

Automatic Vehicle Accident Detection & Messaging System Using GPS & GSM

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Abstract: -- Road accidents constitute the major part of the accident deaths all over the world. According to the Insurance Institute for Highway Safety (IIHS), new cars and its high-tech safety features have helped to lessen auto related deaths over the past 12 years. Though it credits technology for lessening auto accidents, yet the IIHS cannot help accusing bad driving behavior, like drunken driving, speeding and not using seatbelts for still causing major traffic deaths. Automatic vehicle accident detection and messaging system is an embedded intelligence implanted into the automobile. The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system Most of the times we may not be able to find accident location because we don't know where accident will happen. In order to give treatment for injured people, first we need to know where the accident happened through location tracking and sending a message to your related one or to the emergency services. So in this work we are using the basic microcontroller Arduino atmega328 for cost effective and also for easy understanding. Here we used assembly programming for better accuracy and GPS and GSM modules which helps to trace the vehicle anywhere on the globe. The exact location of the vehicle is sent to our remote devices (mobile phones) using GSM modem.

Keywords:-- Arduinoatmega328Microcontroller, Arduino Software, Vibration Sensor, GPS&GSM.

I. INTRODUCTION

Now-a-days it became very difficult to know that an accident has occurred & to locate the position where it has happened. There is no system of identification & intimation regarding an accident in previous Later on the SMS service begins for intimation purpose .The main intention of the project is to find the accident spot at any place & intimation it to ambulance or vehicle owner or relatives through the GPS&GSM networks Accident spot can be detected. When an accident occurs, by this project both information & location of the vehicle are sent through GSM&GPS.SMS can be received from the spot.

Automatic accident detection & messaging system execution is simple as the system makes use of GSM and GPS technologies. GPS is used for taking the coordinates of the site of the accident while GSM is used for sending the coordinates to cell phones. To make this process all the controls are made using Arudino328 where as a LCD is used to display the coordinates

II. ARDUINO ATMEGA328 MICROCONTROLLER

The high performance micro chip 8-bit AVR RISC based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counter with compare modes, internal and external interrupts, serial programmable USART, a byte oriented 2-wire serial interface SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The Atmega328 has 28 pins. It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins. These I/O pins account for 20 of the pin. As stated before, 20 of the pins function as I/O ports. This means they can function as an input to the circuit or as output. Whether they are input or output is set in the software. 14 of the pins are digital pins, of which 6 can function to give PWM output. 6 of the pins are for analog input/output. 2 of the pins are for

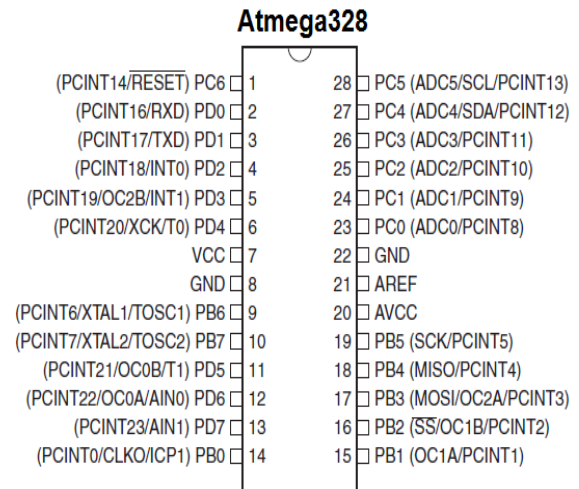
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the crystal oscillator. This is to provide a clock pulse for the ATMEGA chip. A clock pulse is needed for synchronization so that communication can occur in synchrony between the ATMEGA chip and a device that it is connected to.

The chip needs power so 2 of the pins, VCC and GND, provide it power so that it can operate. The Atmega328 is a low-power chip, so it only 1.8-5.5V of power to operate.

The Atmega328 chip has an analog-to-digital converter (ADC) inside of it. This must be or else the Atmega328 wouldn't be capable of interpreting analog signals. Because there is an ADC, the chip can interpret analog input, which is why the chip has 6 pins for analog input. The ADC has 3 pins set aside for it to function- AVCC, AREF, and GND. AVCC is the power supply, positive voltage, that for the ADC. The ADC needs its own power supply in order to work. GND is the power supply ground. AREF is the reference voltage that the ADC uses to convert an analog signal to its corresponding digital value.

