1.1 Overview

In the urban life transportation is very common. A lot of mishappenings occur on the road every day .Therefore the need of security and monitoring is developed .To resolve such problems, a system is developed using GPS and GSM technologies and an application is introduced in the research work. The ability to accurately detect a vehicle location and its status is the main goal of automobile trajectory monitoring systems.& also The high demand of automobiles has also increased the traffic hazards and the road accidents. With the rapid development of technology the need arises to develop an information system which can be used in constructing a system works on a wide geographical area depends mainly on GPS, such systems can be useful for many application such as tracking systems ,chasing systems, anti theft systems, and traffic monitoring systems Imagine if all vehicles in the world provided with GPS-GSM system and all of applications integrated in one huge system.

The main intention of the research is to find the accident spot at any place and intimating it to ambulance through the GPS and GSM networks. The based vehicle accident identification module contains ultrasonic sensor ,GSM module and a GPS connected by microcontroller, Global system for mobiles (GSM) technology is used to establish cellular connection GPS is one of the technologies that are used in a huge number of applications today. Tracking system is very important in modern world. can be useful in soldier 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). The research 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 in regular phone In research the efficient detection of vehicle location is the major goal and system is implemented using so many advanced technologies: GPS, GSM and Google Earth information .

1.2 Background

The Research is Suggests design of an accident avoidance by using sensors

Example ultrasonic to determine of object and alarm to driver ,pressure sensor to detected fail tires, speed sensor to control of speed car , crash sensor detected the accident.

vehicle location is determined by using a Global Positioning System (GPS) device to send SMS to ambulance, and the transmission mechanism of the data is a satellite, terrestrial radio or cellular connection from the vehicle to a receiving satellite, radio receiver, or near by cell tower.

1.3 Problem Statement

As the large number of accident occurs today And increased the number of the Victims the human being and increase the number of accident

1.4 Objectives

Main objective in to design an accident avoidance system that can be easily installed in car to achieve the objective:

1- control system will be proposed using microcontroller along with GPS and GSM.

2- the proposed system will be simulated in order to check the performance.

3- an algorithm to detect the reset station to send the report will be written.
4- performance evolution for the proposed system will be run.
5- the system should satisfy the report sending issue in case of failure of accident avoidance.

Implementing vehicle location system by using the information from GPS and GSM/GPRS by transforming information with following features:

1- Obtaining the information of the vehicle after every specified time interval.
2- Transmission of location information to monitoring or tracking server.

Implementing a display unit by using Google earth to display vehicle location in the map**.**

1.5 Methodology

System in divided into two part (avoidance & reporting system*)*

Avoidance: The Avoidance consists of five basic parts Pressure, speed, crash and ultrasonic sensors. the pressure sensor is determine case tires and alarm the driver to check fail , speed sensor use control breaks if the speed car more increase ,crash sensor to detected accident and ultrasonic sensor to detected an object to alarm driver.

The produce:

The proximity sensor send signal in the shape of fixed time pulse and then wait for the reflection of it . the proximity sensor send the received signal to the microcontroller according to this to the speed of the car and the time taken for the signal rebound and in this way distance can be counted. If the distance is critical microcontroller send a signal to the warning device to tell the driver to take care.

1.6 Research outline

The main goals of research to design model, which requires less power with less complex in structure, easy to implement. the research to aim Vehicle tracking system is the technology used to determine the location of a vehicle using different methods like GPS, GSM and other radio navigation systems operating through satellites and ground based stations and send information SMS to ambulance**.**

Research will contain six chapters as follows:

Chapter one Introduction which explain the problem statement along with the proposed solution and the objectives of the research

Chapter two Literature review highlight the main parts of the system and shows the previous systems

Chapter three System design explain the working principle of the system.

Chapter four the flowchart of the software program.

Chapter five Simulation results and analysis highlight several simulation result and discuss the obtained result

Chapter six **C**onclusion, recommendation summarized the work done in the thesis and suggest several recommendation for future work

2.1 Previous work

Vehicle telemetric is the use of computing, sensing and telecommunication technologies to provide services in an automotive environment. Vehicle telemetric service categories include navigation, remote diagnostics, fleet management, safety, information access, context awareness and mobile commerce. Supporting the services requires unique hardware and software architectures. Additionally, issues such as privacy, data security and human factors design must be considered in the implementation of vehicle telemetric services. The following sections summarize current work and research in the field of vehicle telemetric.

Road system involve a number of diverse technologies, and knowledge of a vehicle location lies at the heart of many services (e.g., route guidance and emergency response).

In Japan, research efforts in real time automobile route guidance were begun in the 1970‟s with the goal of reducing traffic congestion.

the number of traffic accidents by providing drivers with real-time traffic information, route guidance, electronic toll collection, advanced vehicle collision avoidance systems, and automatic notification to authorities in the event of a traffic emergency.

Many researchers have proposed the use of cutting edge technologies to served the target of vehicle tracking. The technology include :Communication ,remote Control, GPS, GIS, server systems and others.

When an accident occurs the information only is send through GSM but there is no possibility to locate the spot .Various solutions to the accident avoidance problems suggested to use technology GSP and GSM to alarm driver of the car .

Automobile safety is the study practice of design, construction, equipment and regulation to minimize the occurrence and consequences of automobile accidents. Road traffic safety more broadly includes roadway design. The main conclusion the crucial importance of seat belts and padded dashboards. The primary vector of traffic-related deaths and injuries is the disproportionate mass and velocity of an automobile compared to that of the predominant victim the pedestrian Distraction as a contributing factor in 22% of car crashes and 71% of truck crashes in naturalistic driving studies.

Using a mobile phone whilst driving is highly distracting and increases your risk of a crash four-fold. the dangers and illegality, approximately 25% of drivers reported using their hand-held mobile phone on a daily basis to answer or make calls, as well as read text messages, while 14% reported using their hand-held phone to send a text message on a daily basis .The significant rise in use of cellular phone leads to increase in road accidents due to use of cell phone while driving, still no research has been carried out to find the number of drivers using cell phone involved in road accident and very limited efforts has been carried out to prevent accident due to cell phone usage.

research sends emergency message to the rescue teams and surrounding people to save the life of victims. Human lives can be saved from an accident by detecting an accident before it occurs. there are several works regarding pre crash detection& avoidance system obstacle. the system is unable to avoid accident then our system has accident detection technique with point location tracking using GSM and GPS The studies solves the issues like automatic speed control mechanism, accident detection and information sending. conclude that system reduce the accidents and save the human lives Real-time tracking and management of vehicles has been a field of interest for many researchers and a lot of research work has been done for tracking system.

The research also provides information regarding the vehicle status such as speed, mileage.

[1] Fleischer, P.B.; Nelson et al describes development and deployment of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle Tracking and Alert System. This system allows inter-city transport companies to track their vehicles in real-time and provides security from armed robbery and accident occurrences.

[2] Le-Tien, T.; Vu Phung describes a system based on the Global Positioning System (GPS) and Global System for Mobile Communication (GSM). It describes the practical model for routing and tracking with mobile vehicle in a large area outdoor environment .

The system will acquire positions of the vehicle via GPS receiver and then sends the data to supervised center by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The supervised center comprises of a development kit that supports GSM techniques-WMP100 of the Wavecom Company. Finally, the position of the mobile vehicle will be displayed on Google Map.

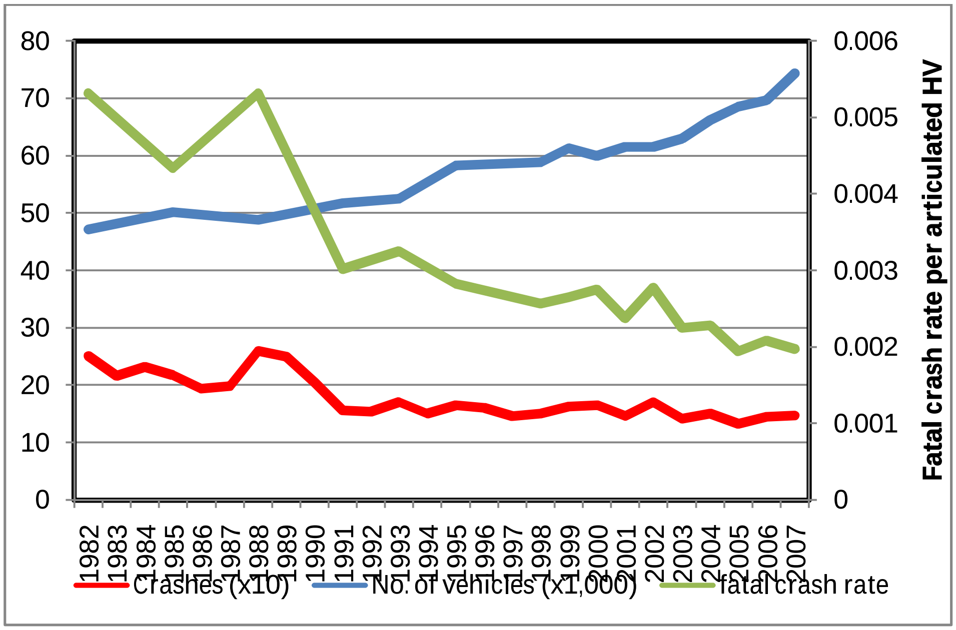
Syedul Amin Jalil et al. (2012) in research author referred research in our research GPS Play an important role in the vehicle system. GPS always monitors the speed of the vehicle. If accidental porn is occurring then, GPS sends the location of the accident with some predefined message body of the alert system or to the concern person.

Sri Krishna Catania Varma et al. (2013) authors demonstrates the accident detection and alert system using GPS and GSM system. He prepares a survey report that shows an porn occur because of the various things.

Authors decides to nullify the accidental situation because it is difficult to track the accidental situation in the rural area.

Figure (2.1) depicts the trends in heavy vehicle safety observed from 1982 to 2007. The red line shows that articulated heavy vehicle fatal crash numbers have remained relatively constant since 1991. However, considering the increase in the number of articulated heavy vehicles (the blue line) it is clear that road safety gains have been achieved despite increased exposure. This can be observed with the success of B-doubles, which carry almost 50% of the freight task and account for less than 30% of heavy vehicle crashes, compared to semi-trailers that account for 60% of heavy vehicle crashes and carry around 40% of the freight task.

The most significant gains in heavy vehicle road safety over this period are attributable to mass road safety initiatives that have improved safety for all road users, particularly improvements to the road network (including divided highways and sealed shoulders), reduced speed limits, and improvements in vehicle design. Heavy vehicle specific measures that have likely contributed to further safety gains include the introduction of fatigue management procedures and regulations, and safety accreditation. research scan is intended to develop a knowledge base that may be used to guide the strategic direction and development of effective outcomes in the area of heavy vehicle safety.



Figure(2.1) fatal crash rate per articulated Heavy vehicle

2.2 Safe systems approach

Many leading road safety countries are now using a systems based approach to road safety. In Australia, the Safe Systems approach has been adopted in the upcoming National Road Safety Strategy and has been adopted by road authorities in each state and territory.

The approach takes a global view of road safety and considers the interaction between people, the road environment and vehicles. The key principles of the Safe System approach includes the following:

1- Human Factors: acceptance that people make mistakes and that the road system should accommodate these mistakes when crashes occur.

2- Human Frailty: the human body can only tolerate a certain amount of force before serious injury or a fatality can be expected in a crash.

3- Forgiving Designs: the roads that we travel on, the vehicles we travel in and the speeds that we travel at need to be more forgiving of errors by road users.

Shared responsibility: everyone has a responsibility to use the road safely and professionals have a responsibility to design, manage and encourage the safe use of the transport system.

2.3 Heavy vehicle crashes

the characteristics of heavy vehicle crashes, including the causal factors, and factors that contribute to the death or injury of the people involved. For example, not wearing a seat belt will not of itself cause a crash however, failure to do so greatly increases the risk of injury or death in a crash. The most commonly researched factors with regard to heavy vehicle crashes are speed, driver factors (such as fatigue, substance use, attitudes, etc.), seat belt use, infrastructure (e.g., road design, condition, and alignment), vehicle factors (e.g., mechanical condition, type, load, and configuration), and issues related to vehicle control. Research regarding heavy vehicle crashes **.**

2.3.1 Factors related to crash causation and/or driver injury or fatality

Author : Brodie, Bugeja, & Ibrahim (2009) Type Journal article Availability Public Research Review of Coroners' files of heavy vehicle driver fatalities

Factors, Speed Excessive or inappropriate speed, Driver Substance use, Seatbelts Non-use of restraints, Infrastructure, Vehicle, Control issues Leaving road out of control.

Author : Brodie, Bugeja, & Ibrahim 2010 Research Examination of Coroners' recommendations on fatal heavy vehicle crashes. Factors Infrastructure Comments to address road environment factors.

Author: Driscoll (2011) type NTI Major accident investigation report Research A review of heavy truck crashes with an aggregate cost greater than $50,000 managed by the National Claims Centre of the NTI.

Factors Speed: 32% of incidents could be attributed to inappropriate speed Driver The number of Fatigue related crashes reduced by 50% ,Vehicle B-doubles carry 46% of the freight task and account for around 30% of all major truck crashes. Semi-trailers were involved in 60% of major crashes but. 0ther: 70% of crashes involved no other vehicle.

In fatal crashes involving another vehicle the other driver was determined to be at fault in 82% of incidents. A 27% reduction in serious truck crashes since 2002 was reportedoutlines research relevant to the design of roads and infrastructure that have important safety implications for heavy vehicles. Some of the key findings from this research include:

1- Road design and infrastructure could be improved to better accommodate heavy vehicles, particularly along freight routes.
2- Road design should consider factors such as horizontal alignment and the impact of heavy vehicles on the road surface.
3- Simple measures such as sealing shoulders along freight routes are a cost-effective means of improving safety.
4- The use of truck climbing lanes and lane restrictions for heavy vehicles provide some safety benefits without major disruptions to overall traffic flow.

2.3.2 Road and infrastructure design implications for heavy vehicle safety

Authors: Rumar, Sivak, Traube, &Miyokawa (1999)) Type UMTRI report Research Examination of the visibility of retro reflective pavement markings from trucks and cars Findings Higher mounted headlights increased the distance of detection, implying that such pavement markings are more visible to truck drivers than car drivers.

Authors :Alvarez (2007) Type FMCSA Tech brief Research A synthesis of literature regarding heavy vehicle interactions with highways Findings Where steep upgrades reduce truck speed by16km/h, truck climbing lanes should be considered. Long steep downgrades may lead to overheated brakes and a reduced ability to decelerate.

The height of heavy vehicles can obscure highway signs to other road users. The has been overcome by including advance warning signs, and placement of signs overhead and on both sides of highways. Yellow light and red light clearance timing at light controlled intersections is an important consideration for trucks.

3.1 Microcontroller

Microcontroller is a computer on a chip that is programmed to perform almost any control, sequencing, monitoring and display the function. Because of its relatively low cost, it becomes the natural choice to the designer. Microcontroller is designed to be all of that in one. Its great advantage is no other external components are needed for its application because all necessary peripherals are already built into it. Thus, we can save the time, space and cost which is needed to construct low cost devices .

Even at a time when Intel presented the first microprocessor with the 4004 there was already a demand for microcontrollers: The contemporary TMS1802 from Texas Instruments, designed for usage in calculators, was by the end of 1971 advertised for applications in cash registers, watches and measuring instruments. The TMS 1000, which was introduced in 1974, already included RAM, ROM, and I/O on-chip and can be seen as one of the first microcontrollers, even though it was called a microcomputer.

The first controllers to gain really widespread use were the Intel 8048, which was integrated into PC keyboards, and its successor, the Intel 8051, as well as the 68HCxx series of microcontrollers from Motorola.

Today, microcontroller production counts are in the billions per year, and the controllers are integrated into many appliances we have grown used like to:

1. household appliances (microwave, washing machine, coffee machine, . . .)
2. telecommunication (mobile phones)
3. automotive industry (fuel injection, ABS,. . .)
4. aerospace industry
5. industrial automation

3.2 the program

Proteus ist ein Softwarepaket für den computerunterstützten Entwurf, Simulation und Design elektronischer Schaltungen. Es besteht aus zwei Hauptteilen, dem ISIS, die Schaltungsentwurfsumgebung, welches auch die den Simulator VSM beinhaltet, und dem ARES den Leiterplatten Designer. Entwickler und Hersteller ist die Firma Labcenter Electronics.

