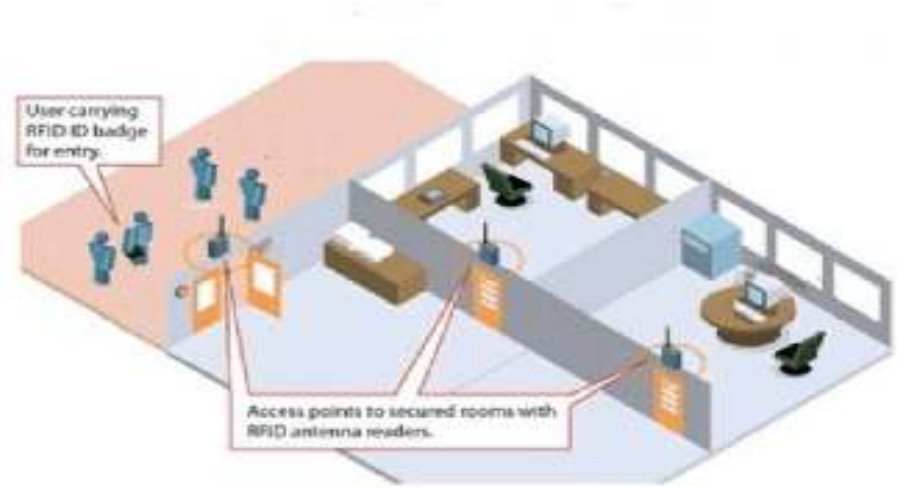

Fig-2.3: security and access system using RFID

The RFID technology did not stop &t thing-level tagging. The paper also presents current research that focuses on locating and tracking labeled ou3ect that move. Since the uses for RFID tags are so extensive, there is a large interest in lowering the costs for production of RFID tags. It turns out that printing tags may become a possible alternative to traditional production. RFID rags or simply "tags' are small transponders that respond to queries from a reader by wirelessly transmitting a serial number or alike identifier. They are greatly used to PIRs are basically made of a pyro electric sensor (which you can see above as the round metal can will a rectangular crystal in the center), which can detect levels of infrared rays (radiation). All emits a few low level rays (radiation), and the hotter something is, the more rays (radiation) is emitted. The sensor in a motion detector is a split in to halves. It is because we ate looking to detect motion (change) not average IR levels. The two halves are hyper up so that they terminate each other out. If one half is more or less IR redaction than the other, the output will move to and fro (high or low). Along with the pyroelectic sensor is a group of supporting circuitry, resistor and capacitor. It seems that most small hobbyist sensors use the BISS0001 ("Micro Power PIR Motion Detector IC") without doubt I very
low-priced chip. This chip takes the output of the sensor and does some minor processing on it to emit a digital output pulse from the analog sensor. Computer with a USB cable or power it with an AC-to-DC adaptor or battery to get in progress. The microcontroller on the board is programmed using Arduino programming language & Arduino development environment

GSM: It is a very ultimate method of security as it alerts different security personnel by Providing a security message on their mobile if in case of any unauthorized access.

PIR Sensor: It is a motion detector as this sensor performance is quite trustworthy & for a long time in security measures.

IFG Sensor: It provides the detection of gas leakage.

2.8.4 Project Name: Improving Position Estimation of the RFID Tag Floor Localization with Multiple Recognition Ranges

This chapter introduces the RFID tag floor localization method with multiple recognition ranges and its mathematical formulation to improve position estimation accuracy. Using the multiple recognition ranges of RFID reader, the reader can obtain more information about the distances to the tags on the tag floor. The information is used to improve the position estimation performance. At first, this chapter reviews the RFID tag floor localization method with single recognition range for mobile robots (Park et al., 2010) and The performance measure based on the position estimation error variance for the localization method. For the second, this paper extends the mathematical formulation of the localization method and the performance measure for the case of multiple recognition ranges. This work is related to the previous work (Park et a1.,2009) that used multiple power to improve position estimation performance. However, previous work lacks analysis and mathematical formulation of general RFID tag recognition models. We extend the mathematical formulation and the analysis of the single recognition range RFID tag floor localization method (Park et al., 2010) to the multiple recognition range case. Then the minimum error variance of multiple recognition range is introduced as a lower bound of position estimation error variance. Finally, it presents performance improvement of proposed localization method via the Monte-Carlo simulation and simple experiments. The analysis for the simulation and experimental results and the consideration for real application will be given. This chapter is organized as follows; This section discusses sensor systems used in the mobile robot localization. Then are advantages of the RFID systems as sensor systems for localization me discussed and the researches on the systems are reviewed. Section 2 introduces the RFID tag floor localization, its mathematical formulation and its performance index. Section 3 represents &e motivation of introducing the use of multiple recognition ranges for the RFID tag floor localization method and extends the mathematical formulation and the error variance for the multiple recognition range case. Section 4 conducts the Monte-Carlo simulation to show the improvement of the position estimation performance when the multiple recognition range is

Used. Section 5 represents experimental results that support simulation results. In Section 6, the minimum error variances (Park et at., 2010) as a lower bound of e4rror variance is extended to the multiple recognition range case. Section 7 gives the conclusions, discussions and tasks for the further researches. Young's Park, Je Won Lee. Daehyn Kim, Sang-woo Kim Electronic and Electric Engineering department, Postech Korea, South Improving Position Estimation of the RFID Tag Floor Localization with Multiple Recognition Ranges 10 www. intechopen.com. 1.1 Sensor systems for indoor mobile robots the localization is essential problem for the mobile robots to navigate a working are and to accomplish their work. For the localization problem, many researchers used various types of sensor systems to solve it. The dead reckoning systems utilize the movement of actuators by encoders to estimate the relative changes of position and heading angle (Evereti, 1995). However, the sensor systems accumulate the errors that induced by the mismatches between real robot and models, slippage of wheels, and variance of wheel diameter due to the air pressure during the navigation. The localization systems with inertial navigation system (INS) utilize the linear accelerations and angular velocities of the mobile robot (Borenstein and Feng, 1996). The systems integrate these information's to estimate the current position and the heading angle. The cost of the INS systems was very high and the size was large for the indoor mobile robots, until the advances of the micro-eletromechanical systems (MEMS).The MEMS based INS has low cost and small size relative to mechanical INS systems. However, the INS suffers from noise and bias that lead to drift of integrated results (Seaside et al., 2000) Some INS packages include magnetic sensors to detedect the terrestrial magnetism, to reduce the pose or hading angle error. However, there are many sources that can distort the terrestrial magnetism for indoor environments. The ultra-sonic ranging system and the lager range finder (LRF) are range detecting sensors. The mobile robot matches range information with the map which they have, to estimate their positions. These range sensors can measure the range of objects very accurately. But, under some surface conditions, they can't detect objects can suffer from multipath problems (Everett. 1995). The ultra-sonic satellite systems such as CRICKET triangulate a moving node's position with distances 6.om fixed nodes by of flight (kiyantha 2005)- However, the system is hard to scale up for the large work and the many mobile robots. When the numbers of fixed nodes and mobile robots are ese4 the localization takes longer time due to the arbitration processes. The radio- frequency-based ranging systems such as chirp spread spectrum (CSS) and received signal the (RSS) are used for localization of the mobile robots (Inacio et al., 2005; Patwari and III, 2003), however,

they have relatively large errors for the indoor mobile robot applications. The ultra-wideband (UWB) communication systems arc also used for the indoor localization problem and have good resolution, however, the system cost is still high and each nodes needs to be synchronized by wires (Gezici et al., 200s). Moreover, the use the wide frequency bands that can be the reason of the signal interference; therefore, it requires permission of the relevant government ministries when it is use. 1.2 RFID systems for mobile robots The RFID based localization systems are also used by several researches to localize the indoor mobile robots. The RFID systems as localization sensor for mobile robots have several advantages. First, the systems are robust to the environments such as light condition surface condition of objects, dirt's on the s, and distortion of the terrestrial magnetism. Vision-based localization systems Suffer from illumination and color changes, bad focused images, image distortions. motion bluer and so forth. The ultra-sonic sensor systems and the LRF sensor systems cannot detect obstacles or walls, under some surface conditions. Second, the RFID Systems can handle numerous unique landmarks, The landmark is the simplest way to locate the current position. however, the vision sensor based localization 190 A

2.8.5 Project Name: Grocery Customer Behavior Analysis using RFID-based Shopping Paths Data

Goal of retailers (discount stores, department stores, convenience stores, supermarkets, etc) is & increase the gross profit margin through sales and cost reduction. This requires improving the efficiency of operation and providing attractive services for customers. Especially, the market focus of large discount stores has been continuous low price sales in tandem with the expansion of new branch stores. Recently, however, they have struggled with the decreased consumer spending due to the economic recession. This has removed the competitive position of a low price strategy only. This situation necessitates new marketing strategies such as aggressive promotions to customers. Traditional strategies include basket analysis or regional analysis based on customer purchase history and demographic information. Information about interested products is analyzed from customer purchase history and products recommended to customers through customer segmentation. The location of future profitable stores is identified using demographic information and regional analysis. However, more aggressive promotional activities are needed as these traditional analyses do not provide

sufficient information to understand customer shopping patterns and behaviors in the physical store environment

2.8.6 Project Name: RFID-Based Hospital Real Time Patient Management System

The pharmaceutical drug approval process is rigorous and dependent on meticulous documentation. As new drugs go through the clinical trial phase, accurately tacking patient is crucial. RFID technology can improve the tracking of drug usage throughout the clinical-phase testing protocols. Improved tracking and accountability can improve the reliability and speed of the United States Food and Drug Administration (FDA) drug approval process.

