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VEHICLE MISFORTURE IDENTIFICATION SING GPS & GSM TECHNOLOGY

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ABSTRACT:

This paper is to develop an embedded based automated vehicle accident detection system to detect the vehicle accident and notify regarding the same to the care taker indicating the place and time of the vehicle accident. We are implementing the embedded system that connects with the Global Positioning Satellite (GPS) continuously to monitor the location of the vehicle. In this system, the Micro controller interfaced with the Vibration sensor located in the in vehicle is interfaced with the micro controller. The vibration sensor will produce a high frequency vibrations indicating that the vehicle had met with the accident. Then the micro controller which is interfaced with the GPS satellite through RS232 serial cable will locate the current position of the vehicle and will SMS the Time and location of the vehicle accident to the care taker of the motorist using GSM (Global System for mobile communication) Modem.

Keywords: ***Gps, Gsm, IC, Rs 232 Cable, Vehicle Network.***

I.INTRODUCTION

With the advent of development of electronics technology, the automotive field has undergone drastic changes in terms of customer comfort and safety. The structure of vehicles has become more complex. Increased degree of automation has been incorporated in the design of the vehicle. Significant safety features have been added at lower costs.

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts[1], designed to perform a specific function. An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost conscious market.

An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application. High-end embedded & lower end embedded systems. High-end embedded system - Generally 32, 64 Bit Controllers used with OS. Examples Personal Digital Assistant and Mobile phones etc .Lower end embedded systems - Generally 8,16 Bit Controllers used with an minimal operating systems and hardware layout designed for the specific purpose.

Embedded systems have a microprocessor/ microcontroller and a memory. Some have a serial port or a network connection. They usually do not have keyboards, screens or disk drives.

AVR STUDIO:

It is often believed that without target hardware it is difficult, if not impossible, to develop and test software for a microcontroller project. This is often not the case as many of the microcontroller manufacturers (or their partners) offer software simulators that exist for just this purpose. Not only does Atmel's free IDE (Integrated Development Environment), AVR Studio[3], provide the framework for compiling programs and downloading them to the microcontroller, but it also comes with the ability to simulate programs for most of their AVR microcontrollers. This simulator has the ability to not only execute AVR instructions but also to simulate limited digital I/O (input/output). So it's not the case that if you don't have an STK500 (the hardware development board that you'll be using this semester) in front of you that you can't be writing and testing software for homework, labs or final projects.

II.RELATED WORK

GSM MODEM:

GSM stands for Global System for Mobile[2] Communication. It 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

The GSM modem basically consists:

- SIM card holder to hold the activated SIM card for sending and receiving SMS.
- 5V AC power supply header to which the 5v ac adapter is connected.
- Power led which gives the indication of modem status that is on or off.
- 9 pin female to which the GSM antenna is connected.

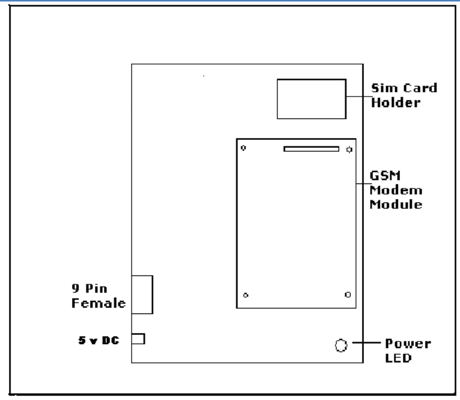

Fig 1. GSM Modem Block Diagram.

Through the mobile equipment the network messages are sent and received. These messages are sent to the terminal adapter which is also known as GSM data card. Now if some data is to be sent to the mobile equipment then the terminal equipment (basically a computer or processor) sends out AT commands to the terminal adapter which in turn sends the mobile equipment the required data. The GSM modem being a serial communication device is connected to the serial port or a serial device through a serial connector. The power input to the modem is given through a 9V ac adapter.

The LED will indicate different status of the modem:

- OFF (Modem Switched off)

- ON (Modem is connecting to the network)

- Flashing Slowly (Modem is in idle mode)

- Flashing rapidly (Modem is in communication mode)

GSM Specifications:

Bandwidth: The broader the bandwidth, the faster the data can be sent.

Bits per second (BPS): A single on-off pulse of data. Eight bits are equivalent to one byte.

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Frequency: The number of cycles per unit of time. It is measured in Hertz between uplink and downlink. A channel has two frequencies,80 MHz a part.

Channel Separation: The separation between adjacent carrier frequencies is 200 KHz.

Transmission rate: GSM is a digital system with the over the air bit rate of 270 kbps.