Intelligent Schematic Input System(ISIS): ISIS lies right at the heart of the proteus system and is far more than just another schematic package. It has powerful environment to control most aspects of the drawing appearance. whether your requirement is the rapid entry of complex design for simulation & PCB layout, Or the creation of attractive Schematic for publication **ISIS** is the right

VSM (Virtual System Modelling): Proteus VSM is an extension of the PROSPICE simulator that facilities co-simulation of microprocessor based design including all the associated electronics. Furthermore, you can interact with the microcontroller software through the use of animated keypads, switches, buttons, LEDs, lamps and even LCD displays.

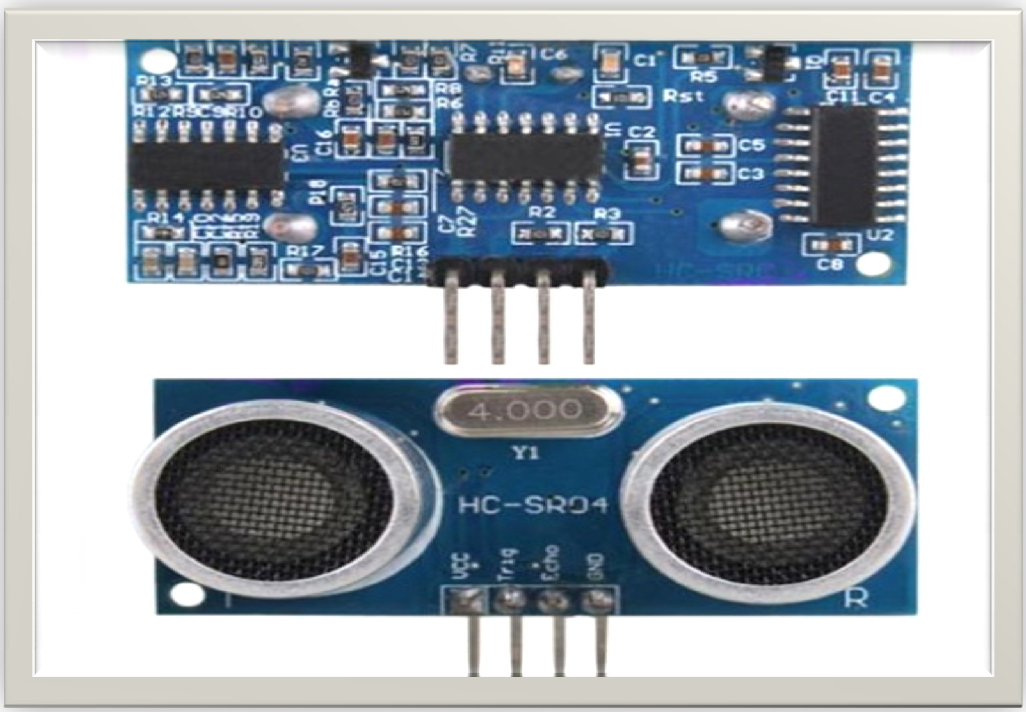
3.3 Ultrasonic Distance Sensor

The human ear can hear sound frequency around 20HZ ~ 20KHZ, and ultrasonic is the sound wave beyond the human ability of 20KHZ .

Ultrasonic sensors (also known as transceivers when they both send and receive, but more generally called transducers) work on a principle similar to radar or sonar, which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively**.** Active ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions.

3.3.1 Communication Protocol

sensor detects objects by emitting a short ultrasonic burst and then "listening" for the echo. Under control of a host microcontroller (trigger pulse), the sensor emits a short 40 kHz (ultrasonic) burst. This burst travels through the air, hits an object and then bounces back to the sensor. sensor provides an output pulse to the host that will terminate when the echo is detected, hence the width of this pulse corresponds to the distance to the target.

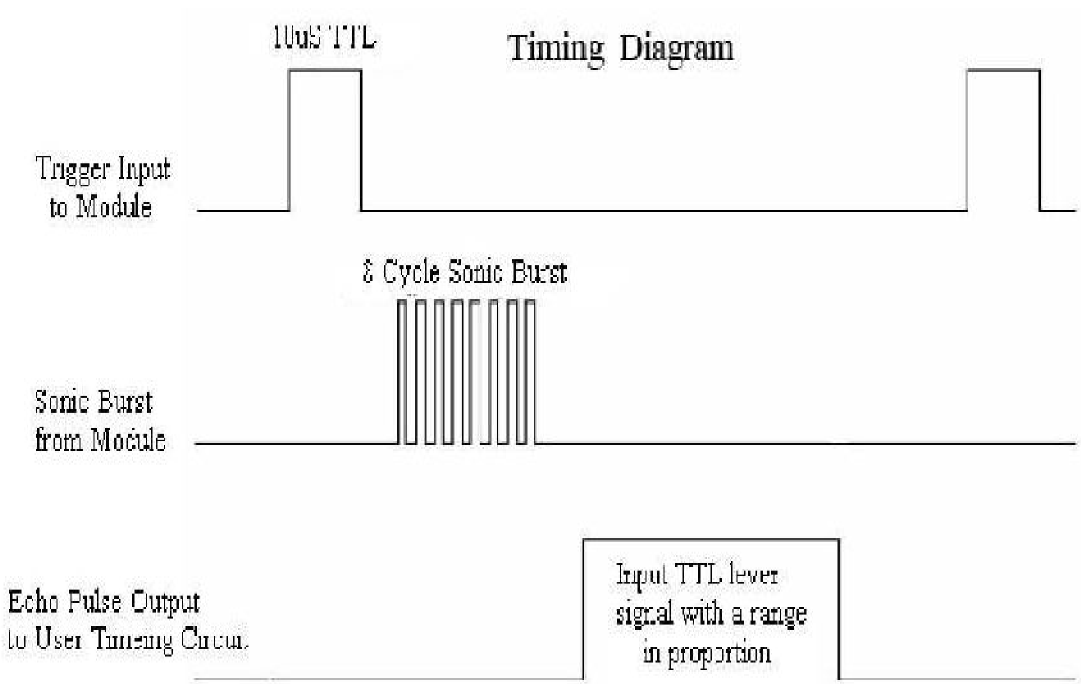


Vcc Trig Echo GND

Figure 3.2 ultrasonic sensor

3.3.2 Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



3.3.3 work of sensor

Figure 3.4 shows how the sensor send; a brief chirp with its ultrasonic speaker and makes it possible for the BASIC Stamp to measure the time it takes the echo to return to its ultrasonic microphone. The BASIC Stamp starts by sending the sensor a pulse to start the measurement. Then, the sensor waits long enough for the BASIC Stamp program to start a PULSIN command. At the same time the sensor chirps its 40 kHz tone, it sends a high signal to the BASIC Stamp. When the sensor detects the echo with its ultrasonic microphone, it changes that high signal back to low.

The BASIC Stamp's PULSIN command stores how long the high signal from the sensor lasted in a variable. The time measurement is how long it took sound to travel to the object and back. With this measurement, you can then use the speed of sound in air to make your program calculate the object's distance in centimeters, inches, feet.

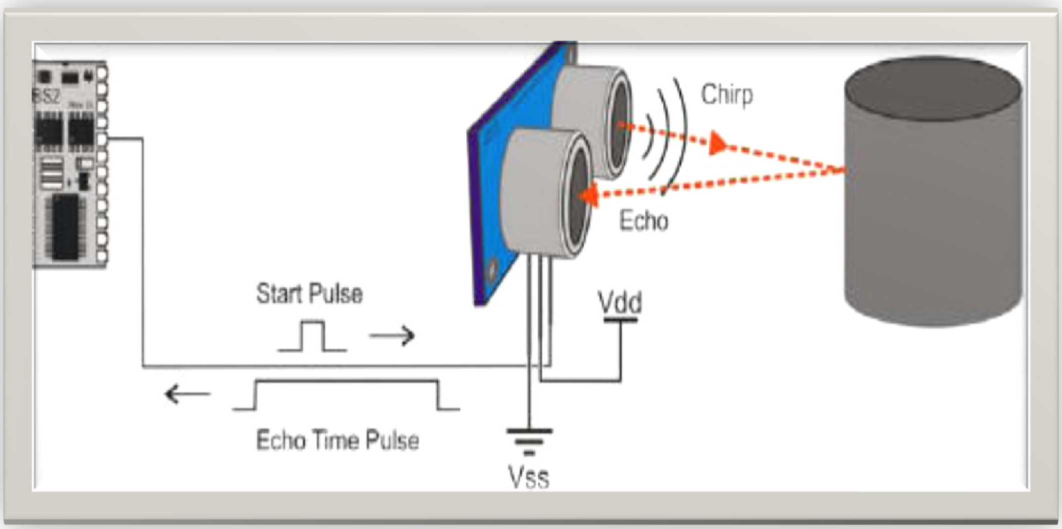


Figure 3.4 how work sensor

Ultrasonic transmitter emitted an ultrasonic wave in one direction, and started timing when it launched. Ultrasonic spread in the air, and would return immediately when it encountered obstacles on the way. At last, the ultrasonic receiver would stop timing when it received the reflected wave.

As Ultrasonic spread velocity is 340m / s in the air, based on the timer record t, we can calculate the distance (s) between the obstacle and transmitter, namely: s = 340t / 2, which is so- called time difference distance measurement principle The principle of ultrasonic distance measurement used the already-known air spreading velocity, measuring the time from launch to reflection when it encountered obstacle, and then calculate the distance between the transmitter and the obstacle according to the time and the velocity. Thus, the principle of ultrasonic distance measurement is the same with radar. Distance Measurement formula is expressed as: L = C X T In the formula, L is the measured distance, and C is the ultrasonic spreading velocity in air, also, T represents time (T is half the time value from transmitting to receiving).

3.4 Pressure sensor

The module of pressure sensor (KP219N3621) is a miniaturized Analog Manifold Air Pressure Sensor .IC based on a capacitive principle. It is surface micro machined with a monolithic integrated signal conditioning circuit imply mended in Bi CMOS technology. The sensor converts a pressure into an analog output signal. The calibrated transfer function converts a pressure of 15 kPa to 102 kPa into a voltage range of 0.25 V to 4.95 V.

The chip is packaged in a “green” SMD housing. The sensor has been primarily developed for measuring manifold air pressure, but can also be used in other application fields. The high accuracy and the high sensitivity of the device makes it a perfect fit for advanced automotive applications as well as in industrial and consumer applications.

3.5 Crash sensor

An impact sensor is also called a crash sensor. It collects data that is required to make the necessary decisions about deployment of the air bags in the passenger cabin. An impact sensor measures the speed at which a vehicle is slowing down in case of a frontal crash/ how it accelerates to one side in case of a side-impact crash. Certain vehicles are outfitted with a special impact sensor system that is specifically-designed to detect a potential roll-over crash.

A frontal impact sensor might be positioned right at the front of the car, near the engine, within the passenger compartment**.** The triple-axis sensing element enables shock measurement in all direction.

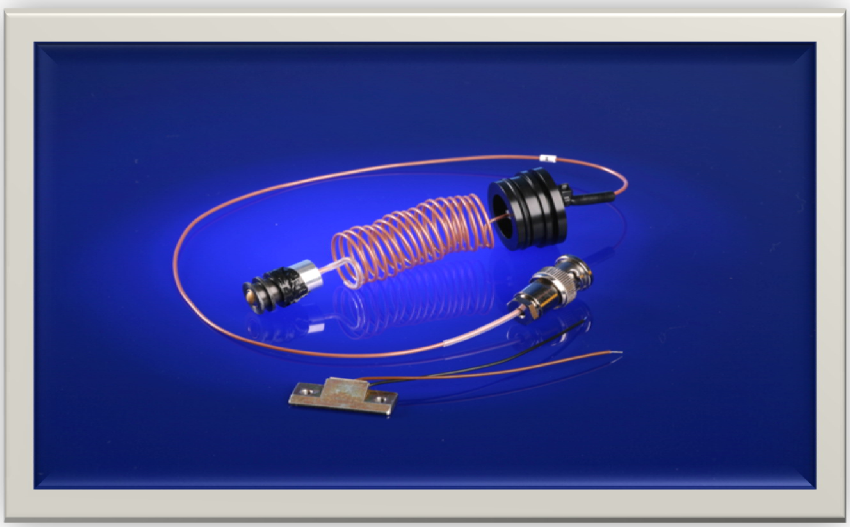


Figure 3.6 crash sensor

3.6 Sensor of speed

The anti-lock brake system (ABS) wheel speed sensor monitors the rotational speed of the wheel and transmits this data to the ABS control module.

3.6.1 Wheel speed sensors in motor vehicles Importance of wheel speed sensors

The increasing complexity of road traffic makes great demands on drivers. Driver assistance systems relieve drivers and optimize safety on the road. Therefore, modern driver assistance systems are part of the standard equipment in almost all new cars in Europe and pose new challenges for garages. Vehicle electronics today play a key role in all comfort and safety features. The optimal interaction of complex electronic systems ensures fault-free function of the vehicle and thus improves traffic safety. The intelligent data communication of the electronic vehicle systems is supported by sensors. In relation to driving safety, wheel speed sensors are of particular importance and are used in numerous applications in various vehicle systems.In driver assistance systems such as ABS, TCS, ESP or ACC, motor control units use these sensors to determine the wheel speed. Via data lines, the wheel speed information from the Anti-Lock Brake System (ABS) is also provided to other systems (engine management, gearbox and chassis control systems and navigation systems.

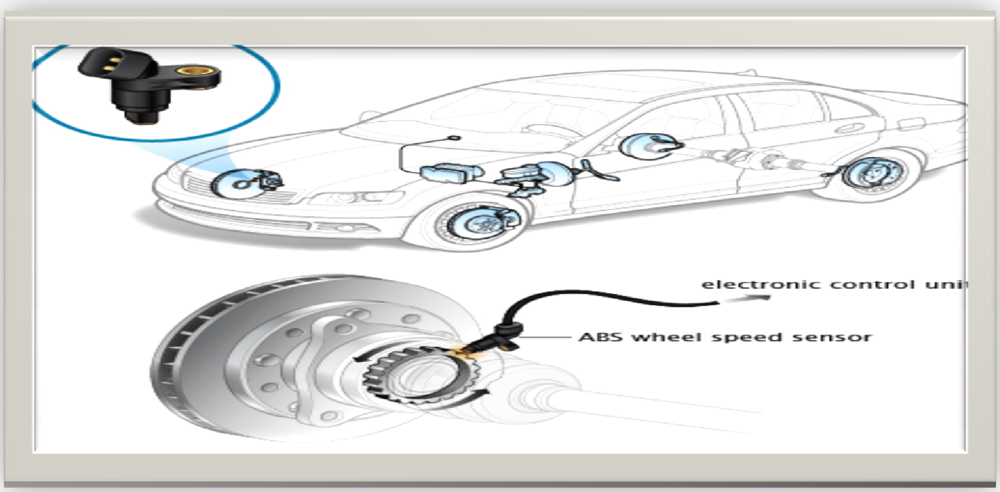


Figure 3.7 ABS wheel speed sensor

3.7 Liquid Crystal Display (LCD)

A 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.

A 16x2LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each 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**.** A 16x2 LCD is used for displaying location values. A 5v battery is used to power up the circuit**.**

3.8 The Global Positioning System (GPS)

The Sky Nav SKM58 Series with embedded GPS antenna enables high performance navigation in the most stringent applications and solid fix even in harsh GPS visibility environments. It is based on the high performance features of the Media Tek 3329 single-chip architecture, Its 165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The 6-pin UART connector design is the easiest and convenient solution to be embedded in a portable device and receiver like PND, GPS mouse, car holder, personal locator, speed camera detector and vehicle locator

3.8.1 NMEA 0183 Protocol

The NMEA protocol is an ASCII-based protocol, Records start with a $ and with carriage return/line feed .GPS specific messages all start with $GPxxx where xxx is a three-letter identifier of the message data that follows. NMEA messages have a checksum, which allows detection of corrupted data transfers. The Sky Nav SKG12A supports the following NMEA-0183 messages: GGA, GLL, GSA, GSV, RMCVTG, ZDA. The module default NMEA-0183 output is set up GGA、GSA、RMC、GSV , and default baud rate is set up 9600bps.

Table 3.4 NMEA-0183 Output Messages

NMEA Record	Description	Default
GGA	Global positioning system fixed data	Y
GLL	Geographic position – latitude/longitude	N
GSA	GNSS DOP and active satellites	Y
GSV	GNSS satellites in view	Y
RMC	Recommended minimum specific GNSS data	Y
VTG	Course over ground and ground speed	N
ZDA	Date and Time	N

3.9 Global System for Mobile Communication (GSM)

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

GSM (Global System for Mobile) / GPRS (General Packet Radio Service) TTL –Modem is SIM900 Quad-band GSM / GPRS device, works on frequencies 850 MHZ, 900 MHZ, 1800 MHZ and 1900 MHZ. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051, etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600- 115200 bps through AT (Attention) commands. This GSM/GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface.