Fig-2.4: Hospital Real Time Time Patient Management System

Inventory Management Manufacturers and distributors need improved visibility throughout the supply chain to gain an accurate account of inventory. Lack of visibility of customer orders results in increased inventory because healthcare practitioners often keep buffer stocks to avoid stock outs. Increase inventory visibility could reduce stocks by substituting RFID has strong application potential with medical device Companies. The FDA requires medical device companies to be able to identify each unit by serial number. Medical device companies need better control of implants on consignment with hospitals because returns can occur more than 50 percent of the time. RFID technology that improves visibility into returns

could enable faster redeployment since the company would know sooner when an unused product could be retuned. Surgical instruments and other devices must be properly cleaned and packaged between uses. Tags on the instruments and readers on the sterilization chambers and storage cabinets can validate proper cleaning and help locate needed instruments. Since medical devices are often mounted on portable carts, smart tags placed on the devices and readers installed in the doorways can enable personnel to quickly locate a crucial piece of equipment and immediately determine its fitness for use.

2.8.7 Project Name: RFID Technology for Smart Vehicle Control using Traffic Signal & Speed Limit Tag Communication

The seriousness of running a red light traffic signal and speed violation on roads can be seen from the statistics as given below [1]. Fig I: Statistics report on total number of road, accidents 80% of road accidents are caused by human error say senior police officials, according to I news report in the TOL Incidentally, India holds the dubious distinction of registering. The highest number of road accidents in the world. According to the experts at the National Transportation Planning and Research Centre OITPRC) the number of road accidents in India is three times higher than that prevailing in developed countries. The number of accidents for 1000 vehicles in India is as high as 35 while the figure ranges from 4 to l0 in developed counties. The report, based on 2006 and 2007 statistics collected from 178 participating countries, said globally over I.2 million people die in mad accidents every year and 20-25 million people suffer non-fatal injuries. Speed is the main reason behind. An increase in average speed is directly related to both the likelihood of a crash and to the severity of mash consequences. A 5% increase in average speed leads to approximately l0%

CHAPTER -03

ADOPTED TECHONOLOGY

3.1 Arduino:

The Arduino Uno is a microcontroller board based on the ATmega328 . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, 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. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduno, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform

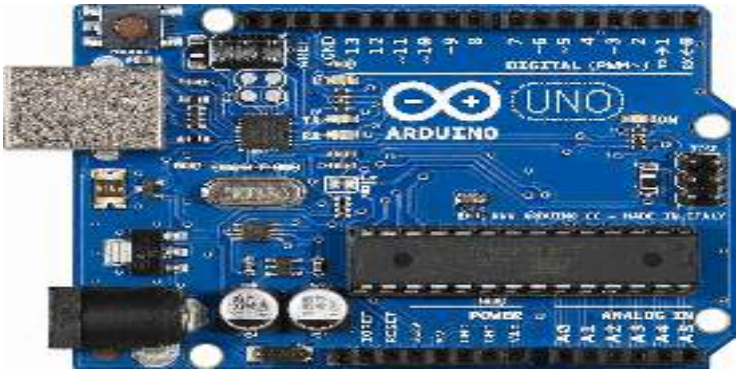

Fig-3.1: Arduino UNO

3.2 Summery Of Arduino UNO

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

3.3 Power Of Arduino UNO

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows: • VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. • 5V. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply. • 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA. • GND. Ground pins.

3.4 Arduino Board :

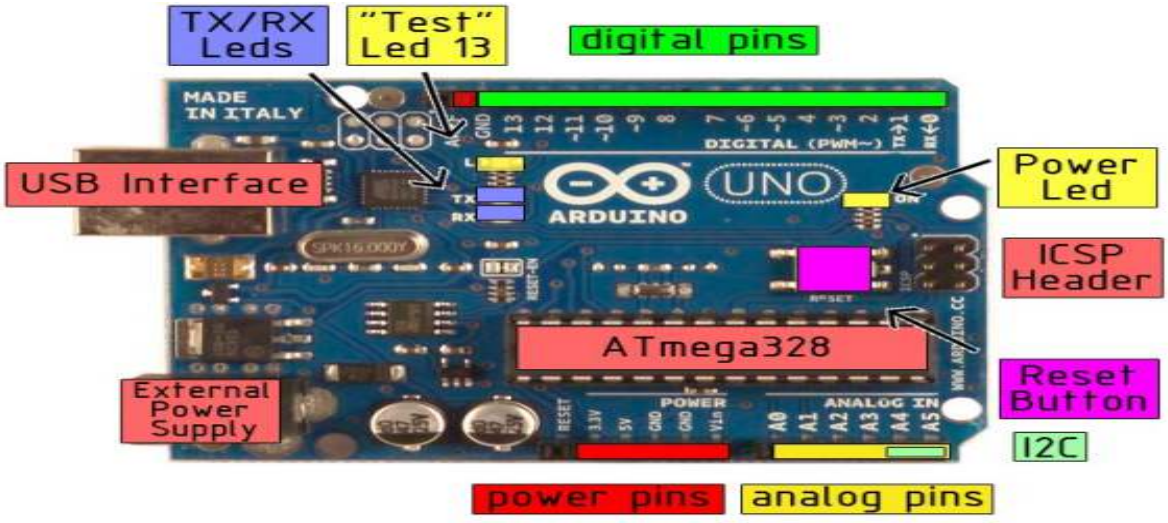

Fig-3.2: Arduino Board

3.5 Mamory Of Arduino UNO

The Atmega328 has 32 KB of flash memory for storing code (of which 0,5 KB is used for the bootloader); It has also 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the

3.6 Input output Of Arduino UNO

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions: • Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. TThese pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip . • External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details. • PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function. • SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language. • LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Uno has 6 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality: • I 2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library. There are a couple of other pins on the board: • AREF. Reference voltage for the analog inputs. Used with analogReference(). • Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

3.7 Communication Of Arduino UNO

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '8U2 firmware uses the standard USB COM drivers, and no

external driver is needed. However, on Windows, an *.inf file is required.. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-toserial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of the Uno's digital pins.

USB overcurrent protection

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

3.8 Introduction RFID:

Radio Frequency IDentification (RFID) is one of the new emerging technologies that use radio frequency waves to transfer data between a reader and a moveable item which is tagged, to identify, categorize and track the item. It is fast, reliable, and does not require contact between reader/scanner and the tagged item.

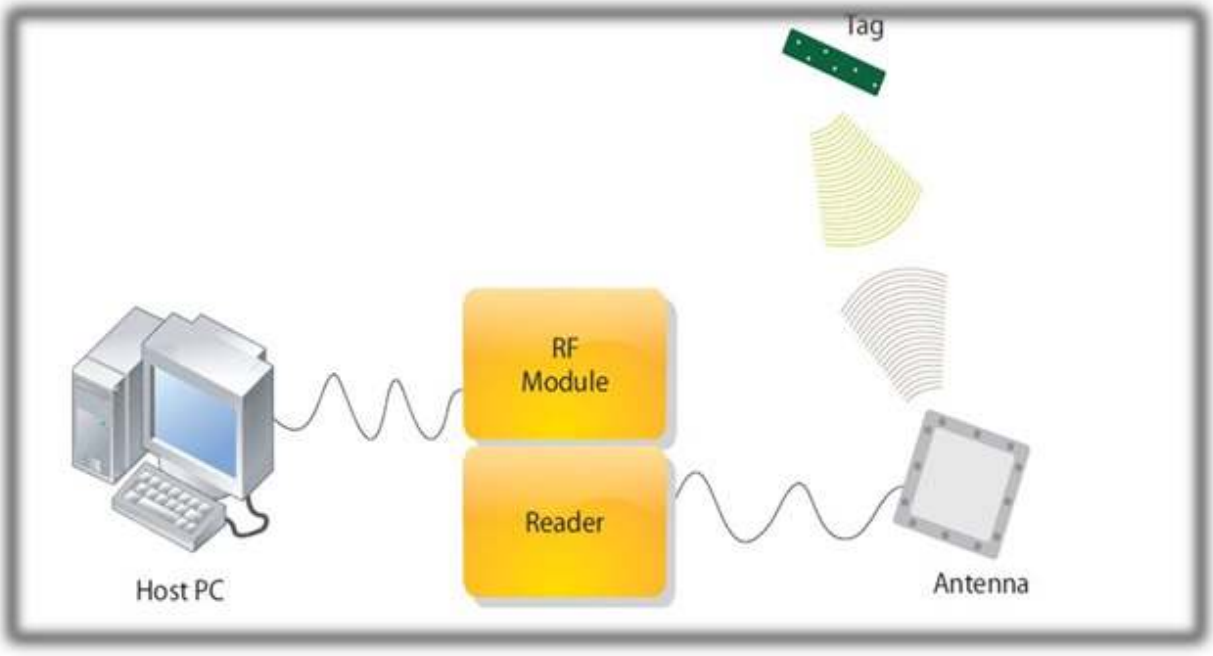

Fig-3.3: RFID System

RFID provides a wireless, over-the-air interface. Unlike bar codes, line-of-sight communication is not necessary

combination of the chip and antenna is called an RFID transponder, tag or inlet. When the RFID transponder is placed in the field of an RFID reader, information is transmitted to the reader and processed by a computer RFID uses an integrated microchip and antenna that reads information.

RFID systems evolved from barcode labels as a means to automatically identify and track products and people. You will be generally familiar with RFID Systems as seen in:

A . Access Control.

RFID Readers placed at entrances that require a person to pass their proximity card (RF tag) to be "read' before the access can be made.

B. Contact less Payment Systems.

RFID tags used to carry payment information. RFIDs are particular suited to electronic Toll collection systems. Tags attached to vehicles, or carried by people transmit payment information to a fixed reader attached to a Toll station. Payments are then routinely deducted from a users account, or information is changed directly on the RFID tag.

