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✉ ijareeie@gmail.com

@ www.ijareeie.com



A State of the Art Low Cost GSM based Vehicle Accident Alert Messaging System Design with Place Direction

T. Hossain¹, Md. Arifuzzaman², M. S. Ridoy³, R. Sultana²

Lecturer, Department of Electrical and Electronics Engineering, American International University, Bangladesh
(AIUB)¹

Assistant Professor, Department of Electrical and Electronic Engineering, Varendra University, Bangladesh²

Lecturer, Department of Electrical and Electronic Engineering, Varendra University, Bangladesh³

ABSTRACT: GSM Based Vehicle Accident Alert System using GPS, GSM. GPS detects the sudden change in the axes of vehicle and GSM module send the alert message on your Mobile Phone with the location of the accident. The advancing technology has made our day to day lives easier. Since every coin has two sides similarly technology has its benefits as well as its disadvantages. The rise in technology has increased the rate of road accidents which causes huge loss of life. The poor emergency facilities available in our country just add to this problem. Our project is going to provide a solution to this problem.

KEYWORDS: GSM, GPS, Crystal 16MHZ, Microcontroller

I. INTRODUCTION

The development of a transportation system has been the generative power for human beings to have the highest civilization above creatures in the earth. Automobile has a great importance in our daily life. We utilize it to go to our work place, keep in touch with our friends and family, and deliver our goods. But it can also bring disaster to us and even can kill us through accidents. Speed is one of the most important and basic risk factors in driving. It not only affects the severity of a crash, but also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental organizations all around the world by various programs to aware against careless driving, yet accidents are taking place every now and then. However, many lives could have been saved if the emergency service could get the crash information in time. As such, efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life. This system proposes to utilize the capability of a GPS receiver to monitor the speed of a vehicle and detect an accident basing on the monitored speed and send the location and time of the accident from the GPS data processed by a microcontroller by using the GSM network to the Alert Service Centre.

The usage of the automobile tracking device is for both individuals and commercial purposes. Individuals use the tracking system when their vehicle is missing or stolen. The usage of the tracking system also varies from small scale to big scale companies. The companies can quickly locate the cars and find whether if it has used correctly. It avoids the risk of using autos for any personal purposes without any official notice. Furthermore, it helps to manage the automobiles in systematic ways. It helps to avoid chaos in the companies. The system widely uses in the field of logistics, rental companies, day-cares, schools and public transportations like buses, trains, boats, ships. The technology system minimizes the illegal activities.

II. PROBLEM DEFINITION

Accident detection and vehicle messaging system using GSM modem which helps to detect accident. Vibration sensor (piezo-elements) comes in handy when you need to detect vibration or a knock. Can use these for tap or knock sensors pretty easily by reading the voltage on the output. Vibration sensor helps to send the signal to Microcontroller. Microcontrollers send the alert message through GSM modem with location [1]. If the person meets a small accident, the driver can inform attention is not required by terminating the message using switch. GSM modem is similar to



mobile phone without any display, keypad and speakers. This accepts a SIM card, and operates over a subscription to a mobile operator.

III.METHODOLOGY

The Prototype of this Accident Detection and information passing technique uses the following steps:

- The Complete Setup is depicted in the form of block diagram.
- Piezoelectric sensor detects the first occurrence of the accident and it is intimated to the Microcontroller [2].
- The Latitude and Longitude are detected using GPS and it is sent as message to the vehicle owner through GSM.
- The message receiver number is pre stored in the EEPROM.
- An OFF Switch is also provided at times of need to avoid false message.

GSM– GLOBAL SYSTEM FOR MOBILE COMMUNICATION

GSM is used as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. Thereby, here GSM is used to monitor and control the DC motor, Stepper motor, Temperature sensor and Solid State Relay by sending a message through GSM modem. Hence no need to waste time by manual operation and transportation. Hence it is considered as highly efficient communication through the mobile which will be useful in industrial controls, automobiles, and appliances which would be controlled from anywhere else. It is also highly economic and less expensive; hence GSM is preferred most for this mode of controlling. Hence this automatic system is more efficient and less expensive and more convenient to use from were ever possible [3]. Hence can be preferred mode of communication for controlling purpose.

GPS - GLOBAL POSITIONING SYSTEM

GPS is used in vehicles for both tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. Whether navigation system or tracking system, the architecture is more or less similar. When an accident occurred in any place then GPS system tracks the position of the vehicle and sends the information to the particular person through GSM by alerting the person through SMS or by a call. GPS module sends the data related to tracking position in real time, and it sends so many data in NMEA format. NMEA format consists of several sentences in which we only need one sentence. This sentence starts from \$GPGGA and contains the coordinates, time and other useful information. This GPGGA is referred to GLOBAL POSITIONING SYSTEM FIX DATA. Know more about NMEA sentences and reading GPS data here [4].