The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).

3.9.1 SIM Com SIM900A GSM Module:

actual SIM900 GSM module which is manufactured by SIM Com. Designed for global market, SIM900 is a quad-band GSM/GPRS engine that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS

1900MHz. SIM900 features GPRS multi slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24mm x 24mm x 3mm, SIM900 can meet almost all the space requirements in User's applications, such as M2M, smart phone, PDA and other mobile devices.

3.9.2 RXD, TXD and GND pins (JP2):

pins are used to connect devices which needs to be connected to GSM module through USART (Universal Synchronous Asynchronous Receiver and Transmitter) communication. Devices may be like Desktop or Laptop Computer System, Microcontrollers, etc. RXD (Receive Data) should be connected to TXD (Transmit Data) of other device and vice versa, where as GND (Ground) should be connected to other device's GND pin to make ground common for both systems.

3.9.3 Principle the GSM system works

In various countries the frequency bandwidths specified for the GSM services are GSM-400, GSM-800, GSM-900, GSM-1800 and GSM-R. The GSM-900 and the GSM-1800 are the most widely used frequency bandwidths in different parts of the globe.

The GSM-900 has a down link frequency range of 935-960 MHz and an up link frequency of range of 895-915 MH z. the frequency band is partitioned into 124 pairs of simplex channels with separation of 200KHz.A particular range of simplex channels is given to a particular network provider.

The type of interface used in GSM is digital air interface. The analogue voice signals are converted to digital signals before transmission. Up to 8 MS subscribers can be handled by the GSM RF carrier at a time. The rate of transmission is 270 Kbps.

The Gaussian minimum shift keying (GMSK) is used for transmitting the digital signals. In GMSK , a phase change represents the change from a digital “1 ” or a “0 “,occurs over a period of time. The addition of high frequency components to the spectrum is reduced .In GSMK ,the phase change is not constant and it is spread- out

3.9.4 Commonly used commands for a GSM module

GSM module to send SMS and make call and other things this command is called AT command as flow.

1- **AT -** This command is used to check communication between the module and the computer. AT tention, used to start a command line.

For example,

AT

OK

The command returns a result code OK if the computer (serial port) and module are connected properly. If any of module or SIM is not working, it would return a result code ERROR.

2- **+CMGF -** This command is used to set the SMS mode. Either text or PDU mode can be selected by assigning 1 or 0 in the command.

SYNTAX: AT+CMGF=<mode>

0: for PDU mode

1: for text mode

The text mode of SMS is easier to operate but it allows limited features of SMS. The PDU (protocol data unit) allows more access to SMS services but the operator requires bit level knowledge of TPDUs. The headers and body of SMS are accessed in hex format in PDU mode so it allows availing more features.

For example,

AT+CMGF=1

OK

3- **+CMGW -** This command is used to store message in the SIM.

SYNTAX: AT+CMGW=" Phone number">*Message to be stored* Ctrl+z

As one types AT+CMGW and phone number, '>' sign appears on next line where one can type the message. Multiple line messages can be typed in this case. This is why the message is terminated by providing a 'Ctrl+z' combination. As Ctrl+z is pressed, the following information response is displayed on the screen.

+CMGW: Number on which message has been stored

4- **+CMGS -** This command is used to send a SMS message to a phone number.

SYNTAX: AT+CMGS= serial number of message to be send.

As the command AT+CMGS and serial number of message are entered,

SMS is sent to the particular SIM.

For example,

AT+CMGS=1

OK

5- **ATD -** This command is used to dial or call a number.

SYNTAX: ATD< Phone number> (Enter)

For example,

ATD123456789

6- **ATA -** This command is used to answer a call. An incoming call is indicated by a message 'RING' which is repeated for every ring of the call. When the call ends 'NO CARRIER' is displayed on the screen.

SYNTAX: ATA(Enter)

As ATA followed by enter key is pressed, incoming call is answered.

For example,

RING

RING

ATA

7- **ATH -** This command is used to disconnect remote user link with the GSM module.

SYNTAX: ATH (Enter).

4.1 Overview

The stimulator has been designed to avoided crash car and report the car by sending an SMS massage. During the design of sensors distance meter, impact, Pressure, GPS, and speed meter and report the car by SMS. figure (4.1) below show the block diagram.

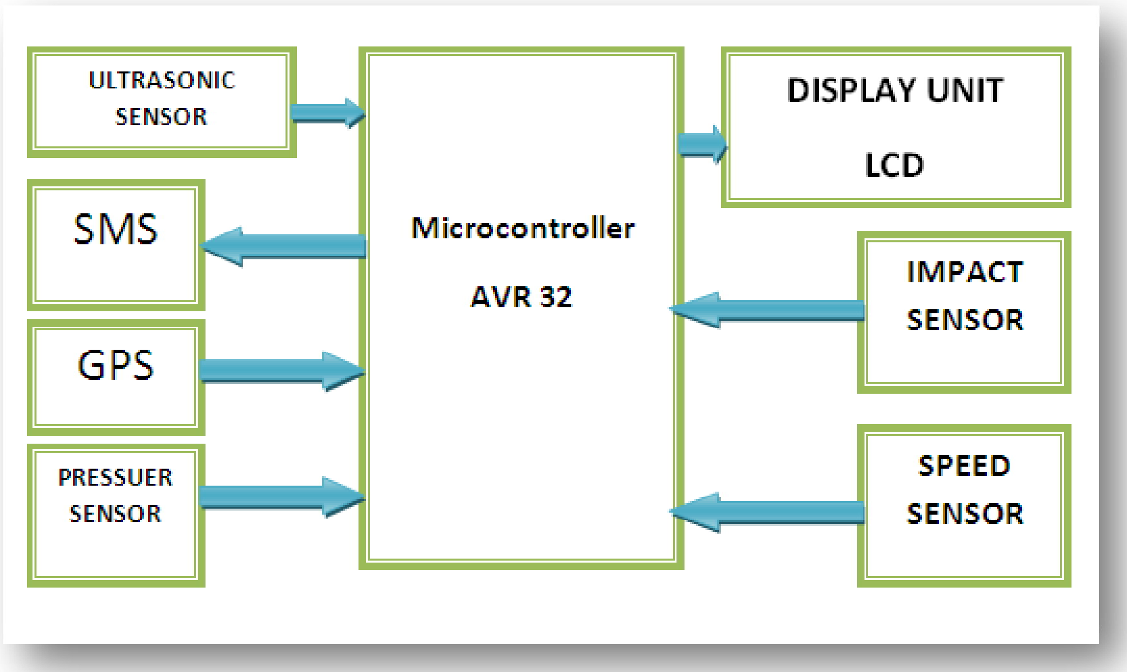


Figure (4.1) block diagram of avoidance crash car and report Device.

The design has been divided into two parts Department avoidance and Department of reporting.

4.2 Avoidance part

The section consists of five basic parts Pressure, speed,impact, GPS,and ultrasonic sensors.

4.2.1Crash sensor

Sensor works on measuring and sensing the crash with the amount Sensor is variable resister change its values depending on the amount of pressure resulting from the crash. Output in this Sensor is analog value depends on the amount of pressure, and converted into digital, decision is made to send a message or not and all this through microcontrollers show Figure (4.2) below.

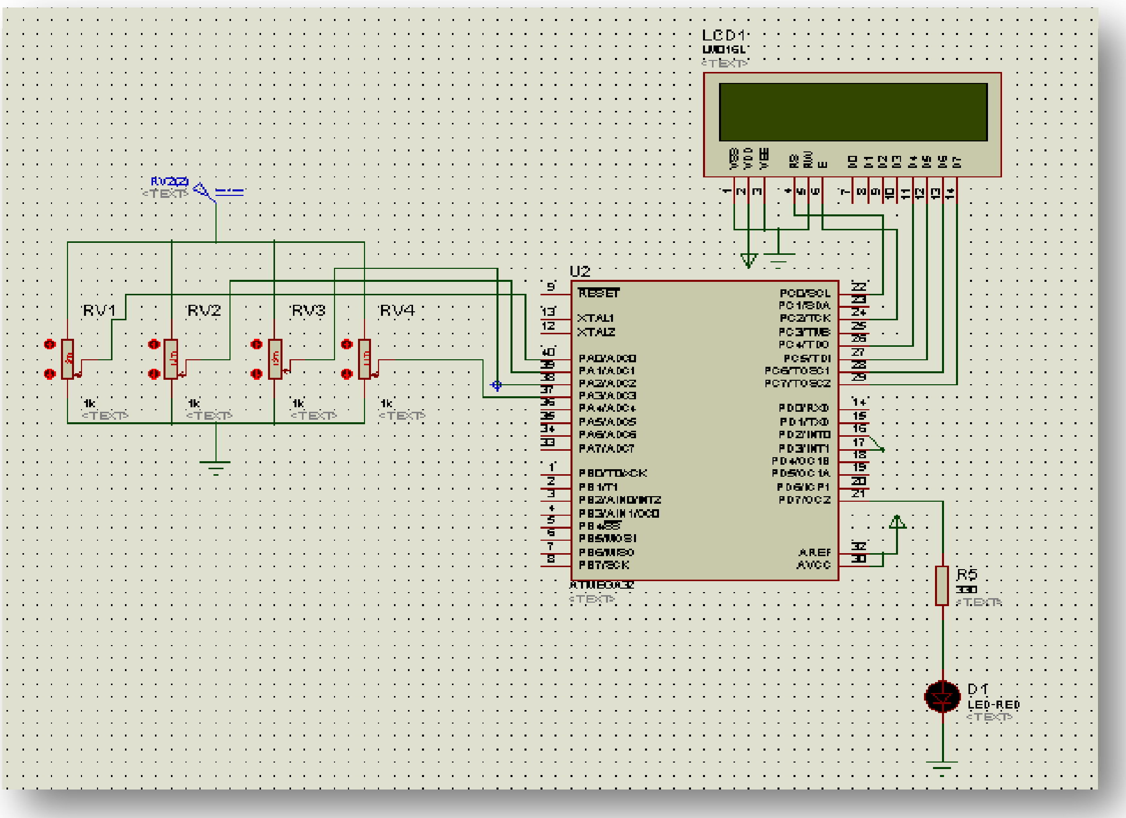


Figure (4.2): Circuit diagram of Crash sensor.

4.2.2 Pressure sensor

the sensor Fumbles the pressure that generates from tube calf of the car gives a signal if the amount of pressure is low and in adequate gives the signal for microcontrollers to decide stopping the car to mind the speed and in surance for safety, the figure (4.3) below show that.

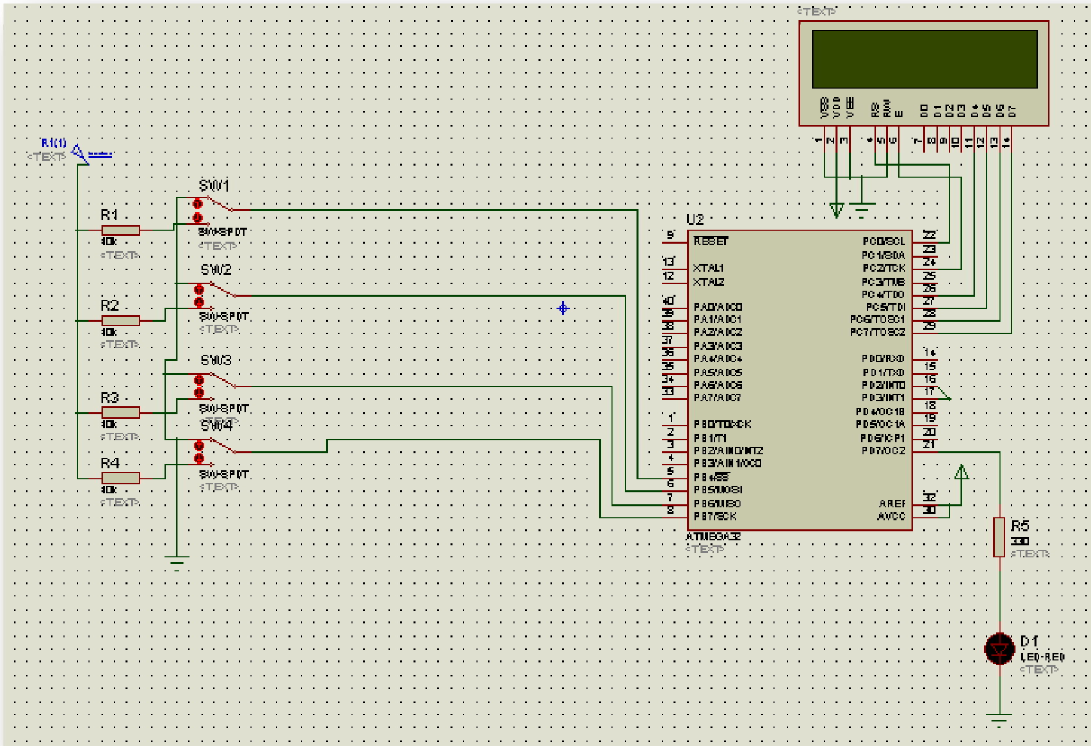


figure (4.3) Circuit diagram of pressure sensor

4.2.3 speed sensor

The Sense of the speed is through accounting number of the cycle car tire. cycle represents meter, Thousand cycle per second represents one kilometers per second, and so on, the speed in kilometers accounting. the figure (4.4) below show that.

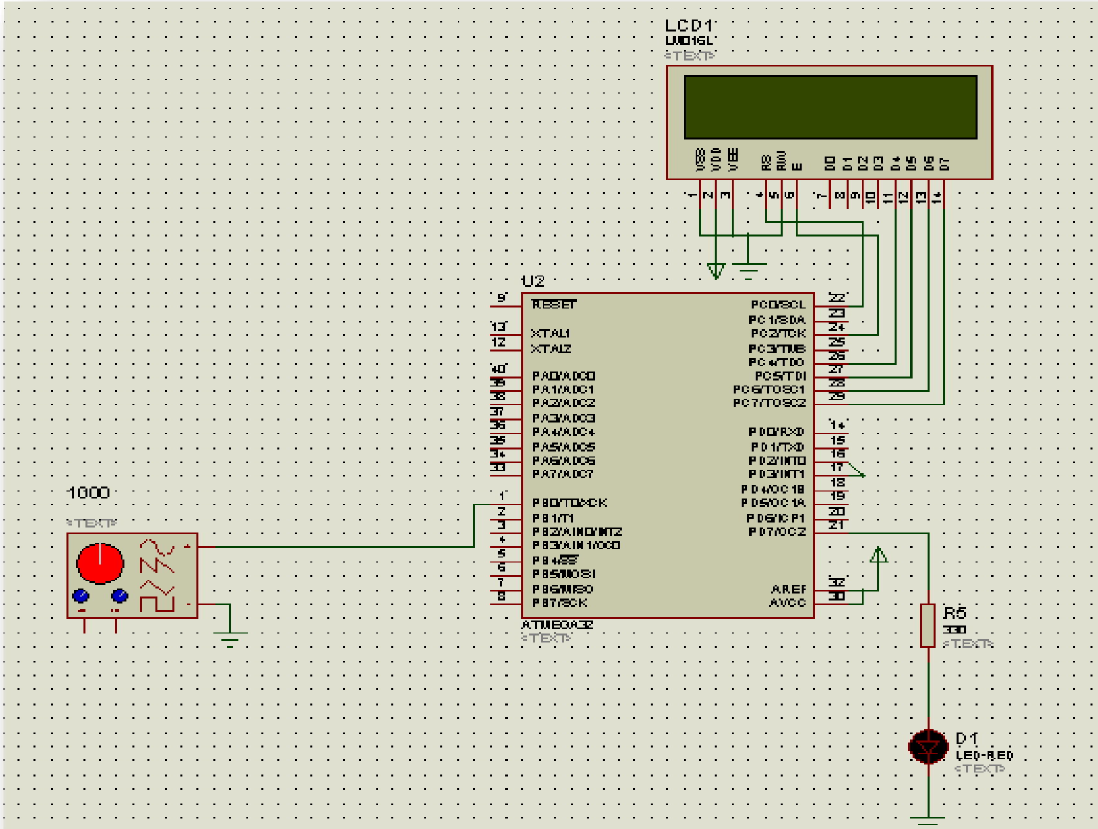


Figure (4.4) below show Circuit diagram speed of sensor

4.2.4 **ultrasonic** sensor

to detect and see the distance between the car and in front of which to avoid the accident while driving the car and it does control with speed sensitive monitoring speed of the car to avoid the accident.