C. Product Tracking and Inventory Control.

RFID systems are commonly used to track and record the movement of ordinary items such as library books, clothes, factory pallets, electrical goods and numerous items.

3.9. A basic RFID system consist of three components:

A. Antenna

The antenna emits radio signals to activate the tag and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication. Antennas are available in a variety of shapes and sizes; they can be built into a door frame to receive tag data from persons or things passing through the door, or mounted on an interstate tollbooth to monitor traffic passing by on a freeway. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually. If constant interrogation is not required, a sensor device can activate the field.

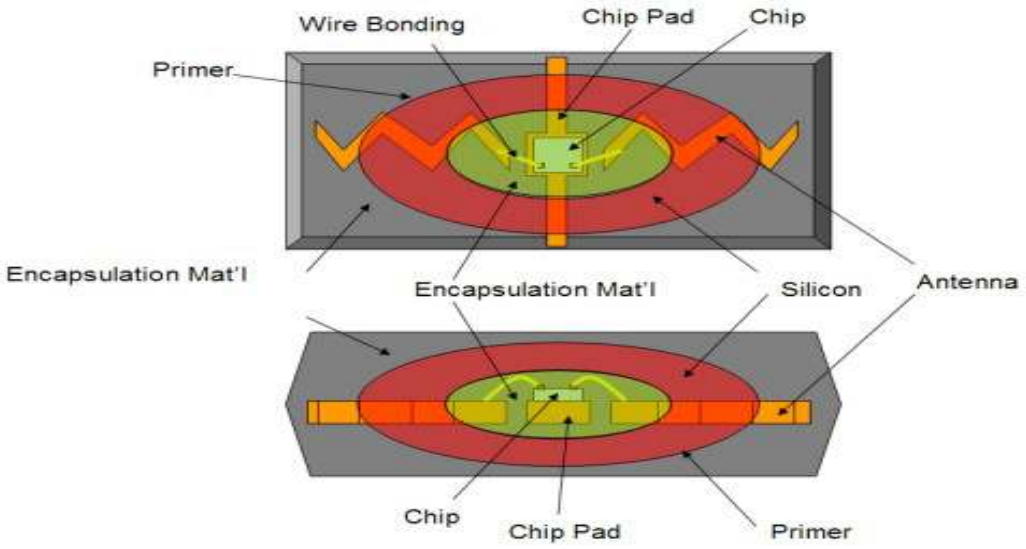

Fig-3.4: RFID Antenna

Often the antenna is packaged with the transceiver and decoder to become a reader which can be configured either as a handheld or a fixed-mount device. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used.

When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing.

B. TAGS (Transponders)

The tags contain transponders that emit messages readable by specialized RFID readers. Most RFID tags store some sort of identification number. A reader retrieves information about the ID number from a database, and acts upon it accordingly. RFID tags can also contain writable memory, which can store information for transfer to various RFID readers in different locations. This information can track the movement of the tagged item, making that information available to each reader.

Tags come in a variety of types, with a variety of capabilities. Key variables include:There are three options in terms of how data can be encoded on tags:

Read-only tags

Contain data such as a serialized tracking number, which is pre- written onto them by the tag manufacturer or distributor. These are generally the least expensive tags because they cannot

have any additional information included as they move throughout the supply chain. Any updates to that information would have to be maintained in the application software. `

Fig- 3.5: RFID Tag

Full "read-write" tags:

Allow new data to be written to the tag as needed—and even written over theoriginal data. Examples for the latter capability might include the time and date of ownership transfer or updating the repair history of a fixed asset. While these are the most costly of the three tag types and are not practical for tracking inexpensive items, future standards for electronic product codes (EPC) appear to be headed in this direction.

Types of Tags :

RFID tags fall into two general categories, active and passive, depending on their source of electrical power. Active RFID tags contain their own power source, usually an on-board battery. Passive tags obtain power from the signal of an external reader. RFID readers also come in active and passive varieties, depending on the type of tag they read.

C. Passive Tags

A passive tag is an RFID tag that does not contain a battery; the power is supplied by the reader. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag

forms a magnetic field.The tag draws power from it, energizing the circuits in the tag. The tag then sends th encoded in the tag's e information memory.

The advantages of a passive tag :

The tag functions without a battery; these tags have a useful life of twenty years or more. The tag is typically much less expensive to manufacture. The tag is much smaller (some tags are the size of a grain of rice). These tags have almost unlimited applications in consumer goods and other areas.

The disadvantages of a passive tag:

The tag can be read only at very short distances, typically a few feet at most. This greatly limits the device for certain applications. It may not be possible to include sensors that can use electricity for power. The tag remains readable for a very long time, even after the product to which the tag is attached has been sold and is no longer being tracked.

D. Semi-Passive

Semi-passive RFID tags are very similar to passive tags except for the addition of a small battery.This battery allows the tag IC to be constantly powered. This removes the need for the aerial to be designed to collect power from the incoming signal.Aerials can therefore be optimized for the backscattering signal. Semi-passive RFID tags are faster in response and therefore stronger in reading ratio compared to passive tags.

E. Active Tags

An RFID tag is an active tag when it is equipped with a battery that can be used as a partial or complete source of power for the tag's circuitry and antenna. Some active tags contain replaceable batteries for years of use, others are sealed units

The advantages of an active tag:

It can be read at distances of one hundred feet or more, greatly improving the utility of the device. It may have other sensors that can use electricity for power.

The disadvantages of an active tag:

The tag cannot function without battery power, it limits the lifetime of the tag. The tag is more expensive. The tag is physically larger, which may limit applications. The long-term maintenance costs for an active RFID tag can be greater than those of a passive tag if the batteries are replaced. Battery outages in an active tag can result in expensive misreads.

3.10 RFID Active tags have these features:

longest communication range of any tag the capability to perform independent monitoring and control the capability of initiating communications the capability of performing diagnostics the highest data bandwidth. Active RFID tags may even be equipped with autonomous networking; the tags autonomously determine the best communication path.

A . Extended Capability

These chips are very high capacity of more than the basic capabilities of the RFID chips as pallets or license as an alternative to vertical modulation technique (Bar-code), these chips are characterized by: -

Their ability to send and receive data distances is very high. Their ability to work in difficult environments. Storage capacity is very high on the card. Ability to integrate with sensors. Ability to communicate with external devices. Ability to withstand fluctuations in weather.

B. Other types of Tags

There are other types of these Tags :

Tags antenna (Antenna types).

Tags are associated with the card (Tag attachment).

Tags that determine the sites (Tagging Position).

C. EPC Tags

EPC refers to "electronic product code," an emerging specification for RFID tags, readers and business applications first developed at the Auto-ID Center at the Massachusetts Institute of Technology. This organization has provided significant intellectual leadership toward the use and application of RFID technology.

EPC represents a specific approach to item identification, including an emerging standard for the tags themselves, including both the data content of the tag and open wireless communication protocols. In a sense, the EPC movement is combining the data standards embodied in certain bar code specifications, such as the UPC or UCC-128 bar code standards, with the wireless data communication standards that have been developed by ANSI and other groups.

Figure -3.6: Electronic product code (EPC)

3.11 RF Transceiver:

The RF transceiver is the source of the RF energy used to activate and power the passive RFID tags. The RF transceiver may be enclosed in the same cabinet as the reader or it may be a separate piece of equipment. When provided as a separate piece of equipment, the transceiver is commonly referred to as an RF module. The RF transceiver controls and modulates the radio frequencies that the antenna transmits and receives. The transceiver filters and amplifies the backscatter signal from a passive RFID tag.

3.12 RFID Frequencies:

There are many different types of RFID systems out in the market. They are categorized according to these frequency ranges.
Some of the most commonly used RFID kits are as follows:

1) Low-frequency (30 KHz to 500 KHz)
2) Mid-Frequency (900 KHz to 1500MHz)
3) High Frequency (2.4GHz to 2.5GHz)

RFID offers the following benefits:

Identification without visual contact

Read/write capability

Cluster reading

Secure communication

Withstanding harsh industrial environment Reliability and speed Reusability
Data storage at point-of-origin

3.13. Disadvantages of Radar in comparison with RFID

Measures instantaneous speed.

Line of Sight needed.

Easy to detect using some devices from long distance.

Easily tricked by people.

Does not differentiate between different car categories.

High processing time & Network traffic.

3.14. The Advantages of RFID Over Bar Coding

1.No "line of sight" requirements:

Bar code reading can sometimes be limited or problematic due to the need to have a direct "line of sight" between a scanner and a bar code. RFID tags can be read through materials without line of sight.

2.More automated reading:

RFID tags can be read automatically when a tagged product comes past or near a reader, reducing the labor required to scan product and allowing more proactive, real-time tracking.

3.Improved read rates:

RFID tags ultimately offer the promise of higher read rates than bar codes, especially in high-speed operations

4. Greater data capacity:

RFID tags can be easily encoded with item details such as lot and batch, weight, etc.

5."Write" capabilities:

Because RFID tags can be rewritten with new data as supply chain activities are completed, tagged products carry updated information as they move throughout the supply chain.

3.15. How do RFID work ?

In every RFID system the transponder Tags contain information. This information can be as little as a single binary bit, or be a large array of bits representing such things as an identity code, personal medical information, or literally any type of information that can be stored in digital binary format.

Shown is a RFID transceiver that communicates with a passive Tag. Passive tags have no power source of their own and instead derive power from the incident electromagnetic field. Commonly the heart of each tag is a microchip. When the Tag enters the generated RF field it is able to draw enough power from the field to access its

internal memory and transmit its stored information. When the transponder Tag draws power in this way the resultant interaction of the RF fields causes the voltage at the transceiver antenna to drop in value. This effect is utilized by the Tag to communicate its information to the reader. The Tag is able to control the amount of power drawn from the field and by doing so it can modulate the voltage sensed at the Transceiver according to the bit pattern it wishes to transmit.