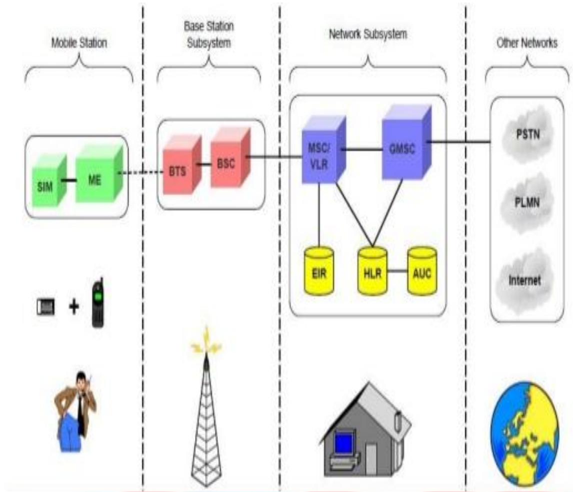

Fig.2: Architecture of GSM network

GPS:

The **Global Positioning System** (**GPS**)[5] is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver.

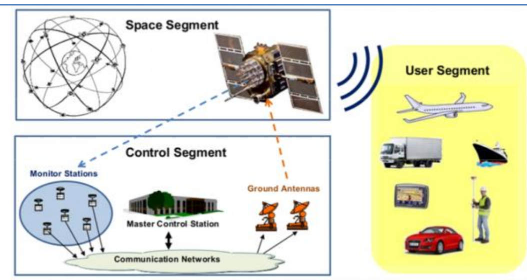

Fig.2: Architecture of Gps network

A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include

- the time the message was transmitted
- satellite position at time of message transmission

The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite using the speed of propagation of electromagnetic waves. Each of these distances and satellites' locations define a sphere. The receiver is on the surface of each of these spheres when the distances and the satellites' locations are correct. These distances and satellites' locations are used to compute the location of the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude; elevation or altitude information may be included. Many GPS units show derived information such as direction and speed, calculated from position changes.

The current GPS consists of three major segments. These are the space segment (SS), a control segment (CS), and a user segment (US). The U.S. Air Force develops, maintains, and operates the space and control segments. GPS satellites broadcast signals from space, and each GPS receiver uses these signals to calculate its three-dimensional location (latitude, longitude, and altitude) and the current time.

The space segment is composed of 24 to 32 satellites[6] in medium Earth orbit and also includes the payload adapters to the boosters required to launch them into orbit. The control segment is composed of a master control station, an alternate master control station, and a host of dedicated and shared ground antennas and monitor stations. The user segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service and tens of millions of civil, commercial, and scientific users of the Standard Positioning Service (see GPS navigation devices).

In general, GPS receivers are composed of an antenna, tuned to the frequencies transmitted by the satellites, receiver-processors[7], and a highly stable clock (often a crystal oscillator). They may also include a display for providing location and speed information to the user.

GPS receivers may include an input for differential corrections, using the RTCM SC-104 format. This is typically in the form of an RS-232 port at 4,800 bit/s speed. Data is actually sent at a much lower rate, which limits the accuracy of the signal sent using RTCM.

The navigational signals transmitted by GPS satellites encode a variety of information including satellite positions, the state of the internal clocks, and the health of the network. These signals are transmitted on two separate carrier frequencies that are common to all satellites in the network.

III.IMPLEMENTATION

Shock and impact sensors are a subset of accelerometers. They are used for measuring, displaying and analyzing shock and impact. Device type is one of the most important specifications to consider when selecting shock and impact sensors. Choices include raw sensors or more complex transducers, switches that make or break contact when a certain activation or vibration level is achieved, and gauges or indicators that have a display but no electronic output. Choices also include instruments, meters, recorders and totalizers. Instruments, meters and analyzers are self-contained shock and impact sensors which usually have a local output. They may also provide signal processing or conditioning. Recorders and totalizers record measure shock and impact values and accumulate totals.

Shock and impact sensors provide outputs that are function of acceleration, velocity[4], displacement or temperature. Performance specifications include maximum shock, maximum vibration, and maximum acceleration. Frequency range, minimum accuracy and number of axes are also important considerations. As a rule, shock and impact sensors that do not have integrated sensors do not have a rated acceleration value. To minimize frequency-response errors, cables can be attached to same machine to which shock and impact sensors are attached. With regard to the number of axes, single-axis, biaxial and triaxial products are commonly available. Biaxial and triaxial shock and impact sensors usually provide measurements along orthogonal axes. In the case of triaxial sensors, these axes are specified as X, Y and Z.