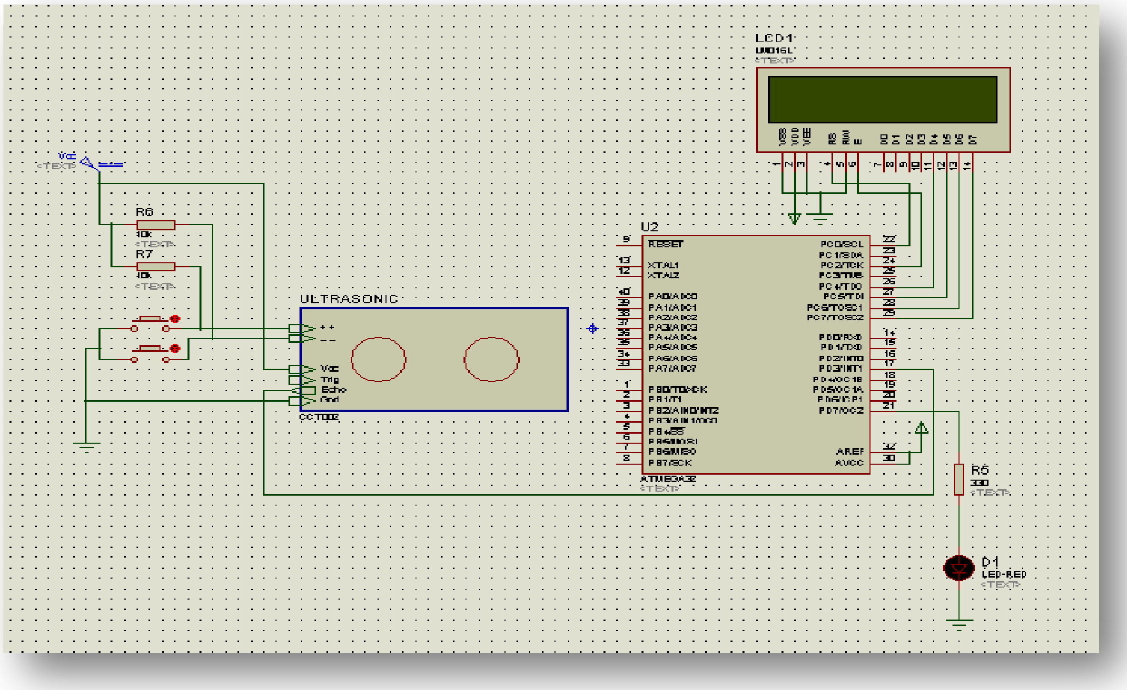


Figure (4.5) below Circuit diagram of ultrasonic sensor

4.3 Report system part

4.3.1 GSM send SMS to ambulance

after detect an accident the system send SMS to ambulance via GPS to determine the location of car.

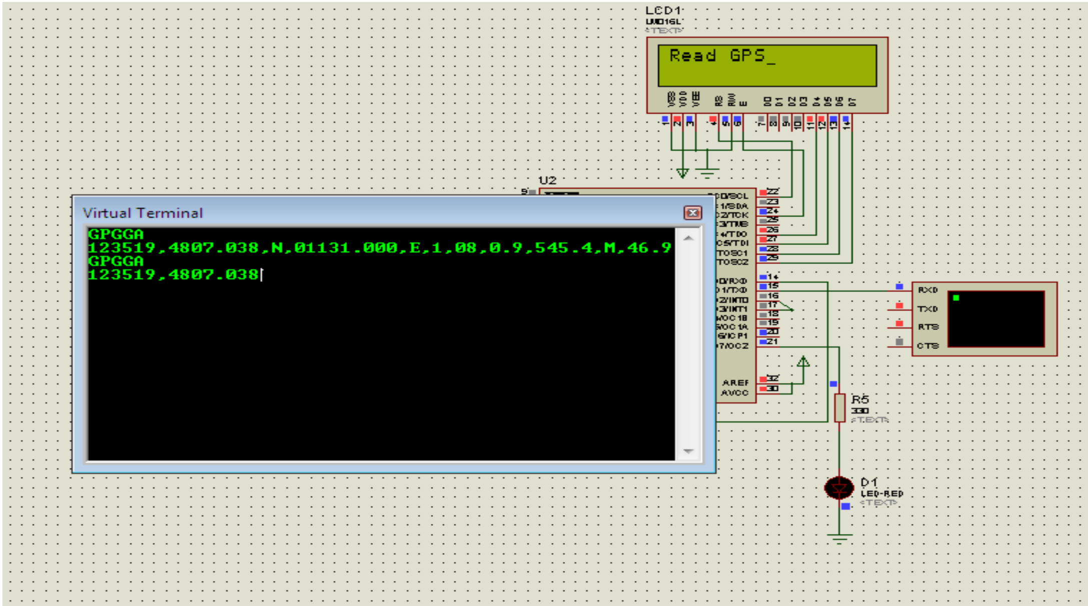


Figure (4.6) below Circuit diagram of GSM

4.3.2 GPS sensor to determine locate

The sensor is based in knowing the current location of the car in any case, so the car extends the geographic location of latitude and longitude in the event of an accident, the system to send the site obtained from the GPS, the concerned entity irresponsible accidents.

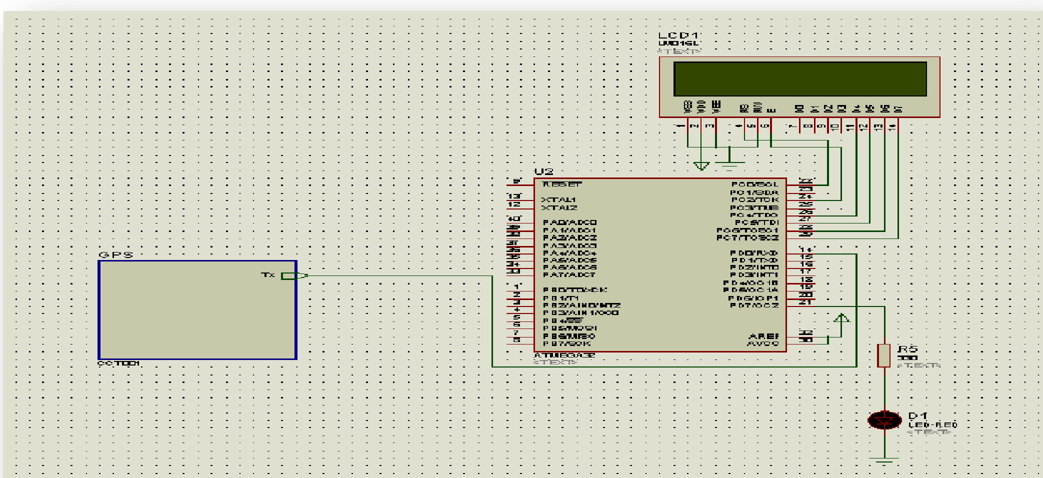


Figure (4.7) below show Circuit diagram of GPS

4.4 Flow chart

System starts running all components and is therefore:-

1- Pressure sensitive to case-frame reading

2- sensitive read the crash to learn of the accident and the amount of pressure that caused the accident

3- speed read sensitive to the speed of the car monitoring

4- reading sensor to determine the distance in front of the car

5-read location of the vehicle and locate the car to read the latitude and longitude

6- avoid the accident of monitoring speed, distance and control the brakes

7- in the event of an accident, the system sends a message containing the accident site.

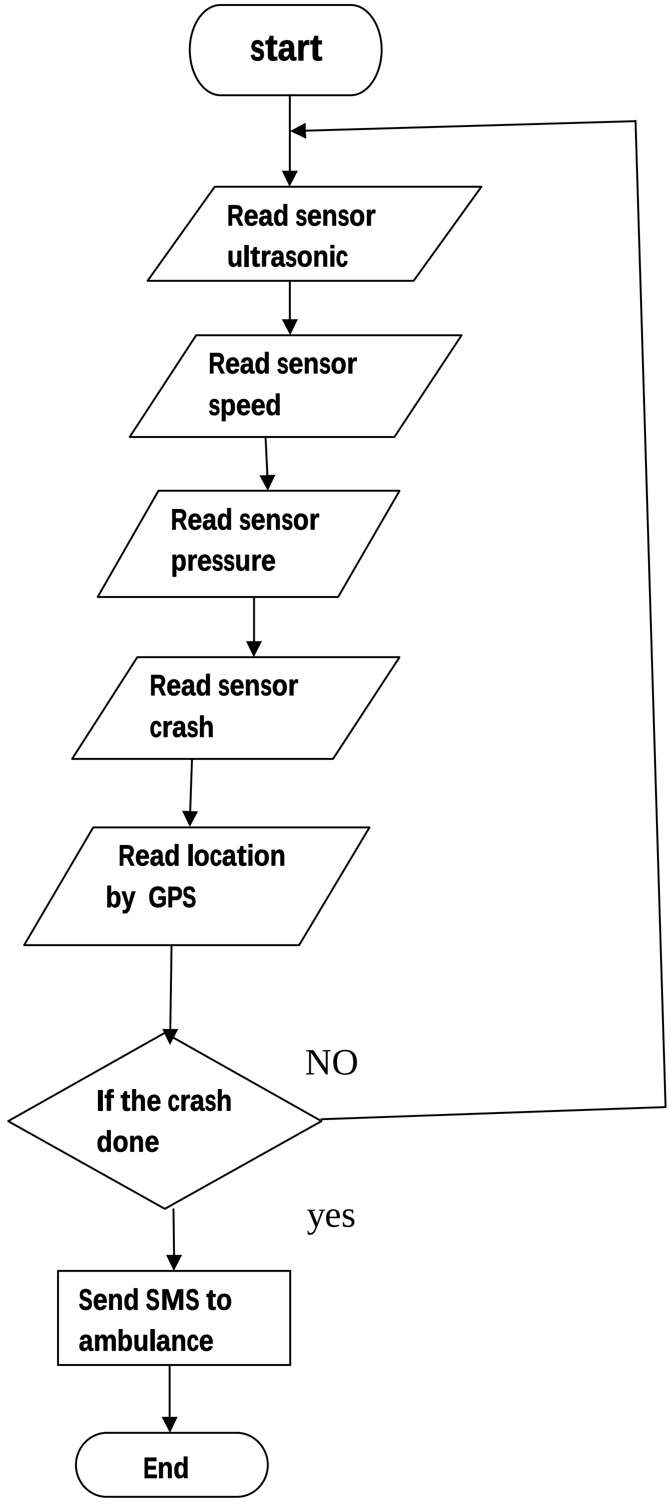


figure (4.8) : flow chart

5.1 overview

The chapter contains the obtained results of the circuit in all stages of the process and the details of each phase sensitive separately, where displays the following:

1. The results obtained from the ultrasonic sensor.

2-The results obtained from the distance pulse sensor.

3- the detects object by determine the distance.

5.2 Results of ultrasonic sensor

After connecting the circuit as a Previous chapter the results as shown in the following figure

figure5.1 show the input signal, operational distanceAnd the output.

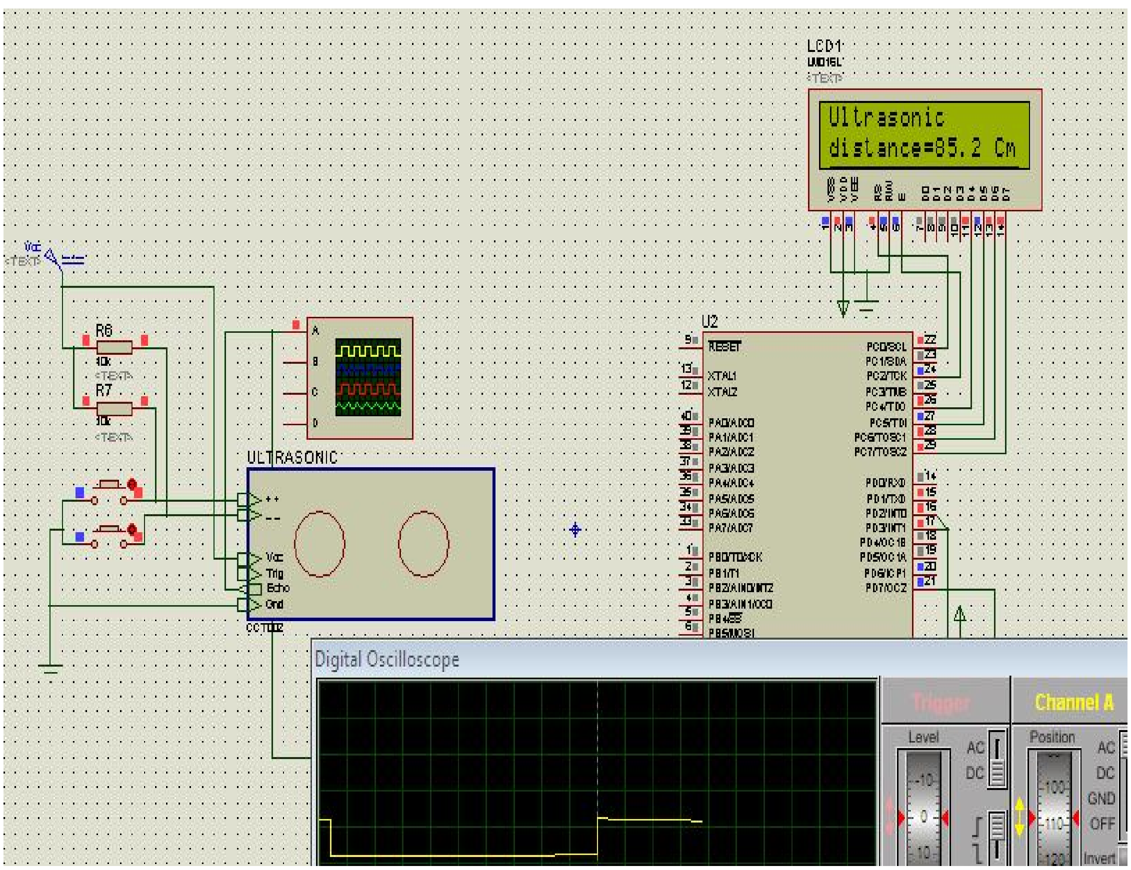
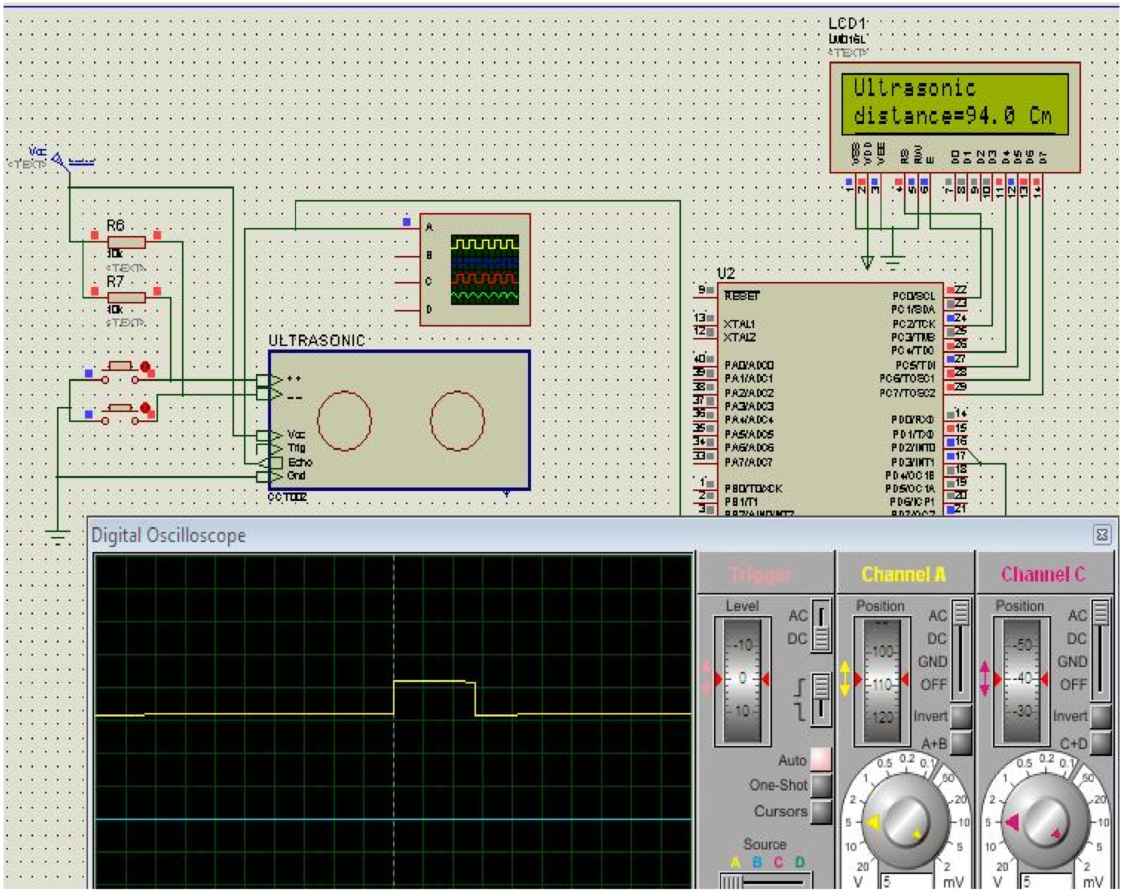


figure (5.1) the input signal, operational distanceAnd the output.