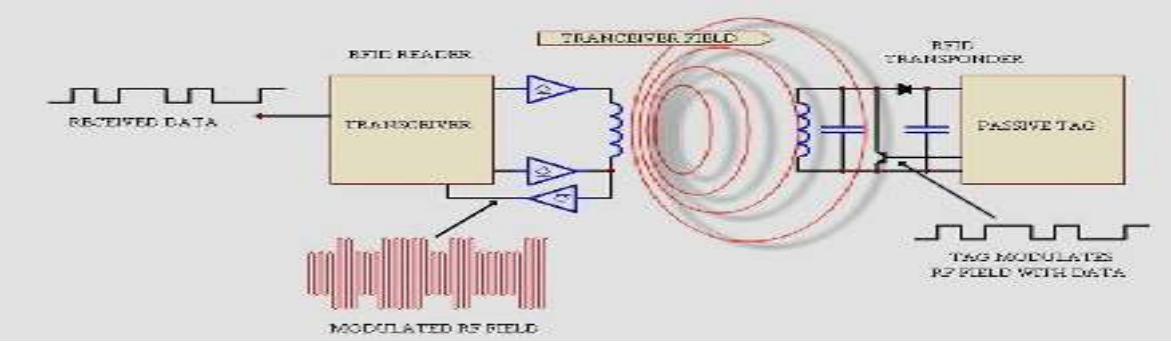

Figure 3.7: RFID Reading System

Typical Applications for RFID

Automatic Vehicle identification
Inventory Management
Work-in-Process
Container/ Yard Management
Document/ Jewelers tracking
Patient Monitoring

Common Problems with RFID

Some common problems with RFID are reader collision and tag collision. Reader collision occurs when the signals from two or more readers overlap. The tag is unable to respond to simultaneous queries. Systems must be carefully set up to avoid this problem. Tag collision occurs when many tags are present in a small area; but since the read time is very fast, it is easier for vendors to develop systems that ensure that tags respond one at a time. See Problems with RFID for more details.

3.16 ATMEGA32 AVR Microcontroller

AVR is a family of microcontrollers developed by Atmelbeginning in 1996. AVR was one of the first microcontrollerfamilies to use on chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time.

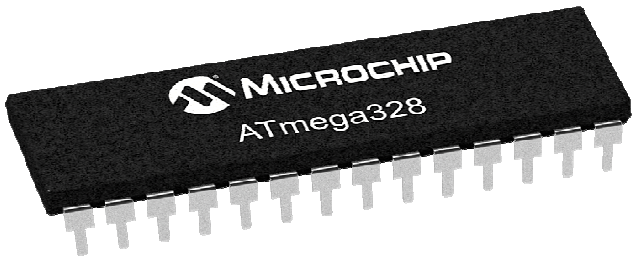

Fig-3.8: Microcontroller

The high-performance, low-power Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 54/69 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for boundary-scan and on-chip debugging/programming, three flexible timer/counters with compare modes, internal and external interrupts,serial programmable USART, a universal serial interface (USI) with start condition detector, an 8-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, SPI serial port, 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

Microcontroller Parameter and value

Parameter Name	Value
Program Memory Type	Flash
Program Memory (KB)	32
CPU Speed (MIPS)	16
RAM Bytes	2,048
Data EEPROM (bytes)	1024
Digital Communication Peripherals	1-UART, 1-SPI, 1-I2C
Capture/Compare/PWM Peripherals	1 Input Capture, 1 CCP, 4PWM
Timers	2 x 8-bit, 1 x 16-bit
Comparators	1
Temperature Range (C)	-40 to 85
Operating Voltage Range (V)	2.7 to 5.5
Pin Count	44
Cap Touch Channels	16

3.17 Sound Module

A sound module is an electronic musical instrument without a human-playable interface such as a piano-style musical keyboard. ... A sound module may be an analog or digital synthesizer, a sampler, or a rompler. Electronic drum module are sound modules which specialize in percussion sounds.

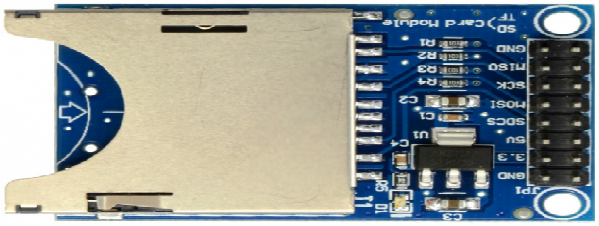

Fig-3.9:Sound Module

3.18: 16x2 Character LCD Display

LCD (Liquid Crystal Display) screen is an electronic display Module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

Pin Diagram:

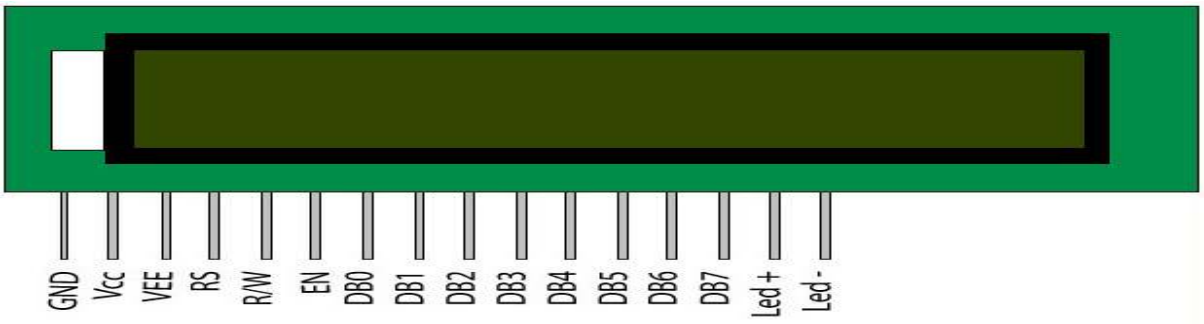

Fig -3.10: Pin Diagram LCD Display

LCD Display Pin Description:

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

3.19 Infrared speed sensor modul

Here is a motor speed sensor module, the major goal is to check the rate of an electric motor. The module can be used in association with a microcontroller for motor speed detection, pulse count, position limit, etc. In principle, any rate meter simply measures the rate at which some event occurs. Usually this is done by counting the events for a given period of time (integration interval) and then simply dividing the number of events by the time to get the

Fig-3.11: Infrared speed sensor modul

Basically, the microcontroller-compatible motor speed sensor module described is a simple device that yields processed pulse trains when the visual path of its optical sensor is physically interrupted by some sort of slotted wheel or similar mechanism (an optical sensor commonly consists of a light emitting diode that provides the illumination, and a phototransistor that senses the presence or absence of that illumination). The transmissive optical sensor used here consists of an infrared light emitting diode and a phototransistor. This both prevents interference from stray external light sources and by having the two components matched for a specific frequency of radiation, they are even more immune to undesired interference.

As stated, the circuity can be used to send calibrated pulses to a microcontroller-based tacho meter or similar circuit/device. The wiring of the hardware turned out to be deceptively simple. At the heart of the circuit is the OS25B10 transmissive optical sensor with phototransistor output (OC1).

dual comparator chip (IC1) configured as a simple Schmitt trigger (schmitt triggers are fundamental circuits with several uses; one is signal processing, they can pull digital data out of some extremely noisy environments). The green indicator (LED1) indicates the presence of voltage applied, and the red indicator (LED2) monitors output of the motor speed sensor module. Recommended working voltage of the module is 4.5 to 5.5 volt dc.

3.20 GSM MODULE SIM900A

GPRS module is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands). This module supports software power on and reset.

Fig-3.12: GSM module

Features of GSM Module SIM900A

- Quad-Band 850/ 900/ 1800/ 1900 MHz
- Dual-Band 900/ 1900 MHz
- GPRS multi-slot class 10/8GPRS mobile station class B
- Compliant to GSM phase 2/2+Class 4 (2 W 850/ 900 MHz)
- Class 1 (1 W 1800/1900MHz)
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT)
- Low power consumption: 1.5mA(sleep mode)
- Operation temperature: -40°C to +85 °

Electrical Characteristics of GSM Module SIM900A

Parameter	Min.	Typical	Max.	Unit
Power voltage (Vsupply)	4.5		5.5	VDC
Input voltage VH	0.7VCC		5.5	V
Input voltage VL	-0.3	0	0.3VCC	V
Current Consumption (pulse)	-		2000	mA
Current Consumption (continuous)			500	mA
Baud rate		115200		Bps

3.21 CRASH SENSOR

A miniature snap-action switch, also trademarked and frequently known as a micro switch, is an electric switch that is actuated by very little physical force.Micro switches are very widely used; among their applications are appliances, machinery, industrial controls, vehicles, and many other places for control of electrical circuits. They are usually rated to carry current in control circuits only, although some switches can be directly used to control small motors, solenoids, lamps, or other devices.

This is a small micro switch sensor designed for the Arduino. It could be directly connected to the IO Expansion shield. It integrates the pull-up resistor and the status indicator LED onboard. That makes it easier for testing.The miniature snap-action micro switch with roller lever make it suitable for more different environment application.