Analog voltages higher than the reference voltage will be assigned to a digital value of 1, while analog voltages below the reference voltage will be assigned the digital value of 0. Since the ADC for the Atmega328 is a 10-bit ADC, meaning it produces a Since the ADC for the Atmega328 is a 10-bit ADC, meaning it produces a 10-bit digital value, it converts an analog signal to its digital value, with the AREF value being a reference for which digital values are high or low. Thus, a portrait of an analog signal is shown by this digital value; thus, it is its digital correspondent value .The last pin is the RESET pin. This allows a program to be rerun and start over. And this sums up the pin out of an Atmega328 chip.

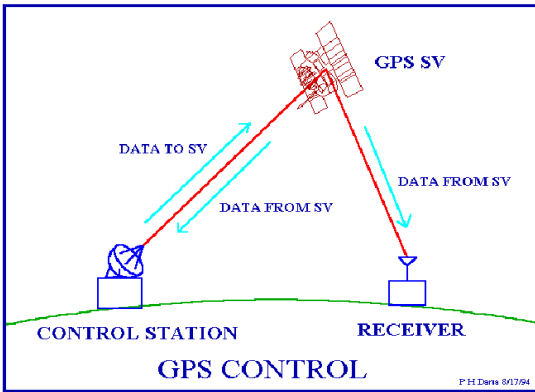


III. GLOBAL POSITIONING SYSTEM

GPS is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe. GPS provides continuous real time, 3-dimensional positioning, navigation and timing worldwide.

A satellite based positioning system available 24 /24h everywhere on the globe with an accuracy better than 100 m. Originally designed for navigation &real time positioning (meter-level accuracy): navigation (airplanes, ships, car, missiles, etc). It is also capable of mm-level accuracy, with important scientific “by-products”: 9In geodesy: shape and rotation of the Earth, terrestrial reference frame 9In solid Earth geophysics: deformation of the Earth’s crust (earthquakes, volcanoes, plate tectonics) 9In atmospheric sciences: tropospheric water vapor, ionospheric electron content.

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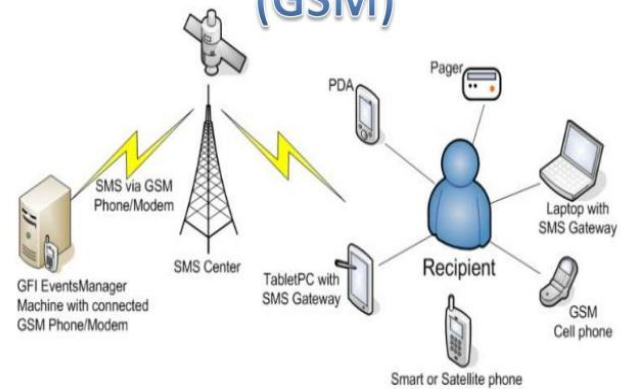
IV. GLOBAL SYSTEM FOR MOBILE COMMUNICATION

Global system for Mobile (GSM) is a second generation cellular standard developed to cater voice services and data delivery using modulation. GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network – Macro, Micro, Pico, femto, and umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the base station antenna is installed on a mast or a building above average rooftop level. Micro cells are cells whose antenna height is under average rooftop level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is a few dozen meters; they are mainly used indoors. Femtocells are cells designed for use in residential or small business environments and connect to the service provider’s network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

One of the key features of GSM is the Subscriber Identity Module, commonly known as a **SIM card**. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user

can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking.