- The output is distance equal 85.2cm.
- The ultrasonic sensor is determine object.

figure5.2 show the output distance, ultrasonic sensor of the Previous ultrasonic distance.



The figure (5.2) show the output distance,

.

- The output distance equal 94.0 cm .

figure5.3 show the output distance, operational ultrasonic sensor And the output of other value:

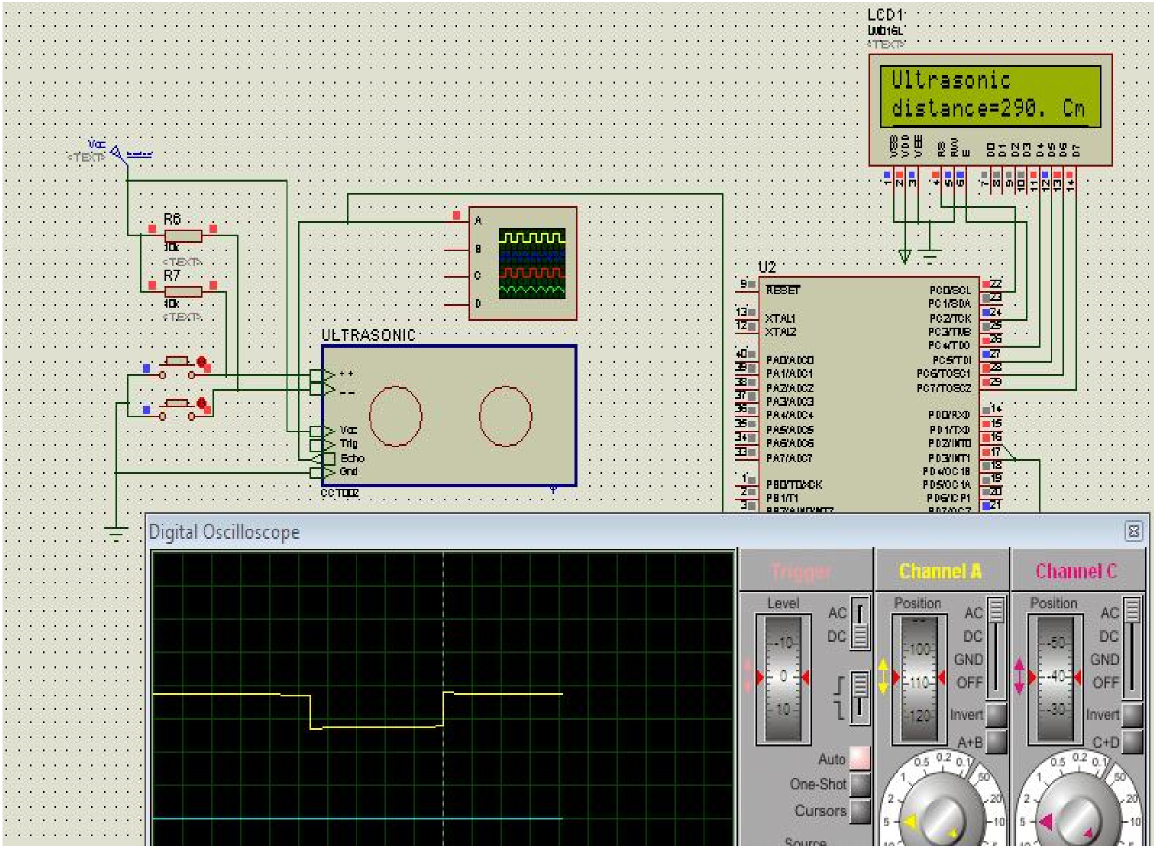


figure (5.3) the input signal, operational distance And the output.

- The output is Square 290 cm

5.3 Results of crash sensor

The part shows the results of measurements for Amount of pressure resulting from the in accident,if large proportion of the incident who shall system sends a message and a small but ignores send the message to the concerned party.

figure5.4 show the output of Amount of pressure, the microcontroller and display unit (LCD) with Amount of pressure value and alarm.

- The output sensor is normally.
- The alarm is not light.
- The output is volt equal 2.

.

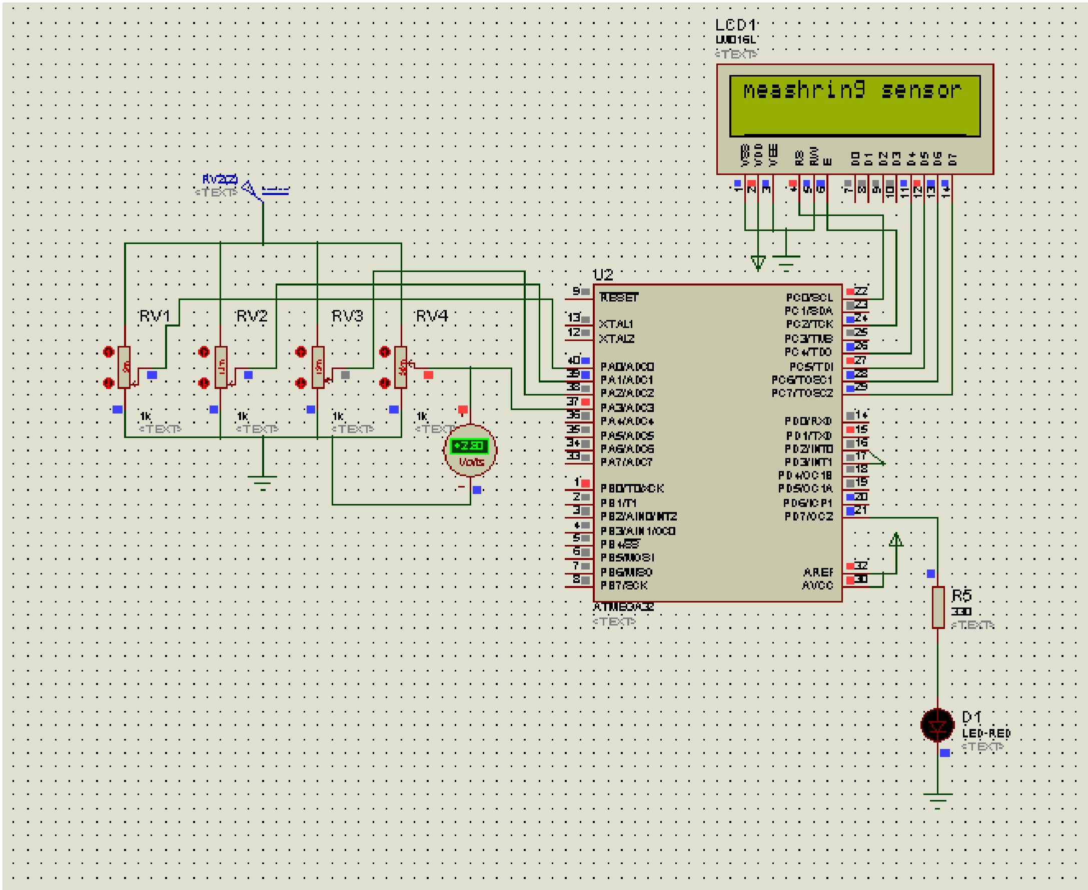


Figure (5.4) show the output of Amount of pressureis equal normally figure5.5 show the output of Amount of pressure sensor , the microcontroller and display unit (LCD) with Amount of pressurenormally

- The output sensor is normally.
- The alarm is not light.
- The output is volt equal 3.

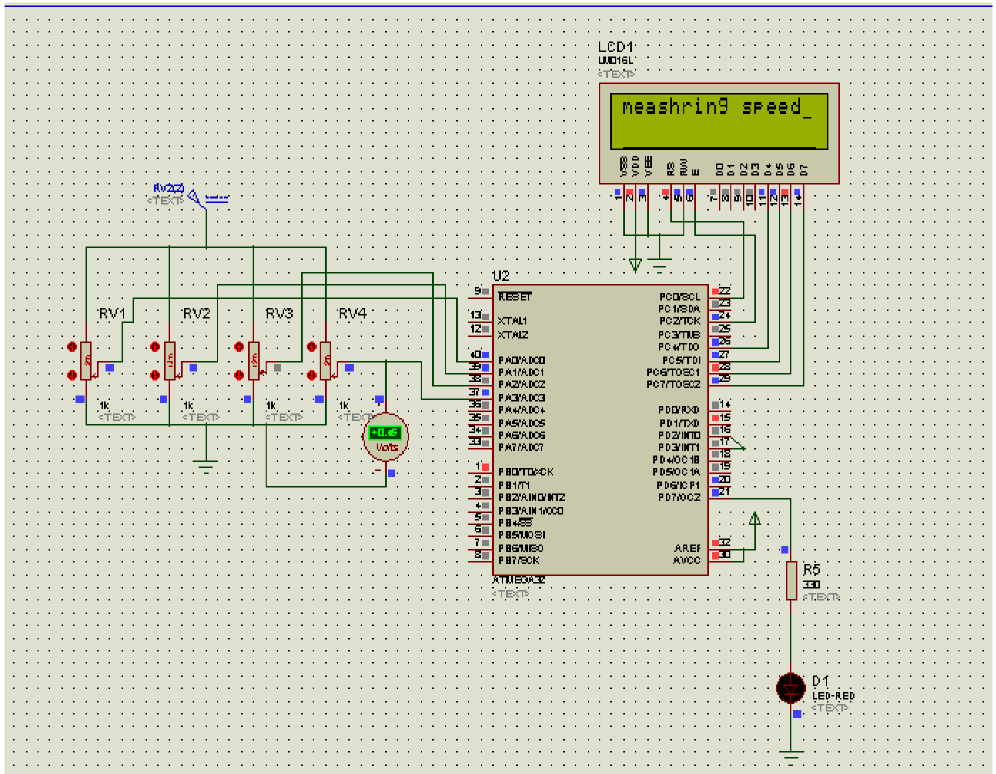


Figure (5.5) show the output of amount of pressure is normally

Figure (5.6) show the output of amount of measuring sensor crash .figure 5.6 show the output of amount of measuring sensor, the microcontroller and display unit (LCD) with tell GPS.

- The output sensor volt equal than 4v.
- The alarm and tell GSM.

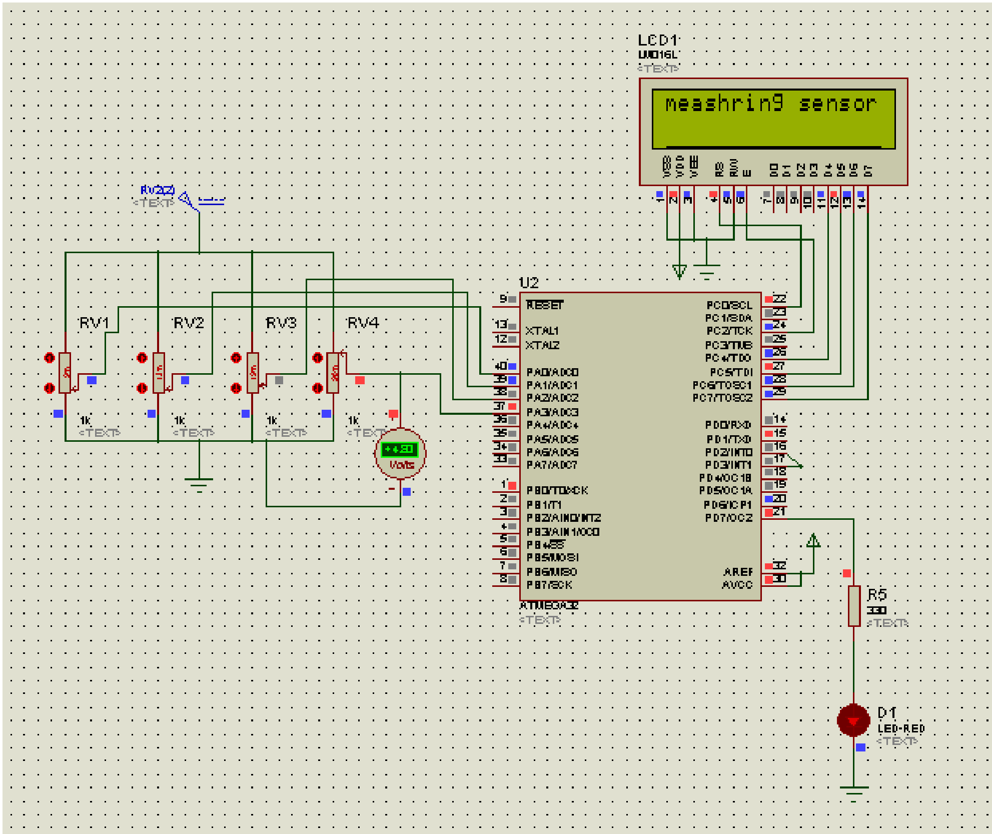
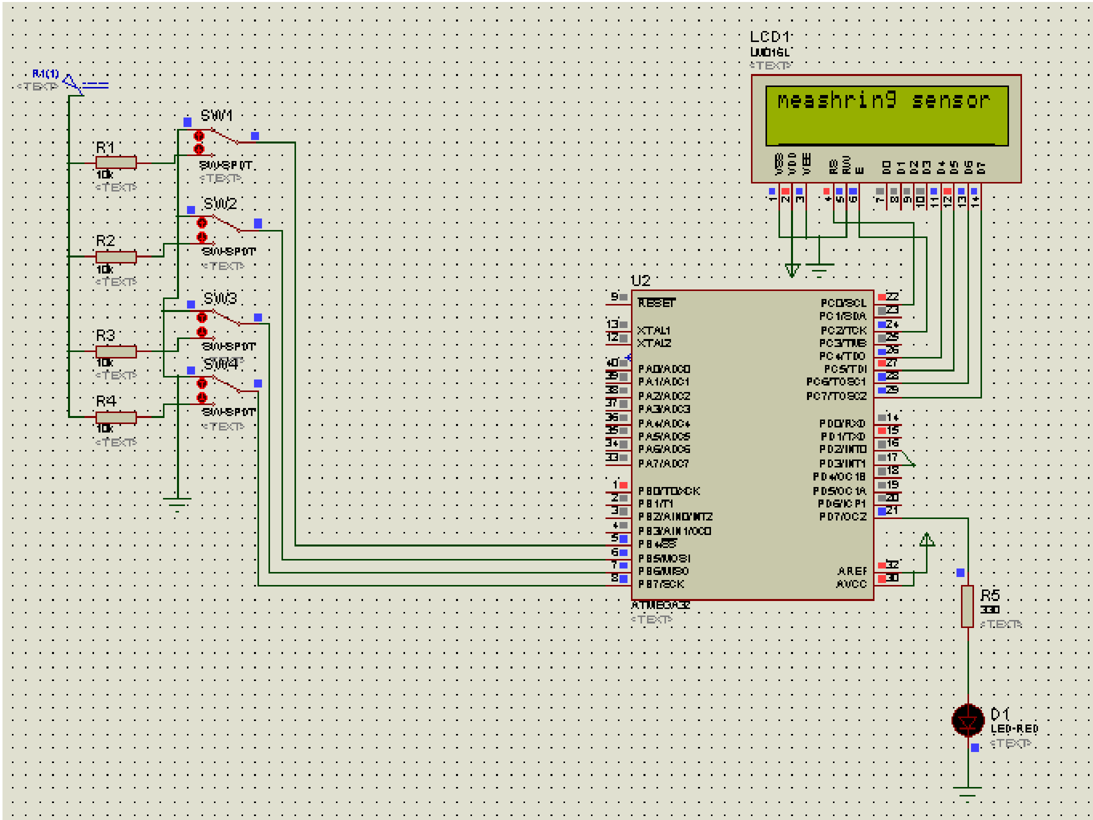


Figure (5.6) show the output of amount of pressure is equal 4V.