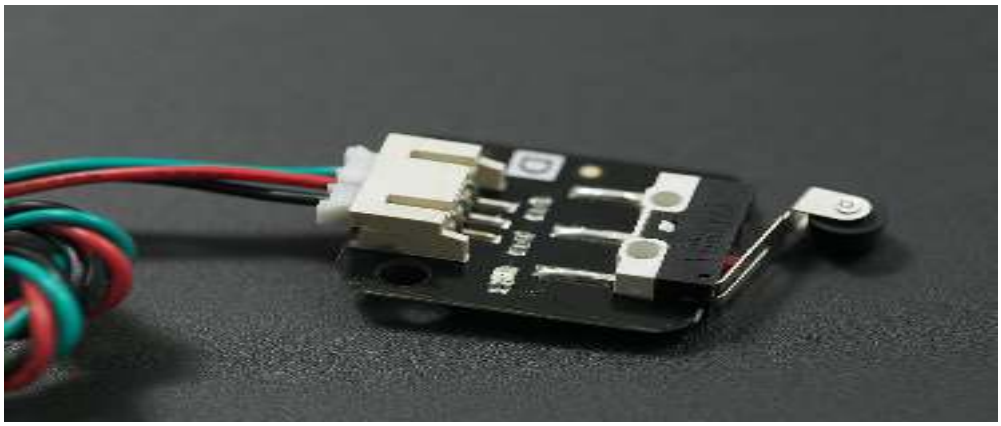

Fig-3.13 : Crash Sensor

CHAPTER -04

DESIGN & IMPLEMENT OF SMART HIGHWAY

4.1 BLOCK DIAGRAM (Vehicle Speed Detect And Road Status Notification)

Arduino Connected on RFID module also connected speed sensor. Speed sensor collect speed data and give this data arduino for show display. Sound module also connected Arduino for give speed data send to speaker.

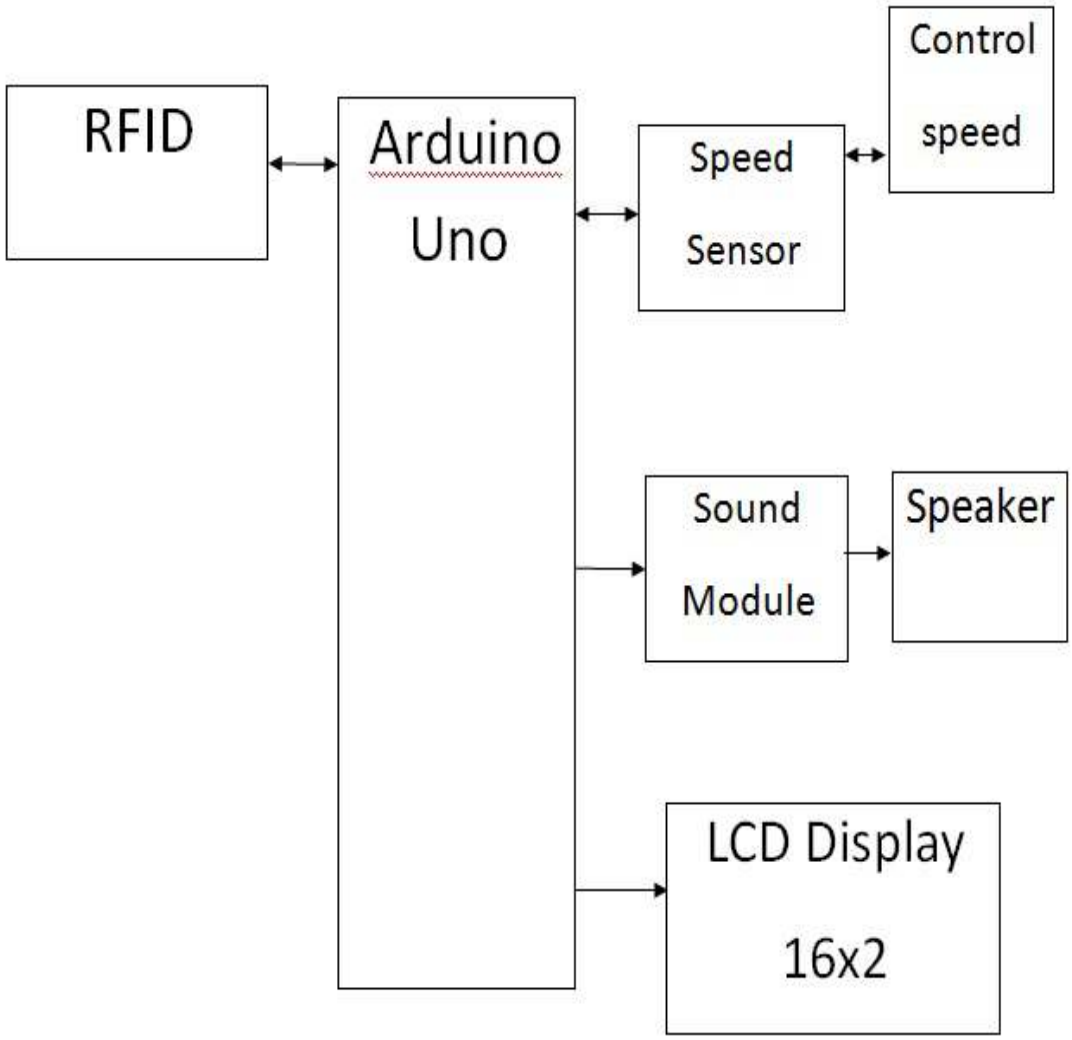

Fig:- 4.1: Block diagram for RFID System

4.2 BLOCK DIAGRAM (Accident Spot Can Be Detected By GSM On SMS Services)

Microcontroller connected on crash sensor and GSM modules. When crash sensor on microcontroler take data and send this information to user by GSM techonology.