AVR studio is an Integrated Development Environment (IDE) by ATMEL for developing applications based on 8-bit AVR microcontroller[3]. Prior to installation of AVR Studio you have to install the compiler WinAVR. This will allow AVR Studio to detect the compiler.

Step 1:

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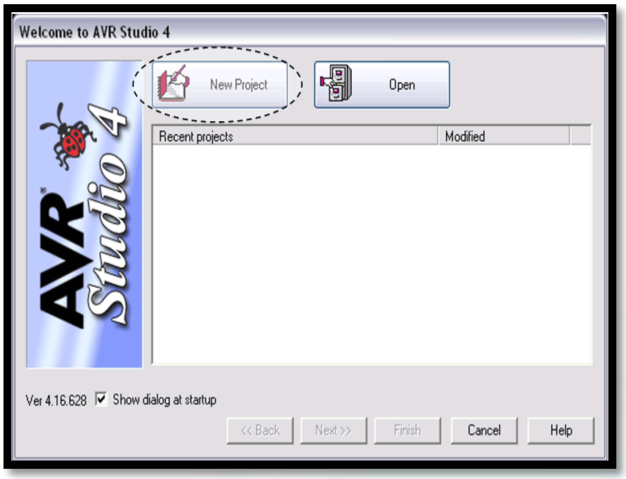
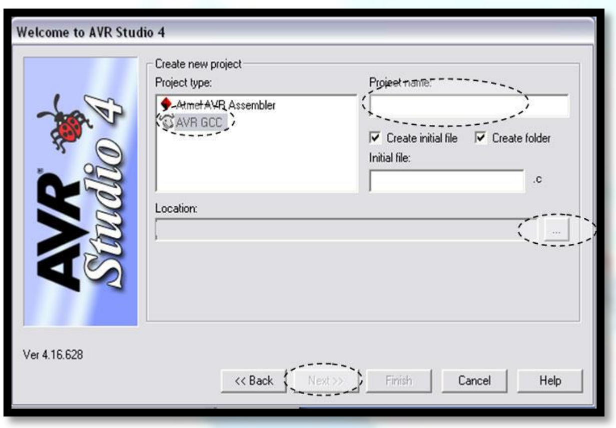
Step 2:



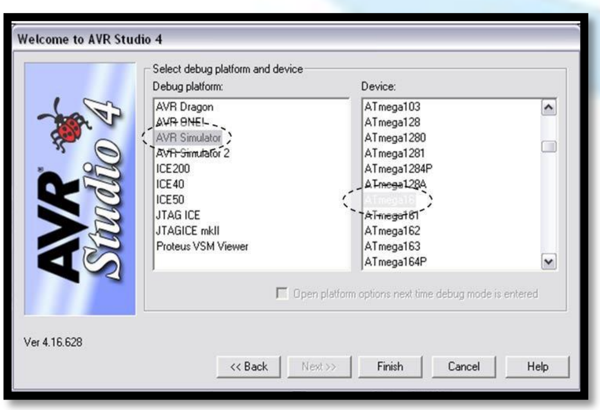
Click on new project

Step 3:



Click on AVR GCC, Write the project name, Select your project location. Click on Next>>

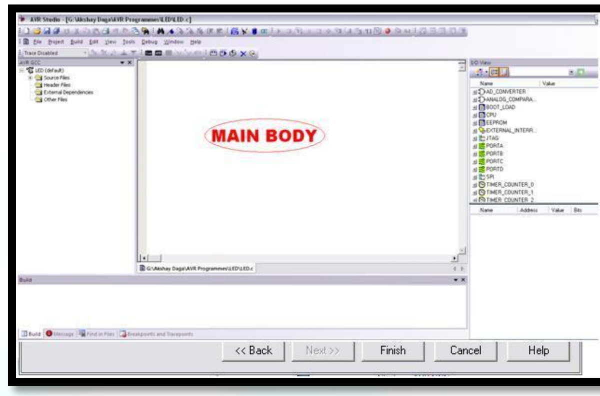
Step 4:



Click on AVR Simulator in left block and then select your controller (e.g.: ATmega16).