5.4 Results of pressure sensor

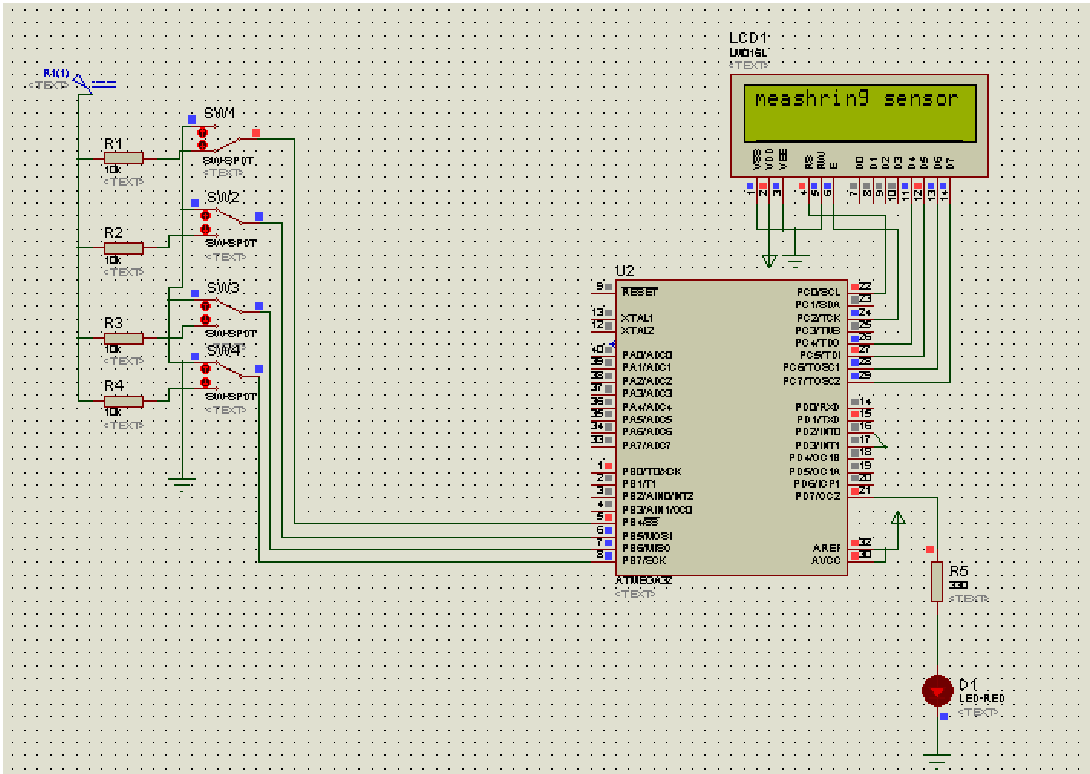
This part shows the results of several measurements for pressure sensor, through which shows the validity and accuracy of sensor measurement and display unit, figure5.7 show the output of pressure sensor, operational detect tire, the microcontroller and display unit (LCD) with pressure sensor



figure(5.7) the output of pressure sensor output equal normal.

figure5.8 the output ofpressure , and operational detect tire.

If tire normal mode, the sensor does not give any indication and if any of them got the alarm of driver sending the frame obtained by the malfunction.



figure(5.8) the output of pressure sensor output detect of tire is fail

figure5.9 show the output of pressure sensor, operational detect, the microcontroller and display unit (LCD) to detect alarm driver

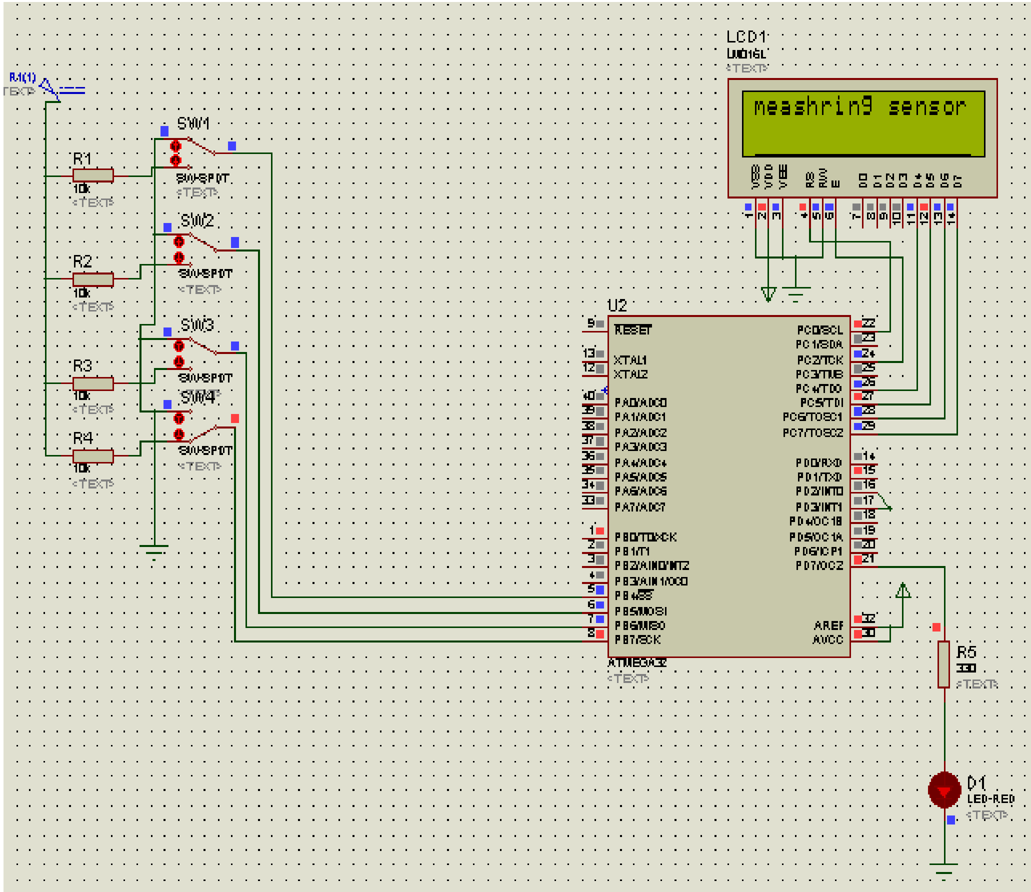


Figure (5.9) the output of pressure sensor output alarm driver.

- The output is alarm.
- The output tell the driver

5.5 Results of speed sensor

Sensor that measures the speed and control the brakes if the car high speed is controlling the brakes automatically

figure(5.10) show speed of sensor**.**

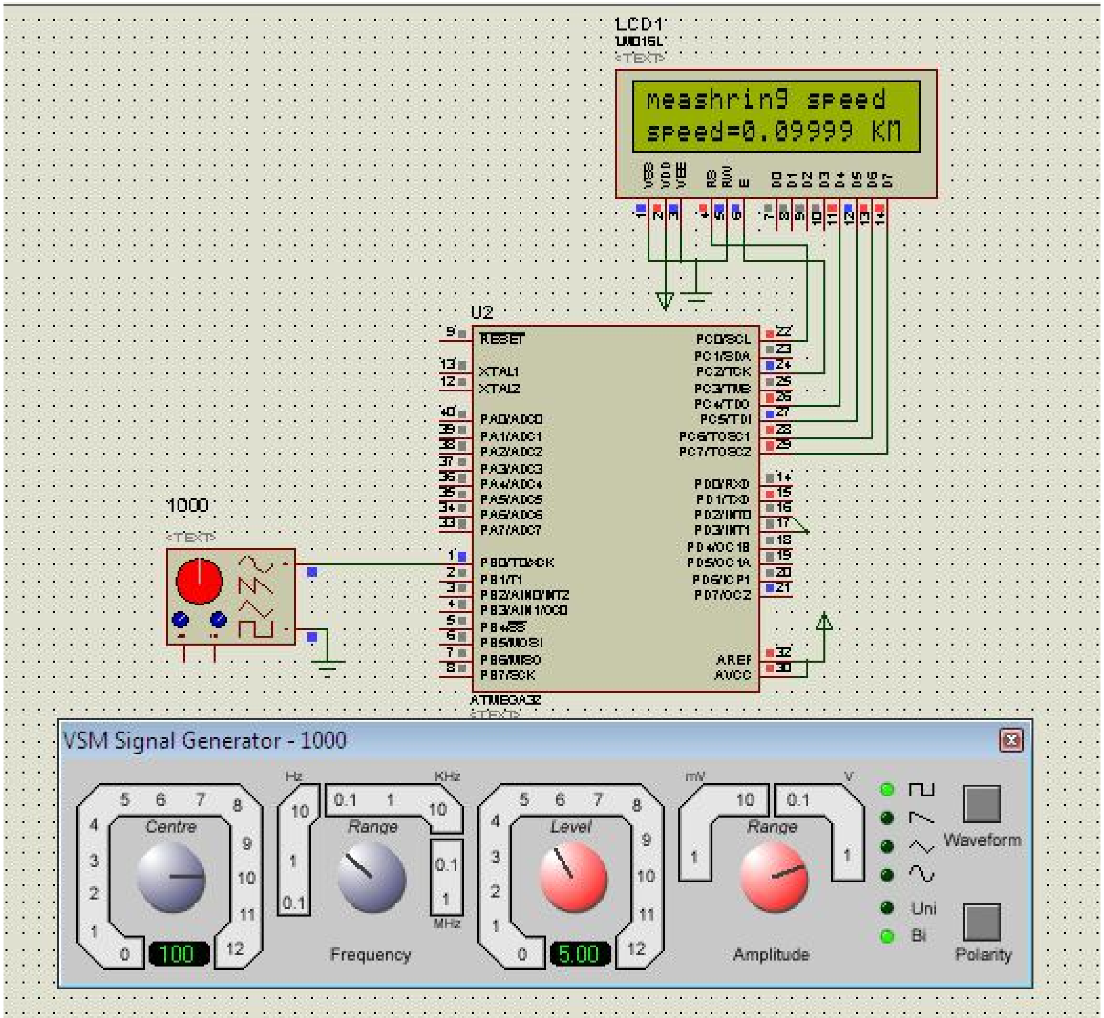


Figure (5.10) show the speed sensor of system.

- The output sensor is equal 100 roll/5ms.
- The output speed is equal0.0999km/s.

figure(5.11) show the sensor of speed i**s** speed than greater

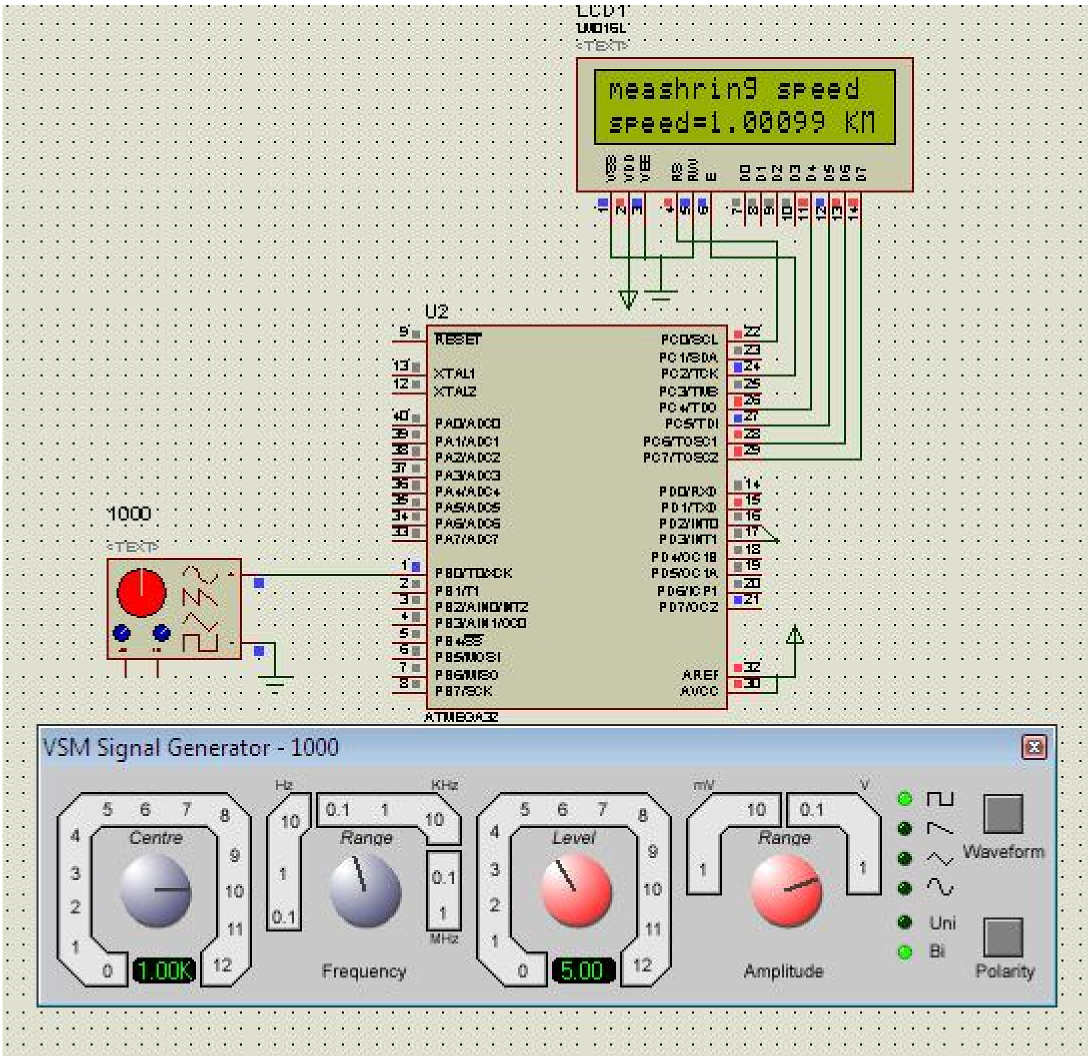


Figure (5.11) show the sensor of speed .

- The output sensor 1k/5ms.
- The output of speed is equal1.00099km/ms.

figure (5.12) show the sensor of speed i**s** speed than greater**.**

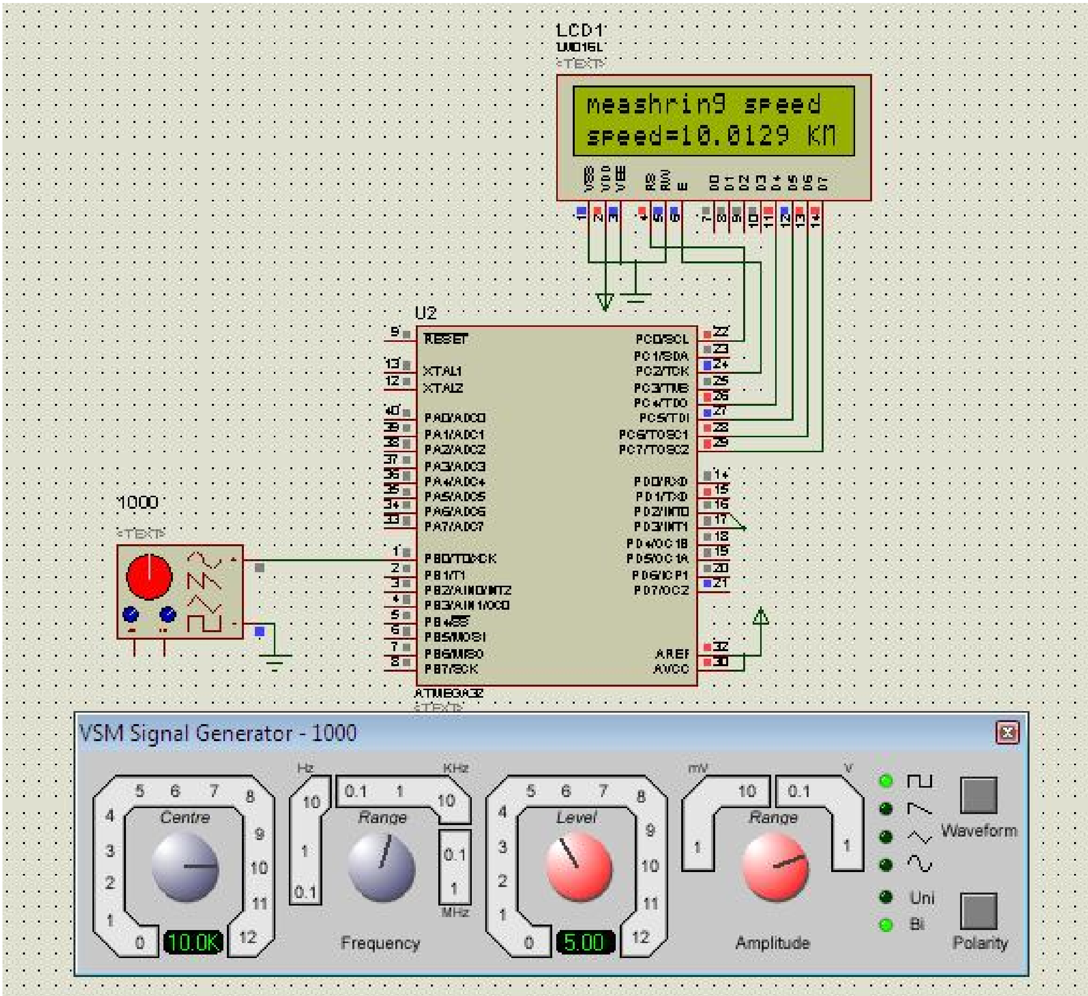


Figure5.12) measuring speeds of sensor.