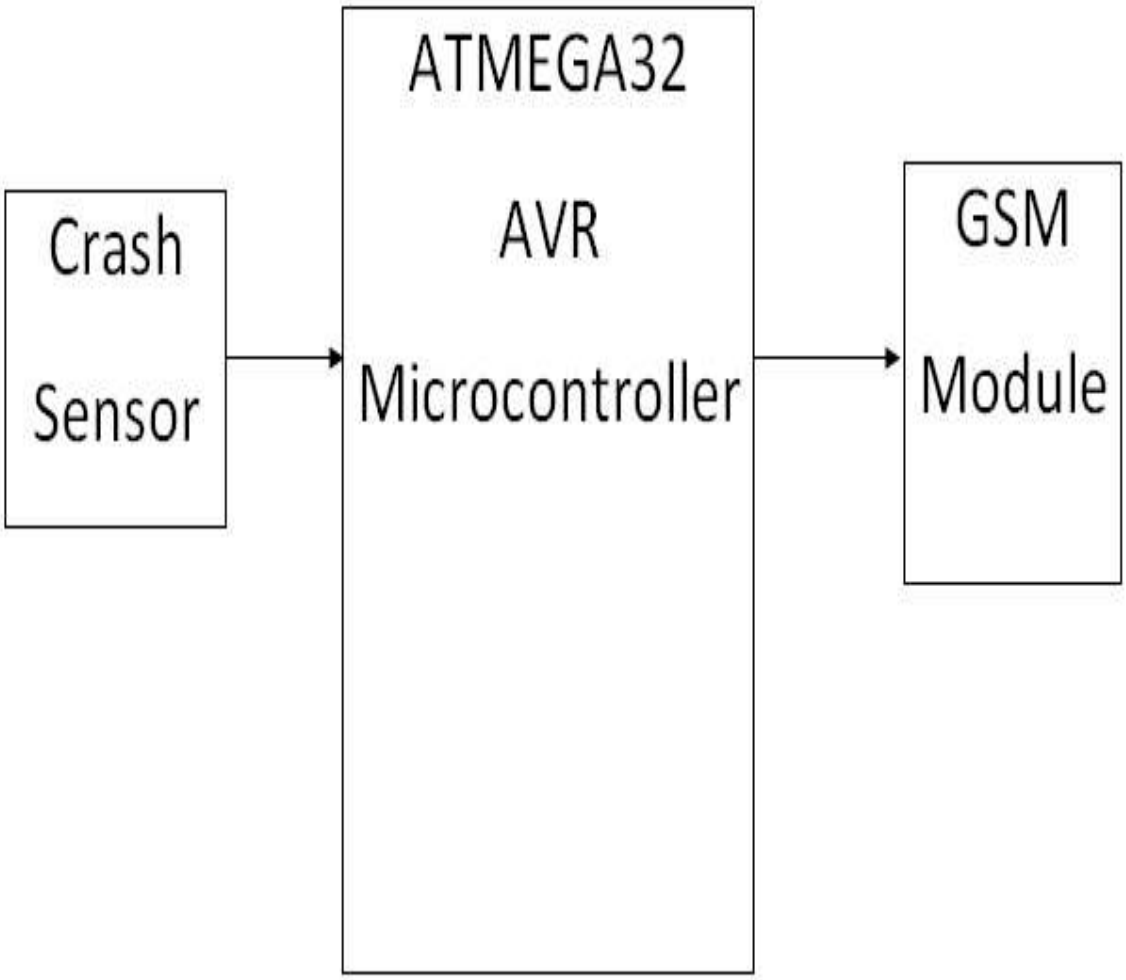

Fig:-4.2: Block Diagram GSM System

4.3 Circuit Diagram (Vehicle Speed Detect And Road Status Notification)

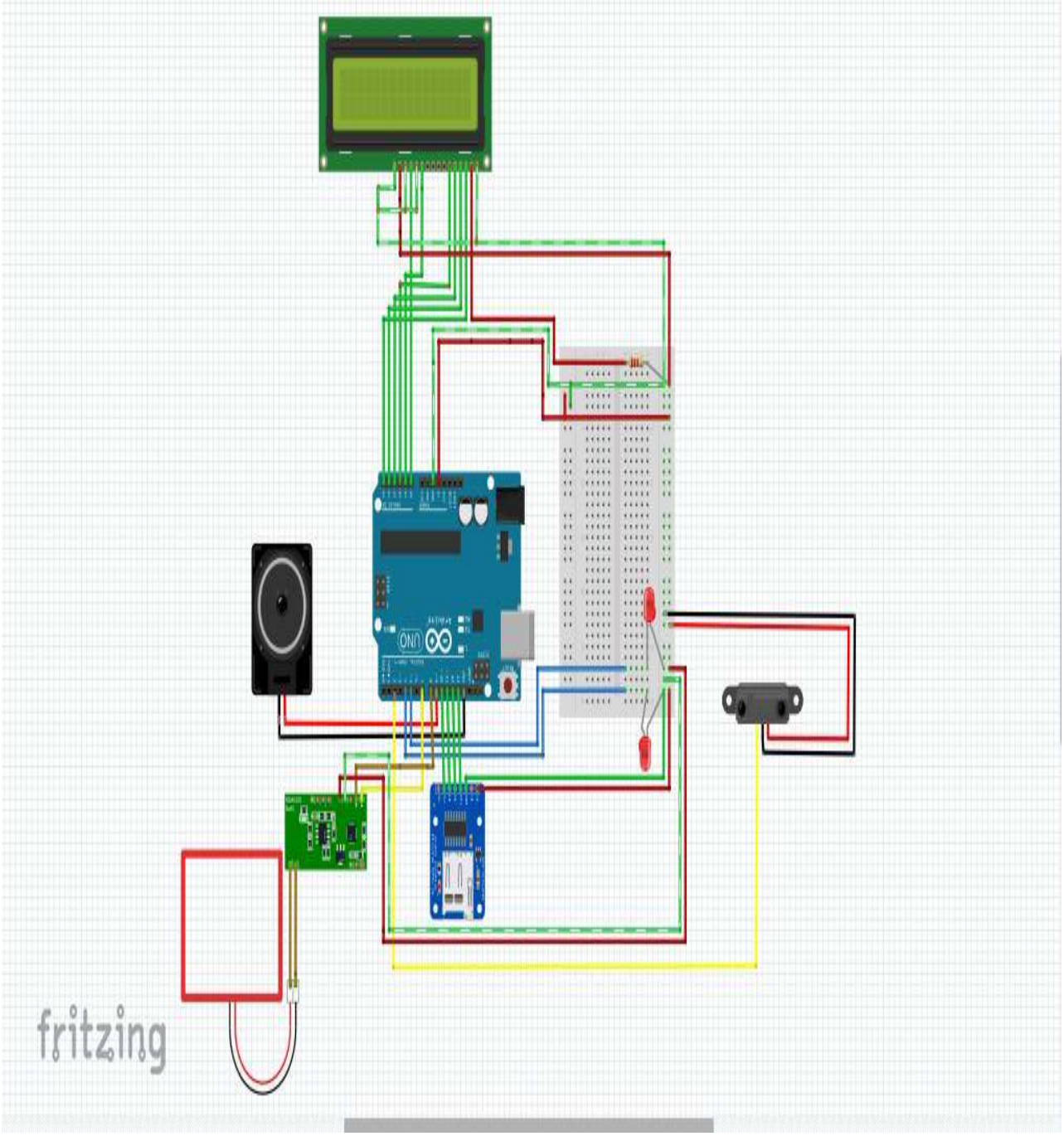

Fig:-4.3: Circuit Diagram RFID System

4.4 Circuit Diagram (Accident Spot Can Be Detected By GSM On SMS Services)

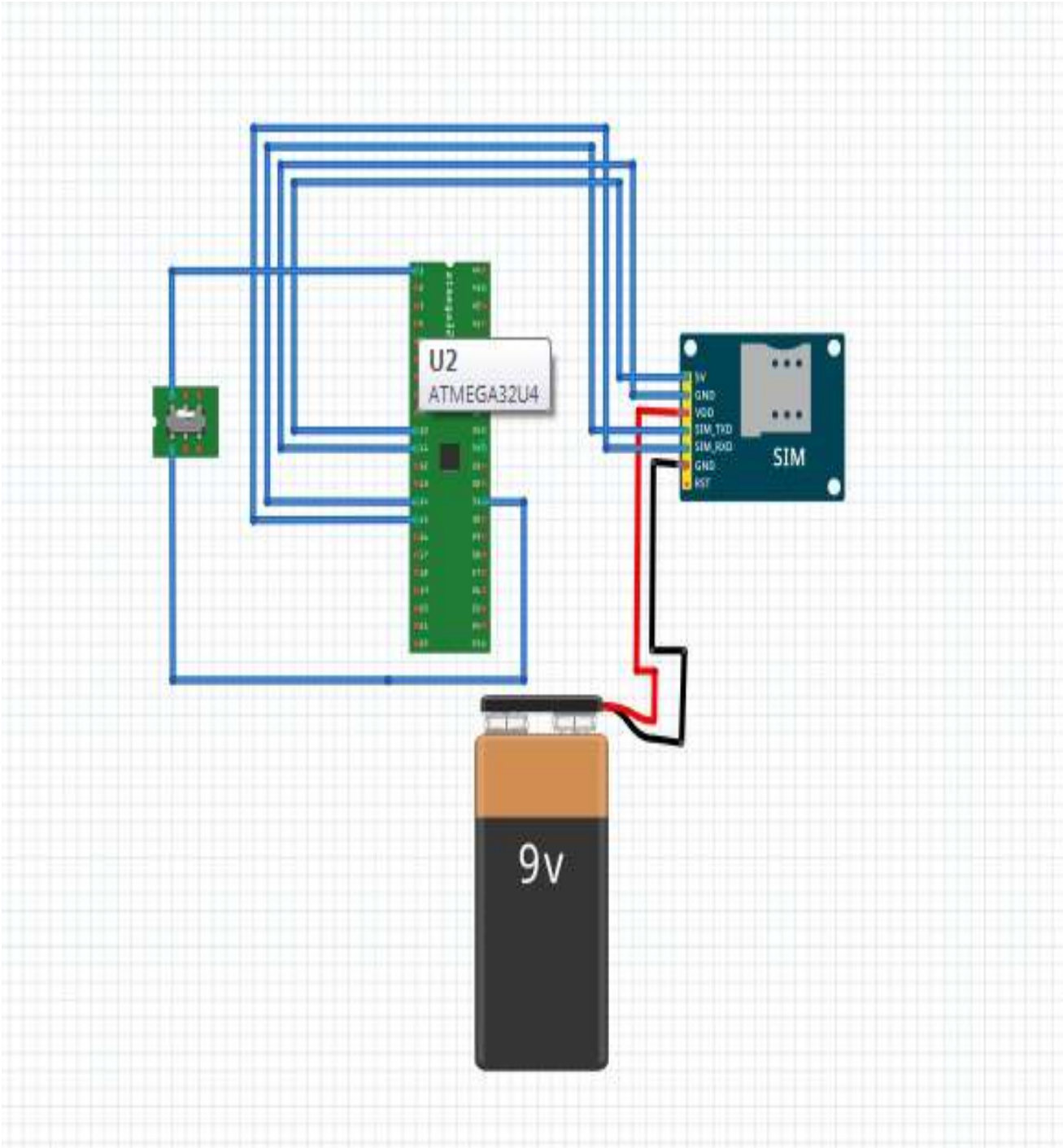

Fig:-4.4: Circuit Diagram GSM System

4.5 Program For GSM System

```
'//--------------------------Start--------------------------////
' SMS.BAS
' (c) 2002 MCS Electronics
' This sample shows how to use AT command on a GSM mode
' The GSM modems are available from www.mcselec.com
'-------------------------------------------------------------------------
$regfile = "m32def.dat"
$crystal = 4000000
$baud = 9600
                    /////----- 'configure the lcd display----/////
Config Lcd = 16 * 2
Config Lcdpin = Pin , Db4 = Portb.4 , Db5 = Portb.5 , Db6 = Portb.6 , Db7 = Portb.7 , E =
Portb.3 , Rs = Portb.2
                    /// -------Variables-----////
Dim B As Byte
Dim A As Bit
Dim S As String * 66
Config Portc = Input
Mcucsr = 128
Mcucsr = 128
'we use a serial input buffer
Config Serialin = Buffered , Size = 12
'enable the interrupts because the serial input buffer works interrupts driven
Enable Interrupts
Cls
Waitms 3000
Do
A = Pinc.0
Home
Lcd "Switch OFF"
If A = 1 Then
Cls
```

```
Locate 1 , 1
Lcd "Switch ON"
Print "AT"
Waitms 300
Print "AT"
Waitms 300
Print "AT+CMGF=1"
Waitms 300
```

//////---------- set SMS text mode -------////////

```
get OK status
Print "AT+CMGS=" ; Chr(34) ; "+8801625000022" ; Chr(34)
Waitms 300
Print "Attention!  accident has occurred ; reported via on-board SIM900A GSM module by
group E." ; Chr(26)
Waitms 300
Cls
Else
End If
Loop
```

//----------Close----------///////

4.6 Program For RFID System

In this code RFID CARD,talking PART and counting system are complete

*/

/*-----Output Device-----*/

```
#include <LiquidCrystal.h>
#include <SoftwareSerial.h>
#include "SD.h"
#define SD_ChipSelectPin 10
#include "TMRpcm.h"
#include "SPI.h"
TMRpcm tmrpcm;
```