Click on finish button

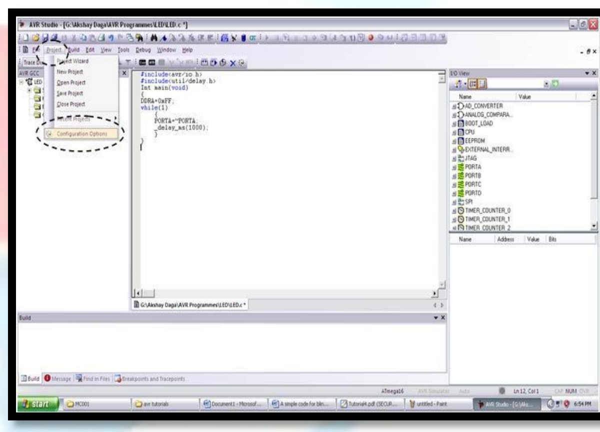
Step5:



Write the code in main body area.

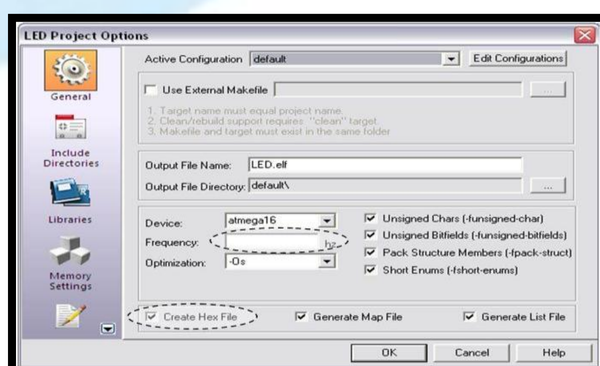
Save the project file.

Step6:



Go to PROJECT -> Configuration Options

Step 7:



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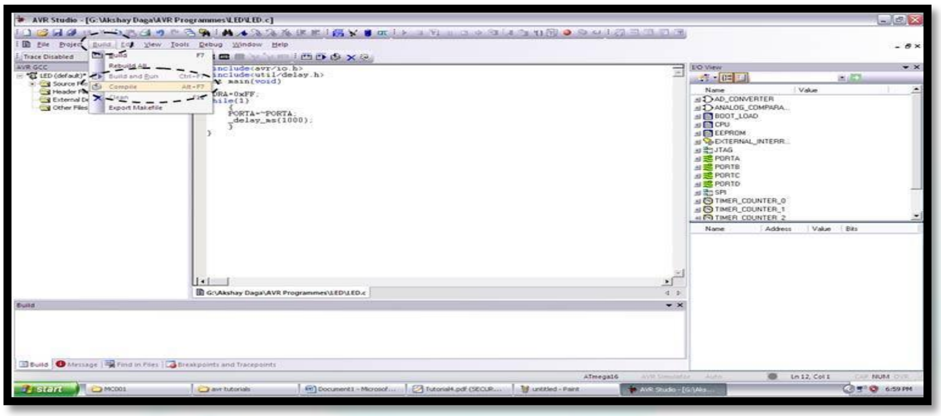
Write the crystal frequency if you are using external crystal.

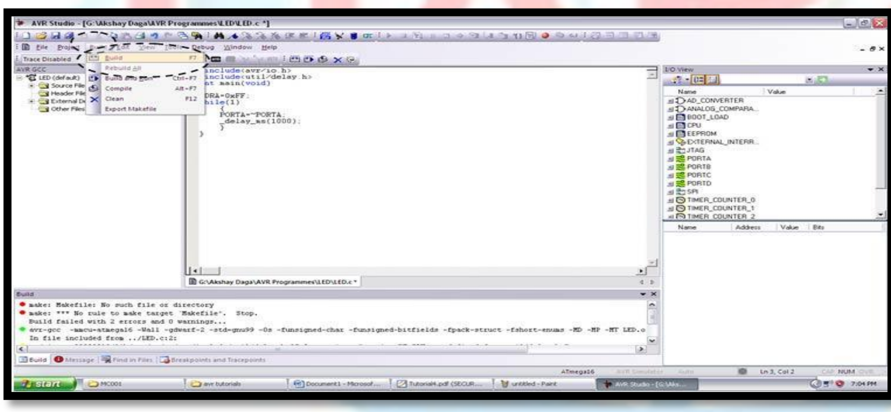
Check the checkbox corresponding to Create Hex File and then click on OK. Save the project again.

Step:8



Go to BUILD -> Compile, This will compile your code and generate error if any.
For the first time it will generate two errors, ignore them.

Step 9:



Just go to the location which you selected at the starting. Open that folder you will find one more folder named Default. This is the default location of where the hex file is generated.

V. CONCLUSION

The concept is to developed an embedded based automated vehicle accident detection system to detect the vehicle accident and notify regarding the same to the care taker indicating the place and time of the vehicle accident. In future we can extend this project further by connecting more devices to make configuration of a vehicle health monitoring system more effective.

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