- The output sensor is equal 100k roll/5ms.
- The output speed is equal 10.0129km/5ms.

5.6 Results of GPS

The car GPS determine location by latitude and longitude, and gives information on the location of the car

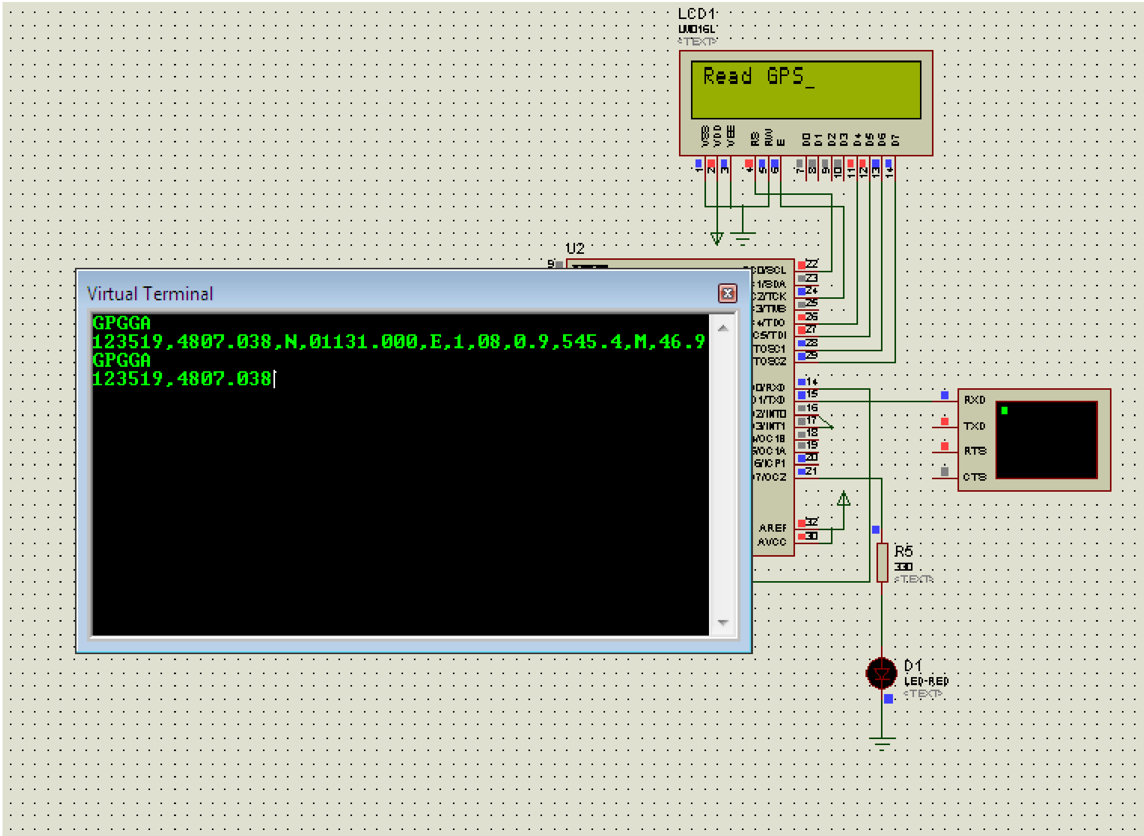


Figure5.13 show the location of car

- The output is location by latitude and longitude**.**
- The output is equal N 01131.000.E.1.08.0.9.545.

5.7 Results GSM

The GPS is send message contain location of car

Figure 5.14 show the result GSM and send SMS to ambulance

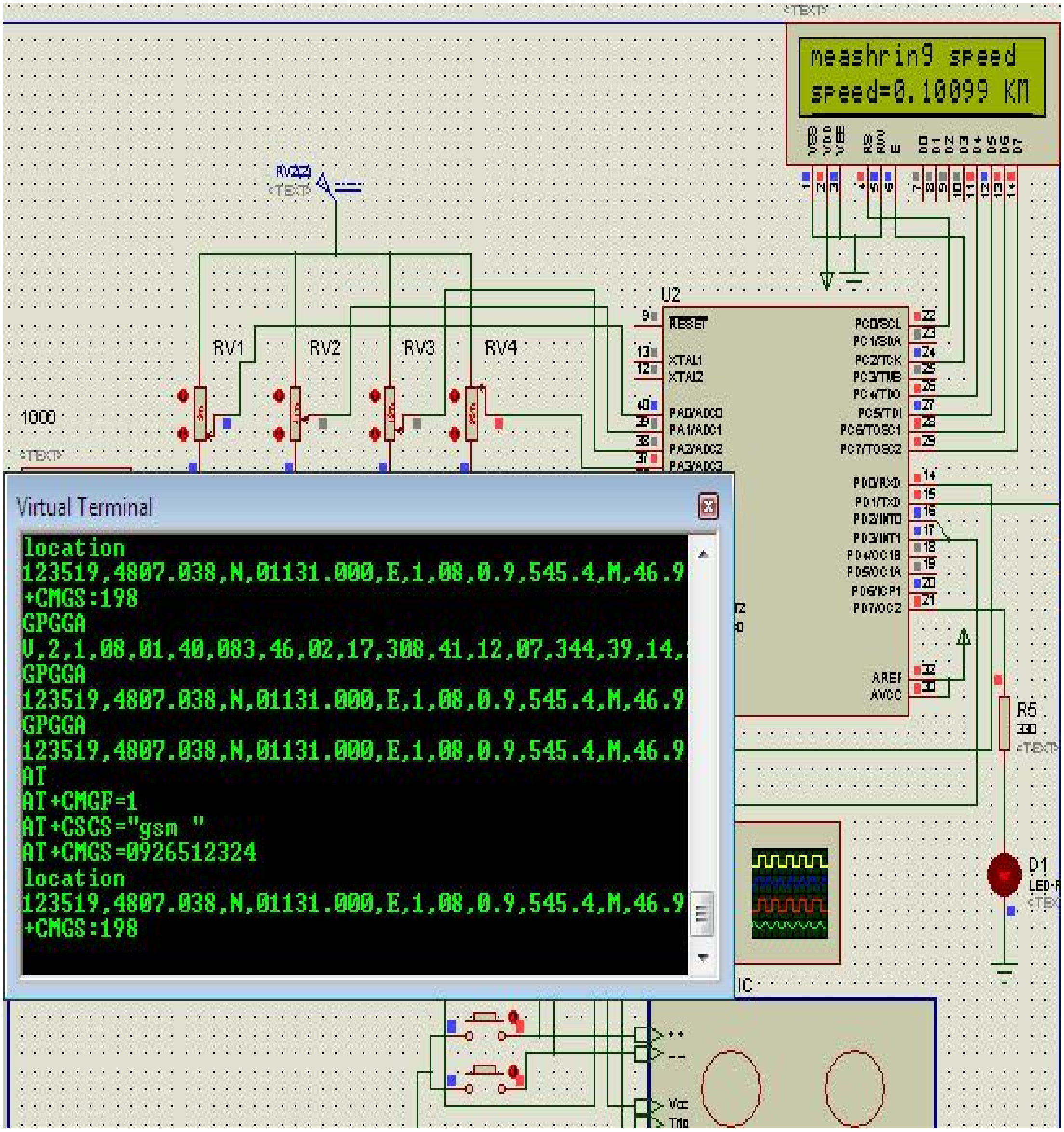


Figure (5.14) show result of SMS and send.

- The output is equal latitude and longitude.
- The output is send latitude and longitude to ambulance.

5.8 Discussion

- The simulation is working good.
- the sensor is reading the signal from distance and the microcontroller converting the analog signal and (MAP) and displayed the result.
- the microcontroller calculating distance from sensor and displayed it.
- The result of ultrasonic is very good.
- The result of speed sensor and crash is good.
- The result of pressure is good.
- The result of GPS is good.
  The result of GSM is good

6.1 Conclusions

The Research solves the issues like automatic speed control mechanism, accident detection and information sending. From this we conclude that this system will reduce the accidents and save the human lives. a Real-time automobile tracking system via Google Earth is presented. The system included two main components: a transmitting embedded module to interfacein-vehicle GPS and GSM devices in order determine and send automobile location and status information via SMS.The system is compact and can easilyinstalled in any vehicle but the location of GPS and GSM antennas should be chosen carefully in order to achieve a good signal.

6.2 Recommendation

1. Increasing for types of used sensor.
2. Increasing system accuracy by using more advance microcontroller.
3. Enhance the system for wireless by using more advance technique with more features.
4. The system could be modified to a universal computerized system includes mobile system, antitheft system, Chasing system

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Appendix A

Appendix code for the microcontroller:

```
$regfile = "m32def.dat"
$crystal = 8000000
$baud = 9600
$hwstack = 40
$swstack = 16
$framesize = 32
ConfigLcd = 16 * 2
ConfigLcdpin = Pin , Db4 = Portc.4 , Db5 = Portc.5 , Db6 =
Portc.6 , Db7 = Portc.7 , E = Portc.2 , Rs = Portc.0
Config Timer0 = Counter ,Clear_timer = 0 , Edge = Falling
Config Portb.4 = Input
Config Portb.5 = Input
Config Portb.6 = Input
Config Portb.7 = Input
Config Portd.7 = Output
Config Portd.6 = Output
ConfigAdc = Single ,Prescaler = Auto
Dim W As Word , V0 As Single , V1 As Single , Counter11
As Single , V2 As Single , V3 As Single
Dim Ov As Word , B1 As Word
B1 = 1
```

```
Dim Dis As Single : Dis = 0
Dim Timeal As Single :Timeal = 0
Config Timer1 = Timer ,Prescale = 64
Stop Timer1
Config Int0 = Rising
Config Int1 = Falling
Enable Timer0
Enable Interrupts
Enable Int0
Enable Int1
On Int0 L1
On Int1 L2
On Timer0 Ovff
Ov = 0
Dim S As String * 100
Dim SsAs String * 100
Dim SssAs String * 7
Dim V As Byte
Sss = "$GPGGA"
Do
Cls
Locate 1 , 1
Lcd "meashring sensor"
```

```
W = Getadc(0)
V0 = 5 * W
V0 = V0 / 1024
W = Getadc(1)
V1 = 5 * W
V1 = V1 / 1024
W = Getadc(2)
V2 = 5 * W
V2 = V2 / 1024
W = Getadc(3)
V3 = 5 * W
V3 = V3 / 1024
If Pinb.4 = 1 Or Pinb.5 = 1 Or Pinb.6 = 1 Or Pinb.7 = 1 Or
V0 >= 4 Or V1 >= 1 Or V2 >= 4 Or V3 >= 4 Then
Portd.7 = 1
Else
Portd.7 = 0
End If
Locate 1 , 1
Lcd "meashring sensor"
Waitms 1000
Cls
'meashreing the speed"
```

```
Locate 1 , 1
Lcd "meashring speed"
Counter0 = 0
Start Counter0
Waitms 1000
Stop Counter0
Counter11 = Ov * 256 : Counter11 = Counter11 + Counter0
Counter11 = Counter11 / 1000
Counter0 = 0 :Ov = 0
Cls
Locate 1 , 1
Lcd "meashring speed"
Locate 2 , 1
Lcd "speed="
Lcd Counter11
Locate 2 , 14
Lcd" KM"
Waitms 2000
'altra sonic calc
Cls
Locate 1 , 1
Lcd "Ultrasonic"
Locate 2 , 1
```

```
Lcd "distance="
Lcd Dis
Locate 2 , 14
Lcd" Cm"
Waitms 1000
If Counter11 =>0.050  And Dis <= 200 Then
Portd.6 = 1
'Elseif Counter11 => .100 And Counter11 < .050 And Dis <=
350 And Dis > 300 Then
'Portd.6 = 1
'Elseif Counter11 => .200 And Counter11 < .100 And Dis <=
400 And Dis > 350 Then
'Portd.6 = 1
Else
Portd.6 = 0
End If
Cls
Locate 1 , 1
Lcd "Read GPS"
Waitms 100
For B1 = 1 To 10 Step 1
Inputhex V Noecho
'Print Asc(v)
```

```
Waitms 15
Input S Noecho
If V = 176 Then
Print "GPGGA"
Print S
Ss = S
End If
Next B1
'send an sms by gsm
If V0 >= 4 Or V1 >= 4 Or V2 >= 4 Or V3 >= 4 Then
'send an sms by gsm
Cls
Locate 1 , 1
Lcd "send sms"
Print "AT"
Waitms 100
Print "AT+CMGF=1"
Waitms 100
Print "AT+CSCS="gsm ""
Waitms 100
Print "AT+CMGS=0918852683"
Waitms 100
Print "location"
```

```
Print Ss
Print "+CMGS:198"
End If
Loop
Ovff:
Incrov
Return
L1:
Timer1 = 0
Start Timer1
Return
L2:
Stop Timer1
Timeal = Timer1 * 0.524288
Timeal = Timeal / 65536
Timeal = Timeal / 2 : Dis = Timeal * 3400
Return
```

Appendix B

ATmega32

Features:

- High-performance, Low-power Atmel® AVR® 8-bit Microcontroller

• Advanced RISC Architecture

– 131 Powerful Instructions – Most Single-clock Cycle Execution

– 32 x 8 General Purpose Working Registers

– Fully Static Operation

– Up to 16 MIPS Throughput at 16 MHz

– On-chip 2-cycle Multiplier

• High Endurance Non-volatile Memory segments

– 32Kbytes of In-System Self-programmable Flash program memory

– 1024Bytes EEPROM

– 2Kbyte Internal SRAM

– Write/Erase Cycles: 10,000 Flash/100,000 EEPROM

– Data retention: 20 years at 85°C/100 years at 25°C(1)