/*------- Display Output----------*/

```
SoftwareSerial rfid(7, 8); // RX, TX
LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);//RS,E,D4,D5,D6,D7
int location=0;
float value=0;
float rev=0;
int rpm;
int oldtime=0;
int time;
int max_speed=12000;
void isr() //interrupt service routine
{
rev++;
}
void setup()
{
 lcd.begin(16,2);
 rfid.begin(9600);
 tmrpcm.speakerPin=9;
  Serial.begin(9600);
if(!SD.begin(SD_ChipSelectPin))
{
  Serial.println("SD fail");
  return;
}
Serial.println("SD found");
tmrpcm.setVolume(6);
  attachInterrupt(0,isr,RISING);  //attaching the interrupt
 pinMode(5,OUTPUT);
 pinMode(4,OUTPUT);
 pinMode(3,OUTPUT);
 pinMode(6,OUTPUT);
 lcd.clear();
 lcd.setCursor(0,0);
```

```
 lcd.print("Welcome");
 delay(2000);
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("*DRIVE SAFLY* ");
}
char character;
String our_id;
void loop() // run over and over
{
  while(rfid.available()>0)
  {
    character = rfid.read();
    our_id += character;
  }
      lcd.setCursor(0,0);
      lcd.print(" HIGHWAY DETECT ");
      delay(100);
      digitalWrite(5,HIGH);
      tmrpcm.play("02.wav");

      delay(5000);
      digitalWrite(5,LOW);
      tmrpcm.stopPlayback();
      lcd.setCursor(0,0);
      lcd.print("                ");
      lcd.setCursor(0,0);
      lcd.print("*HAPPY DRIVING* ");
      lcd.print(max_speed);
      delay(100);
    }
                                  /*---------- U turn detect ----------*/
    else if(our_id=="21004E92AB56")//use for 'U' turn detect
```

```
 {
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print("'U' TURN DETECT ");
  delay(100);
  digitalWrite(5,HIGH);
   tmrpcm.play("03.wav");
  delay(5000);
  digitalWrite(5,LOW);
  tmrpcm.stopPlayback();
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print("'U' TURN RUNNING");
  delay(100);
 }
                                        /*----------- U turn Exit----------*/
else if(our_id=="830048E5F8D6")//use for 'U' turn Exit
 {
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print("'U' TURN EXIT  ");
  delay(100);
  digitalWrite(5,HIGH);
  tmrpcm.play("04.wav");
  delay(5000);
  digitalWrite(5,LOW);
 tmrpcm.stopPlayback();
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
```

```
    if(location==1)
    {
     lcd.print("(L.A) M.S=");
     lcd.print(max_speed);
    }
    else
    lcd.print("*HAPPY DRIVING* ");
    location=0;
    delay(100);
   }
   rfid.flush();
   our_id="";
  }
detachInterrupt(0);          //detaches the interrupt
time=millis()-oldtime;       //finds the time
rpm=(rev/time)*60000;  if (our_id.length() > 10)
  {
                          /*-----------Speed Limit Area Detect ----------*/
   our_id = our_id.substring(1,13);
   if(our_id=="21005314A8CE")//use for limit way to entry
   {
    max_speed=12000;
    lcd.setCursor(0,0);
    lcd.print("               ");
    lcd.setCursor(0,0);
    lcd.print("limited area detect");
    lcd.setCursor(0,1);
    lcd.print("               ");
    lcd.setCursor(0,1);
    lcd.print(" Max.speed=");
    lcd.print(max_speed);
    delay(100);
    digitalWrite(5,HIGH);
```

```
  tmrpcm.play("01.wav");
  delay(5000);
  digitalWrite(5,LOW);
  tmrpcm.stopPlayback();
  location=1;
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print("(L.A) M.S=");
  lcd.print(max_speed);
  delay(100);
}
```

/*---------- Left Turn Detect ----------*/

```
else if(our_id=="21004E92AB56")
{
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print(LEFT' TURN DETECT ");
  delay(100);
  digitalWrite(5,HIGH);
   tmrpcm.play("03.wav");
  delay(5000);
  digitalWrite(5,LOW);
  tmrpcm.stopPlayback();
  lcd.setCursor(0,0);
  lcd.print("               ");
  lcd.setCursor(0,0);
  lcd.print(LEFT' TURN DETECT");
  delay(100);
}
```

/*----------Right Turn Detect ----------*/

```
else if(our_id=="21004E92AB56")
```

```
{
  lcd.setCursor(0,0);
  lcd.print("                ");
  lcd.setCursor(0,0);
  lcd.print(RIGHT' TURN DETECT ");
  delay(100);
  digitalWrite(5,HIGH);
   tmrpcm.play("03.wav");
  delay(5000);
  digitalWrite(5,LOW);
  tmrpcm.stopPlayback();
  lcd.setCursor(0,0);
  lcd.print("                ");
  lcd.setCursor(0,0);
  lcd.print(RIGHT' TURN DETECT");
  delay(100);
}
```

4.7 Photo of Implementation (Smart Highway).

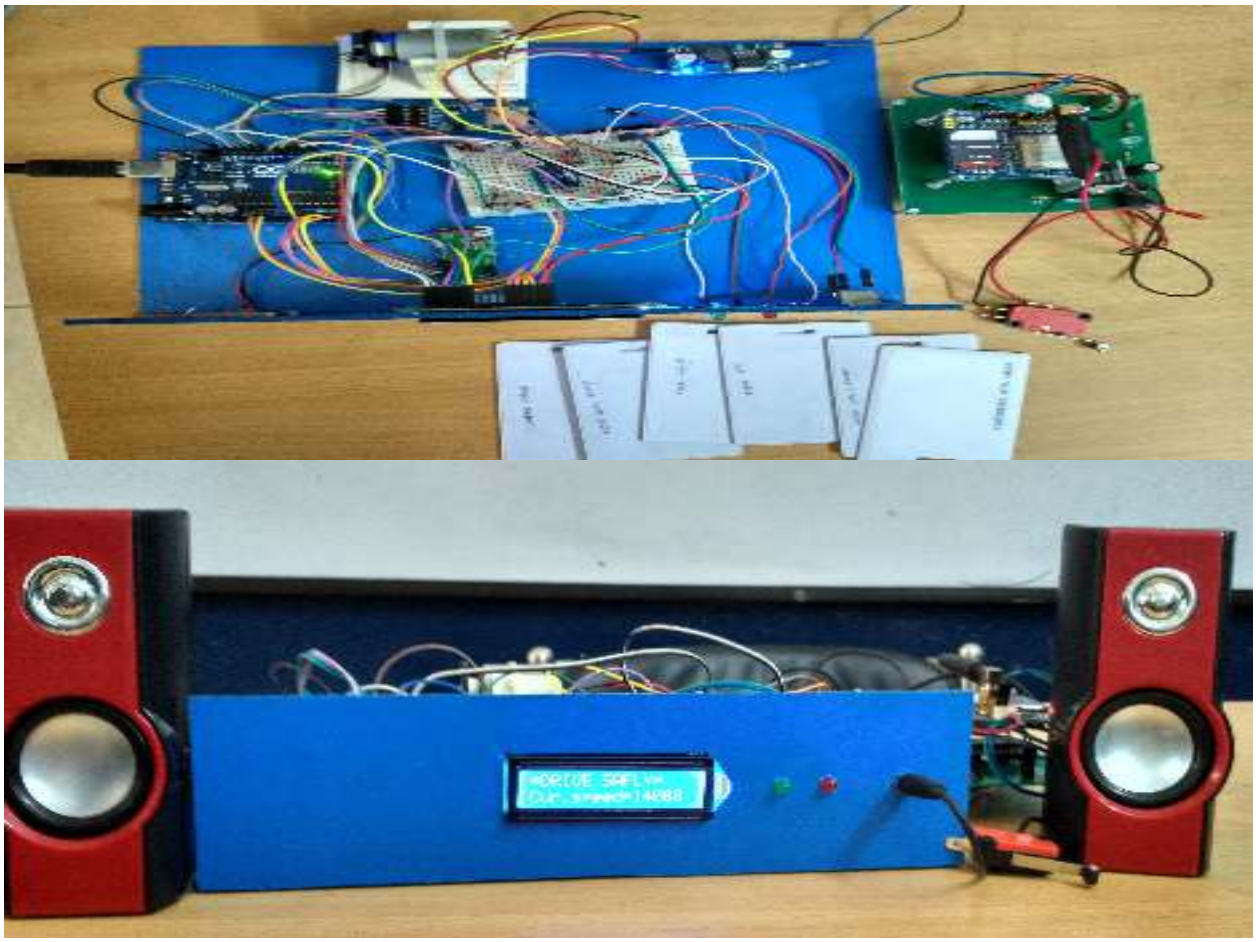

Fig: 4.5 Smart highway system

4.8 Photo of Implementation (Accident Spot Can Be Detected By GSM On SMS Services).

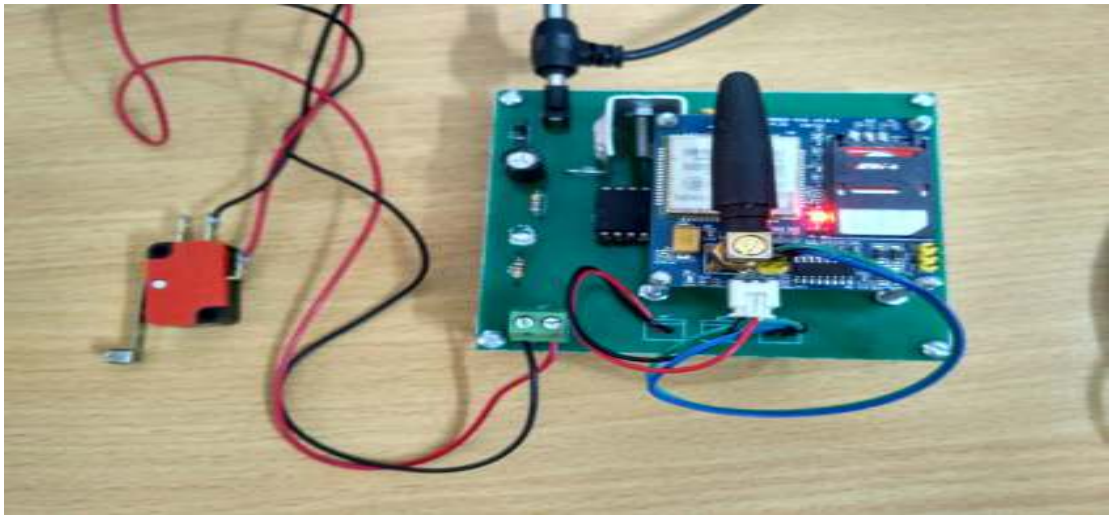

Fig. 4.6 GSM with crash sensoe

4.9 Cost of Smart Highway Project.

Description of Materials	Quantity	Unit Price	Total Price
Arduino UNO	01 Nos	470	470
ATMEGA32 AVR microcontroller	01 Nos	180	180
Infrared Speed Sensor	01 Nos	180	180
RDM6300 RFID module	01 Nos	490	490
Sound card module for arduino	01 Nos	140	140
SIM900a GSM module	01 Nos	2250	2250
Crash SENSOR	01 Nos	15	15
LCD 16*2	01 Nos	200	200
Power adapter	01 Nos	160	160
Connector	18 Nos	8	144
PCB	01 Nos	360	360
Bread Bord	01 Nos	120	120
Speaker	01 Nos	20	20
		Total Taka=	5339