Global System for Mobile (GSM)



V. BLOCK DIAGRAM & WORKING

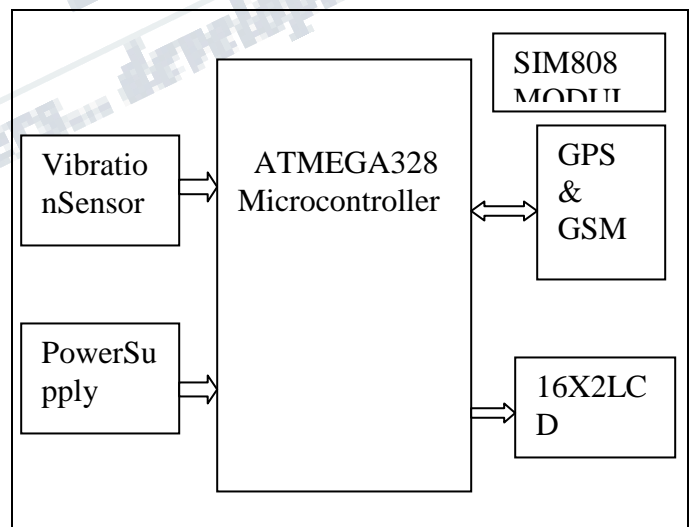


Figure: block diagram for automatic vehicle accident detection & messaging system using GPS & GSM

Accident detection and messaging system is easy and the components used vibration sensor,

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which detects the accident and it turn sends the signals to Arduino. At this point the Arduino takes control and starts collecting the coordinates received from the GPS which are later sent to the central Emergency Monitoring Station by using the GSM module.

The GPS module continuously produces a set of data regarding the position of the earth surface where it is situated which includes the current position with respect to the equator of the earth in term of latitude and longitude. This data can be decoded and printed into the readable format with the help of a microcontroller only. In this project the data regarding the geographical coordinate is extracted from the GPS output with the help of the ARDUINO.

GPS Antenna frequency range up to 1575.42MHz GSM module is interfaced to Arduino module serially. At commands are used to send messages from GSM module to the authorized users. GSM TX pin is connected to Arduino RX pin. GSM RX pin is connected to Arduino Tx pin.

In this project we are going to use an accident detection unit which will be fitted inside the front and rear bonnet of the car. This accident detection unit consists of two metallic plates which are kept at little distance apart from each other. In case of accident, if the car is hit to some other vehicle or an object then due to the impact the two metal plates will come in contact with each other. Due to this a signal will be sent to microcontroller. Microcontroller is the central processing unit CPU of our project. Once microcontroller gets signal from metal plates, then it will immediately turn on the LED.

A key will be provided for the driver. If the accident is very normal, or driver has hit the wall in some situations like parking then driver will press the key. This will inform the microcontroller that this is a very normal accident. But if driver is not in situation to press the switch or if the accident is really a major accident then driver will not press the key. Then

microcontroller will get the coordinates from the GPS modem then it will send this information to the GSM modem, GSM modem is used to send this information via SMS. SMS will be sent to the family member of the driver, so that they can take immediate action to help the persons suffering due to this accident.

VI. ARDUINO SOFTWARE

It is advanced software tool to insert a program in to Arduino Microcontrollers. Arduino provides an open-source and easy to use programming tool, for writing code and uploading it to ur board .it is often refer to as the Arduino IDE(Integrated Development Environment).the Arduino uses simplified variation of the c programming language. In this the created compiler takes the language specific text you enter for the program and converts it in to a machine readable form that is downloaded in to the controller .When the programmer executes, the controller executes the machine code line by line.

RESULTS

By using latitude and longitude values we can specify virtually any point on the Earth, we can identify the exact location of accidents through Google Maps

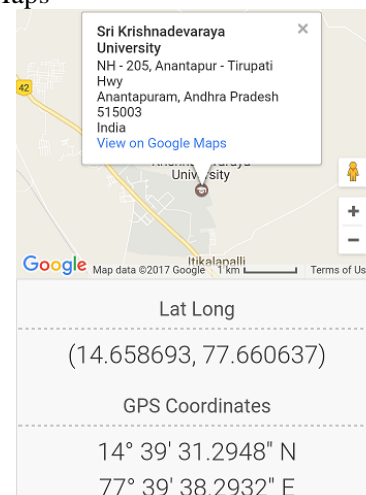


Figure: Exact Location of the Accident Detected

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VIII. CONCLUSION

To minimize the several conditions due to accidents the GPS & GSM technology or used where immediate action would be take space by the ambulance /police serves which might reduced the severity. The exact location of the vehicle by making used of Google maps can be detected.

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