– Optional Boot Code Section with Independent Lock Bits

In-System Programming by On-chip Boot Program

True Read-While-Write Operation

– Programming Lock for Software Security

• JTAG (IEEE std. 1149.1 Compliant) Interface

– Boundary-scan Capabilities According to the JTAG Standard

– Extensive On-chip Debug Support

– Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface

• Peripheral Features

– Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes

– One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode

– Real Time Counter with Separate Oscillator

– Four PWM Channels

– 8-channel, 10-bit ADC

8 Single-ended Channels

7 Differential Channels in TQFP Package Only

2 Differential Channels with Programmable Gain at 1x, 10x, or 200x

– Byte-oriented Two-wire Serial Interface

– Programmable Serial USART

– Master/Slave SPI Serial Interface

– Programmable Watchdog Timer with Separate On-chip Oscillator

– On-chip Analog Comparator

• Special Microcontroller Features

– Power-on Reset and Programmable Brown-out Detection

– Internal Calibrated RC Oscillator

– External and Internal Interrupt Sources

– Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby

and Extended Standby

• I/O and Packages

– 32 Programmable I/O Lines

– 40-pin PDIP, 44-lead TQFP, and 44-pad QFN/MLF

• Operating Voltages

– 2.7V - 5.5V for ATmega32L

– 4.5V - 5.5V for ATmega32

- Speed Grades

– 0 - 8MHz for ATmega32L

– 0 - 16MHz for ATmega32

- Power Consumption at 1 MHz, 3V, 25°C

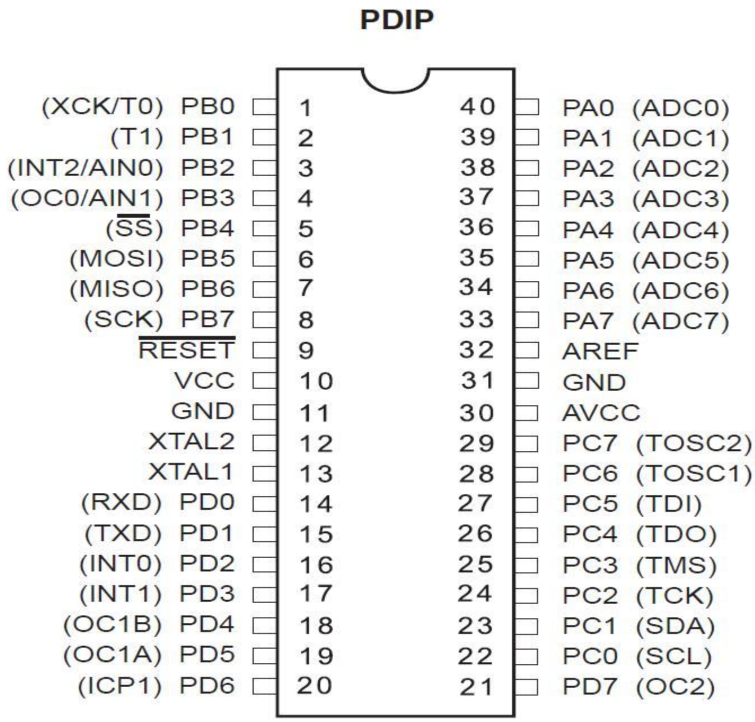
– Active: 1.1mA

– Idle Mode: 0.35mA

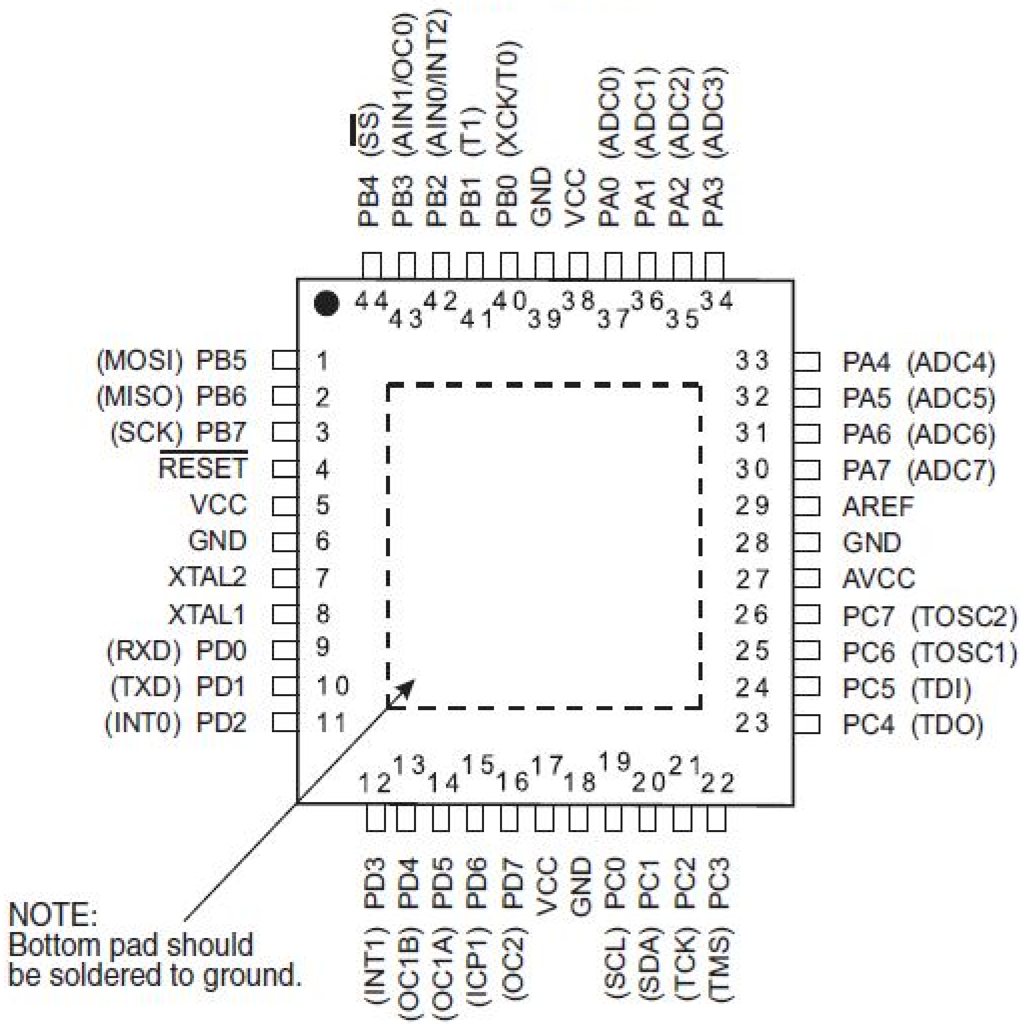
– Power-down Mode: < 1µA

Pin Configurations

Figure 1. Pinout ATmega32



TQFP/QFN/MLF

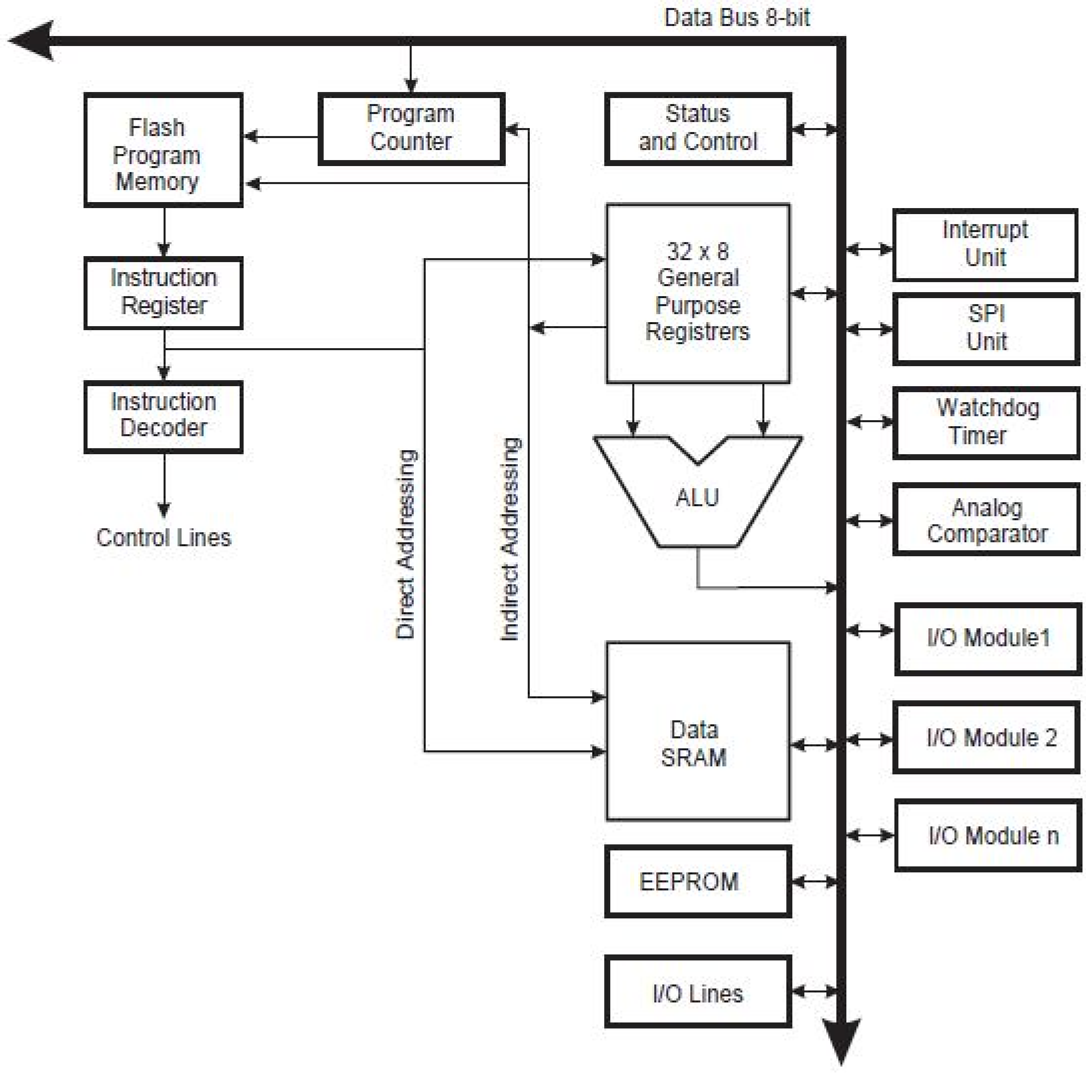


AVR CPU Core

This section discusses the Atmel® AVR® core architecture in general. The main function of the CPU core is to ensure correct program execution. The CPU must therefore be able to access memories, perform calculations, control peripherals, and handle interrupts.

Architectural

Figure 3. Block Diagram of the AVR MCU Architecture



In order to maximize performance and parallelism, the AVR uses a Harvard architecture – with separate memories and buses for program and data. Instructions in the program memory are executed with a single level pipelining. While one instruction is being executed, the next instruction is pre-fetched from the program memory. This concept enables instructions to be executed in every clock cycle. The program memory is In-System Reprogrammable Flash memory.

The fast-access Register File contains 32 × 8-bit general purpose working registers with a single clock cycle access time. This allows single-cycle Arithmetic Logic Unit (ALU) operation. In a typical ALU operation, twooperands are output from the Register File, the operation is executed, andthe result is stored back in the Register File – in one clock cycle.

Six of the 32 registers can be used as three 16-bit indirect address register pointers for Data Space addressing – enabling efficient address calculations. One of the these address pointers can also be used as an address pointer for look up tables in Flash Program memory. These added function registers are the 16-bit X-, Y-, and Z-register, described later in this section Six of the 32 registers can be used as three 16-bit indirect address register pointers for Data Space addressing – enabling efficient address calculations. One of the these address pointers can also be used as an address pointer for look up tables in Flash Program memory. These added function registers are the 16-bit X-, Y-, and Z-register, described later in this section. The ALU supports arithmetic and logic operations between registers or between a constant and a register. Single register operations can also be executed in the ALU. After an arithmetic operation, the Status Register is updated to reflect information about the result of the operation.

Program flow is provided by conditional and unconditional jump and call instructions, able to directly address the whole address space. Most AVR instructions have a single 16-bit word format.

Every program memory address contains a 16-bit or 32-bit instruction.

Program Flash memory space is divided in two sections, the Boot program section and the Application Program section. Both sections have dedicated Lock bits for write and read/write protection. The SPM instruction that writes into the Application Flash memory section must reside in the Boot Program section.

During interrupts and subroutine calls, the return address Program Counter (PC) is stored on the Stack. The Stack is effectively allocated in the general data SRAM, and consequently the Stack size is only limited by the total SRAM size and the usage of the SRAM. All user programs must initialize the SP in the reset routine (before subroutines or interrupts are executed). The Stack Pointer SP is read/write accessible in the I/O space. The data SRAM can easily be accessed through the five different addressing modes supported in the AVR architecture.

The memory spaces in the AVR architecture are all linear and regular memory maps.

A flexible interrupt module has its control registers in the I/O space with an additional global interrupt enable bit in the Status Register. All interrupts have a separate interrupt vector in the interrupt vector table. The interrupts have priority in accordance with their interrupt vector position. The lower the interrupt vector address, the higher the priority.

Appendix C

All sensor

Ultrasonic Distance Sensor

Features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

(1) Using IO trigger for at least 10us high level signal,

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time × velocity of sound (340M/S) / 2.

3.2.1.1 Wire connecting direct as following:

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

Pressure sensor

Features

Following features are supported by the KP219N3621:

1- High precision pressure sensing (± 1.5 kPa)

2- Ratio metric analog output

3- Large temperature range (-40 °C to 125 °C)

4- Broken wire detection

5- “Green” 8 pin SMD housing

6- Automotive qualified

Application

The KP219N3621 is defined for use in following target applications:

1- Automotive applications (manifold air pressure measurement)

2- Industrial control

3- Consumer applications

4- Medical applications

5- Weather stations

6- Altimeters

Table 3.1 shows the pin description.of pressure sensor

Pin No.	**Name**	**Function**
1	TEST	Test pin1
2	CLOCK / VPROG	External clock for communication / programming voltage1
3	DATA IN	Serial data input pin1
4	DATA OUT	Serial data output pin1
5	VDD	Supply voltage
6	GND	Circuit ground potential2
7	VOUT	Analog pressure signal output
8	GND	Circuit ground potential2

Impact sensor

FEATURES

1- Digital triple-axis accelerometer, ±19 g
2- Programmable event recorder
   a- Internal and external trigger inputs
   b-Automatic event data storage in nonvolatile flash
3- Low power operation
4- Programmable digital input/output lines
5- Real-time clock
6- Embedded temperature sensor
7- Programmable power management

APPLICATIONS

1- Crash or impact detection
2- Condition monitoring of valuable goods
3- Safety, shut-off sensing
4- Impact event recording
5- Security sensing and tamper detection

Sensor of speed

Feature

- ❖ Speed and direction from 0Hz to 2500Hz.
- ❖ Air gap diagnostics.
- ❖ wire current-loop operation.
- ❖ Wide Operating Temperature Range.
- ❖ Functional during temperature excursions to 190C.
- ❖ Reverse Supply Protected (-30V).

Application

- ❖ Automotive

  a-Wheel speed and direction sensing

  b-Transmission speed sensing

- ❖ Industrial

  a-Incremental position sensing

b- Proximity switching

Liquid Crystal Display (LCD)

Features

- ❖ 5*8 dots with cursor.
- ❖ 16 characters*2line display.
- ❖ 4-bit or 8-bit MPU interfaces.
- ❖ Built –in controller.
- ❖ Display Mode & Backlight Variations.
- ❖ ROHS Compliant.

Pins description

Table 3.2 pin number and function OF LCD

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

The 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.

The Global Positioning System (GPS)

Features

- Ultra high sensitivity: -165dBm
- 22 tracking/66 acquisition-channel receiver
- WAAS/EGNOS/MSAS/GAGAN support
- AGPS support
- NMEA protocols (default speed: 9600bps)
- One serial port
- Embedded patch antenna 12*12*4 mm
- Operating temperature range: -40 to 85
- RoHS compliant (Lead-free)
- Tiny form factor： 20.5mm x12.8mm x 7.8mm

Applications

- ❖ LBS (Location Based Service).
- ❖ Vehicle navigation system.
- ❖ PND (Portable Navigation Device).
- ❖ GPS mouse and Bluetooth GPS receiver.
- ❖ Timing application.

TABLE 3.3 PINS OF GPS

1	VCC	P	Module Power Supply	VCC: 3.0~4.2V
2	GND	G	Module Power Ground	Reference Ground
3	A VBAT	O	RTC and backup SRAM power (2.0-4.2V)	May be connect to Battery
4	TXD	O	TTL.1V ≥ VOH≥2.4V -0.3V≤VOL≤ 0.4V	Strap pin, default MUST pull up
5	RXD	I	3.6V ≥ VIH ≥ 2.0V -0.3V≤ VIL ≤0.8V	Leave Open if not used
6	PPS	O	Time pulse Signal (Default 100ms pulse/sec)	Leave Open if not used

Global System for Mobile Communication (GSM)

Features

1- GSM communications, SMS and Data**.**

2- Low power up to 12 months operation on 3 alkaline “D” cells.

3- Quad Band GSM/GPRS : 850 / 900 / 1800 / 1900 MHz**.**

4- Built in RS232 to TTL or vice versa Logic Converter (MAX232).

5- Configurable Baud Rate.

6- SMA (Sub Miniature version A) connector with GSM L Type Antenna.

7- Built in SIM (Subscriber Identity Module) Card holder.

8- Built in Network Status LED.

9- Inbuilt Powerful TCP / IP (Transfer Control Protocol / Internet Protocol) stack for internet data transfer through GPRS (General Packet Radio Service).