CHAPTER -05

TESTING AND PERFORMANCE OF SMART HIGHWAY

5.1 GSM System Work When Accident Has Occurred (Accident Spot Can Be Detected By GSM on SMS)

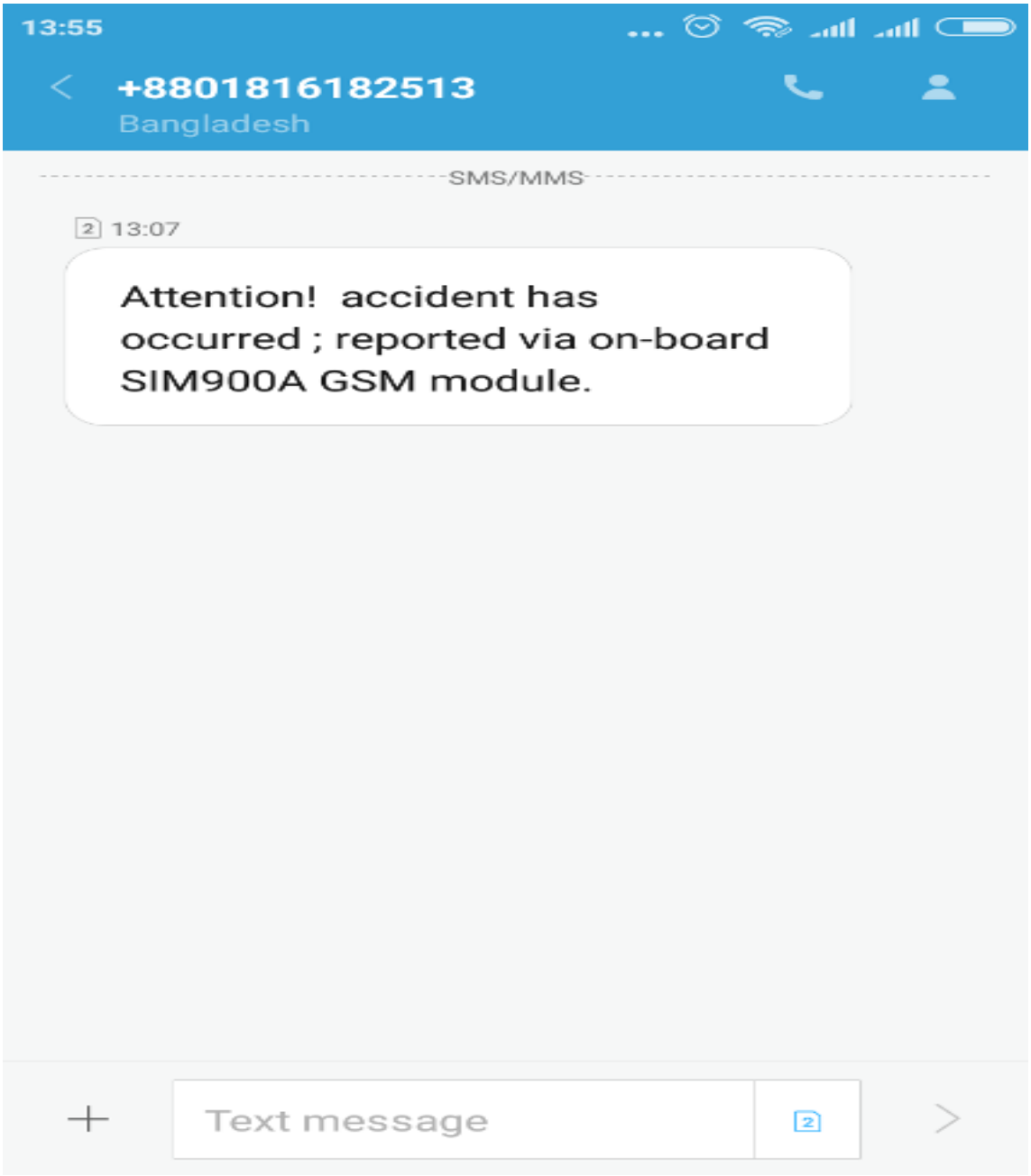

Fig: 5.1 SMS Report

5.2 RFID Detect On Limited Speed Area and give output (Display, Indicator Lamp & Speaker)

Fig: 5.2 Speed Limit Area

5.3 RFID Detect Over Speed and give output (Display, Indicator Lamp & Speaker)

Fig: 5.3 Over Speed

5.4 RFID Detect Normal Speed and give output (Display, Indicator Lamp & Speaker)

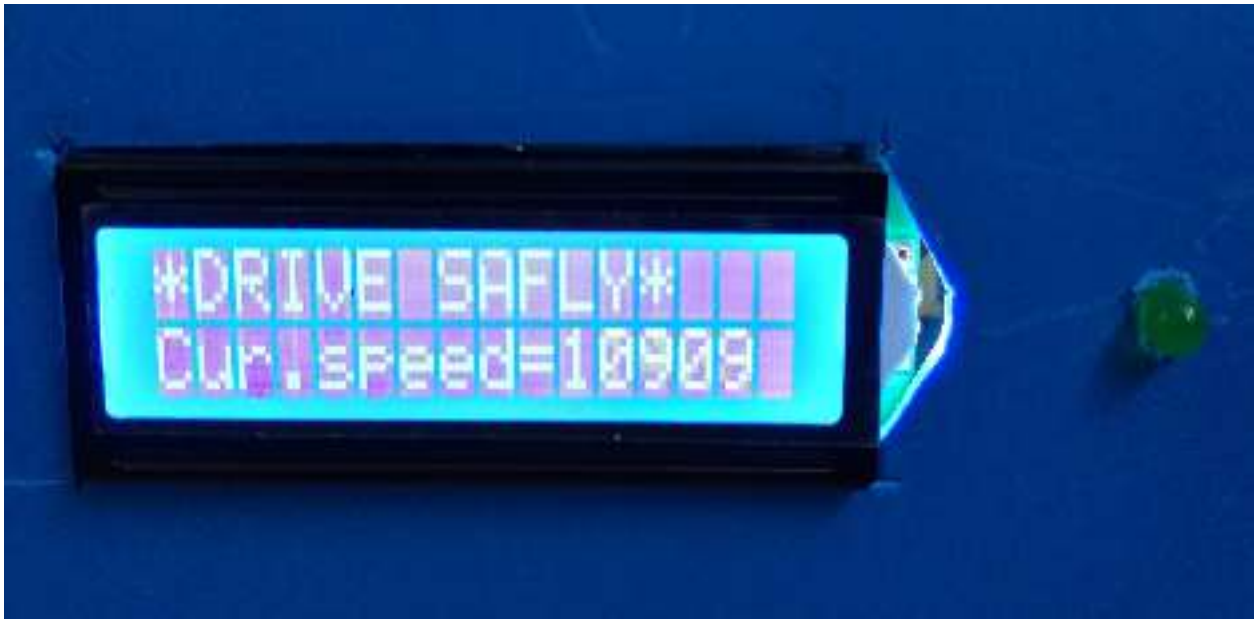

Fig:-5.4: Normal Speed

5.5 RFID Detect Left Turn and give output (Display, Indicator Lamp & Speaker)

Fig:- 5.5 Left Turn

5.6 RFID Detect Right Turn and give output (Display, Indicator Lamp & Speaker)

Fig: 5.6: Right Turn

CHAPTER -06

CONCLUSION

6.1 Conclusion.

After Performing RFID and GSM Based Smart High-way Project Conclude That This Project Reduced Accident, Save Time, Money, Fuel. Rates Because Of It's Totally Automatic. This Project Also Provide SMS For Any Kind Of Car Crash. Provide This Massage Nearest Police Station And Car Owner. Over Speed Or Speed Barker Or Any Kind Of Rode Status Provide All Information Display, Indicator Light And Sound.

6.2 Limitation.

There are so many limitations in our project. Due to short time of our project work, we were unable to design a sustainable and efficient circuit. But we tries our best. The main limitation of our project are....

1. This project use passive RFID Tag, not avabible Active Tag in Market.
2. High Speed Car Canot Work Passive RFID Tag.

6.3 Future Extensions.

Here is some scope to research more on our project.

1. Using Electronic fuel control system to control Car Speed.
2. Using Electro-Hydraulic Breaking System to control car speed.
3. Using Active RFID Tag to get Better Result.

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The End