IV. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected [5]. From the past event and the existing approach the below Drawback are been noted:

- Manual system is adopted.
- Life loss and property loss were not stopped in large scale. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.
- The Automated system is used once the accident occurs.
- This system GSM will send the message to the More Human life can be saved using this automated system.
- Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

V. DESCRIPTION

This work Speed is one of the most significant causes of an accident. Nowadays, GPS receiver has become an integral part of a vehicle. Besides using in other purposes, the GPS can also monitor the speed and detect an accident. It can use a very cheap and popular GSM modem to send the accident location to the Alert Service Centre. It can also send the last speed before accident which will helps to assess the severity of the accident and can initiate a voice call. Beside the



automatic detection system, the vehicle occupant will be able to manually send the accident situation by pressing the Manual Detection Switch. A rescue measures in time with sufficient preparation at the correct place can save many life. Thus, the proposed system can serve the humanity by a great deal as human life is valuable.

VI. BLOCK DIAGRAM

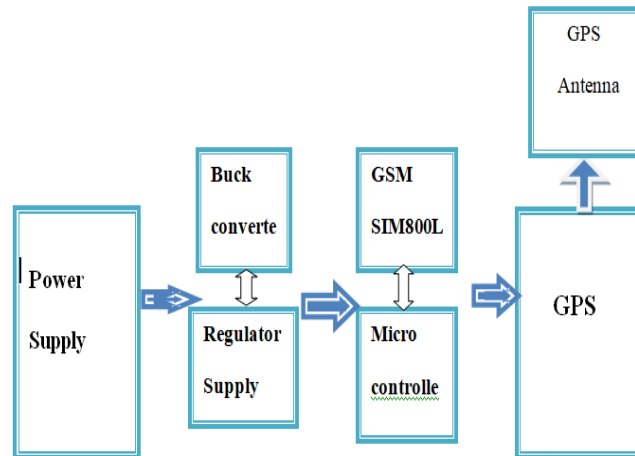


Fig -1: Block Diagram

1. AT MEGA 328P MICROCONTROLLER

The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core.

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

Burning the Boot loader-

- Upload the Arduino ISP sketch onto your Arduino board.
- Select "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu. ...
- Select "Arduino as ISP" from Tools > Programmer.
- Run Tools > Burn Boot loader.

ATMEGA328 is used similar to any other controller. All there to do is programming. Controller simply executes the program provided by us at any instant. Without programming controller simply stays put without doing anything [6].

As said, first we need to program the controller and that is done by writing the appropriate program file in the ATMEGA328P FLASH memory. After dumping this program code, the controller executes this code and provides appropriate response.

2. EEPROM

24C04 EEPROM is used in this project. This EEPROM stores the mobile numbers entered by the user for receiving accident alert SMS. The data stored in the EEPROM will retain even the power is off for long time.

3. Crystal 16MHZ

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency.



The way crystals (and ceramic resonators) work is that they are made of a piezoelectric material that produces a voltage when they are distorted in shape. The crystal is made into a shape that will physically resonate (like a tuning fork or a cymbal) at the desired frequency.

A crystal oscillator relies on the slight change in shape of a quartz crystal under an electric field, a property known as electrostriction or inverse piezoelectricity. A voltage applied to an electrode on the crystal causes it to change shape; when the voltage is removed, the crystal generates a small voltage as it elastically returns to its original shape[7]. The quartz oscillates at a stable resonant frequency, behaving like an RLC circuit, but with a much higher Q factor (less energy loss on each cycle of oscillation). Once a quartz crystal is adjusted to a particular frequency (which is affected by the mass of electrodes attached to the crystal, the orientation of the crystal, temperature, time and other factors), it maintains that frequency with high stability.

CIRCUIT DIAGRAM

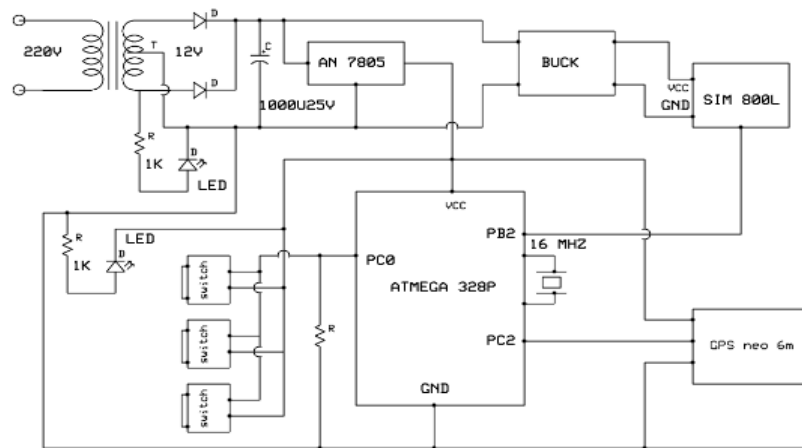


Fig -2: Circuit Diagram

VII. ADVANTAGES

- Isolates both GSM & GPM alerts hospital and vehicle owner about accidents.
- Simple design and can be interfaced with other systems.
- Easy to operate by the user.
- Reliable system.
- Easy to operate.
- Monitors hazards and threats.
- Sophisticated security.
- Simple and Reliable Design.

VIII. RESULT

The system detects accident from vehicle and send message through GSM module. The message is received by another GSM module. Google Map Module It displays Google map show you exact location of accident and it details. It gets detail SMS from accident location. Hence there is small variation in the coordinates, initial value of latitude and longitude are same but fractional value changes with small difference.

IX. SCOPE AND FUTURE WORK

A wireless webcam can be added in this for capturing the images which will help in providing driver`s assistance. This can also be bettered by locking all the brakes automatically in case of accident. Mostly in accidents, it becomes serious as the drivers lose control and fail to stop the vehicle. In such cases, the vibration sensor will be triggered because of the vibrations received and also processed by the processor. The processor has to be linked to the devices which can lock the brakes when triggered. With this improvement, we can stop the vehicle and can weaken the impact of the



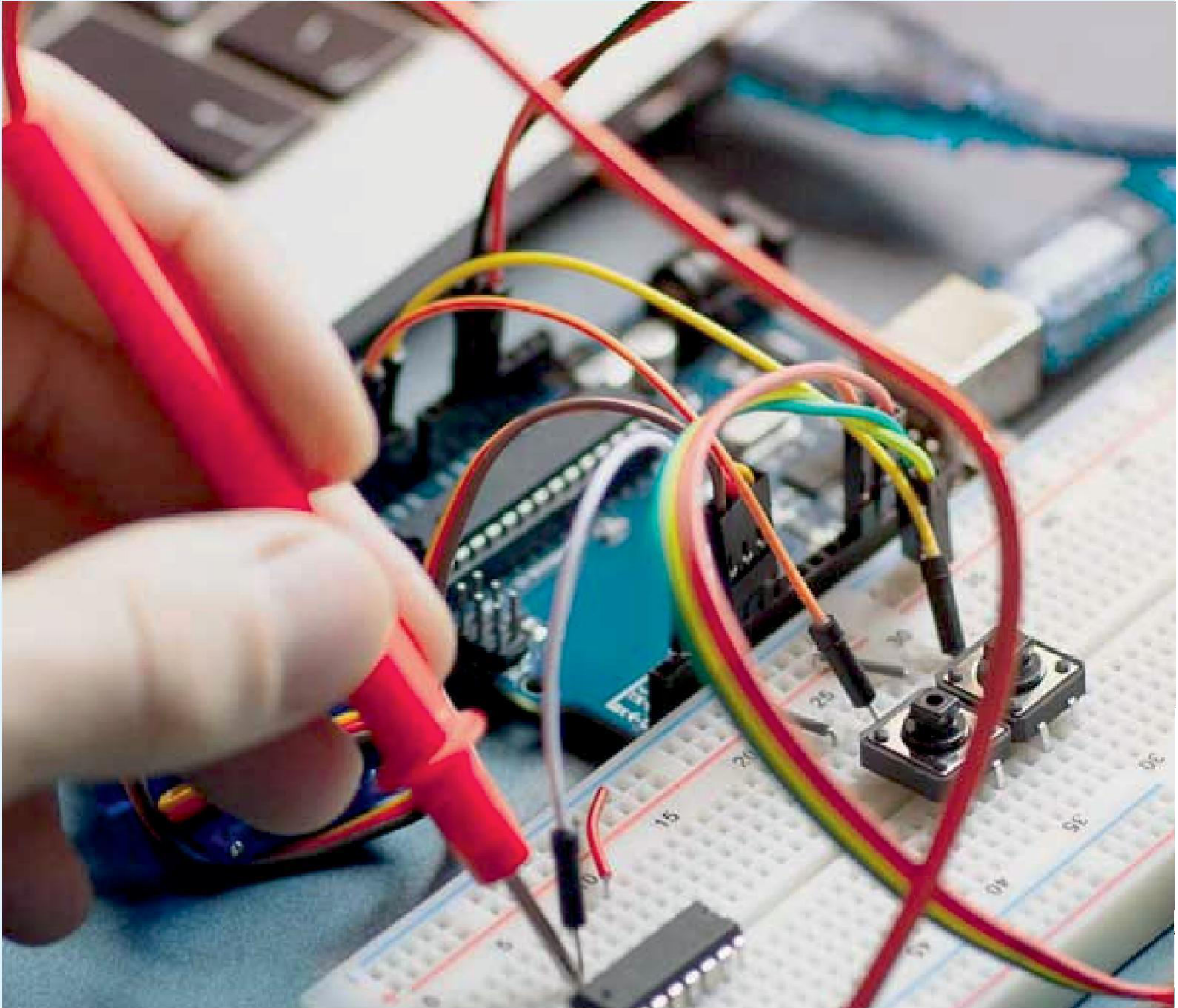
accident [8]. This system can also be utilized in fleet management, food services, traffic violation cases, rental vehicle services etc.

X. CONCLUSION

Our idea is used to detect accident and automate emergency assistance services. As a result, system is sending SMS to the nearest Emergency assistance service or vehicle owner provider from accident location. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. This design is a system which can detect accidents in significantly less time and sends the basic information. This alert message is sent to the rescue team or vehicle owner in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team or vehicle accident and the message is sent through the GSM module.

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