ACCIDENT AVOIDABLE SYSTEM USING ARDUINO NANO AND GSM

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Abstract- *The Rapid growth of technology and infrastructure has made our live easier. The advent of technology has also increased the traffic hazards and the road accident take place frequently which cause huge loss of life and property because of the poor emergency facilities. In this project, an IOT Based Accident Avoidable system using Arduino Nano and GSM is developed in order to detect vehicle accident and send location information to the mobile phone through message or SMS service.*

Key Words: IOT, Ultrasonic, Wire mesh, GSM LCD, ARDUINO.

1. INTRODUCTION

The development in the field of automobiles is highly increased and which lead to accidents and so many hazards due to traffic. People's life are under high risk. This situation prevails, just because there is a lack of emergency facilities in our country. In our country, many people lose their life because of accidents. Because of casualties or improper communication to rescue system. We are in the process of solving this issue by proposing an efficient solution and reduce the loss of lives as much as possible. In our theory, the design of the system helps us to detect accident in significantly minimum time and transfer the fundamental information to the first aid center within the few seconds covering the geographical coordinates, where the vehicle had met with an accident. The message is sent through the GSM module and location of the incident. The basic idea is to localize the vehicle system by receiving real time position through GPS and send the information through GSM module through SMS service.

1.1 Hardware Specifications

- Ultrasonic Sensor
- Wire mesh Sensor
- Arduino NANO
- GSM
- LCD Display
- Power supply
- Motor Driver
- Vehicle

1.2 Software Specifications:-
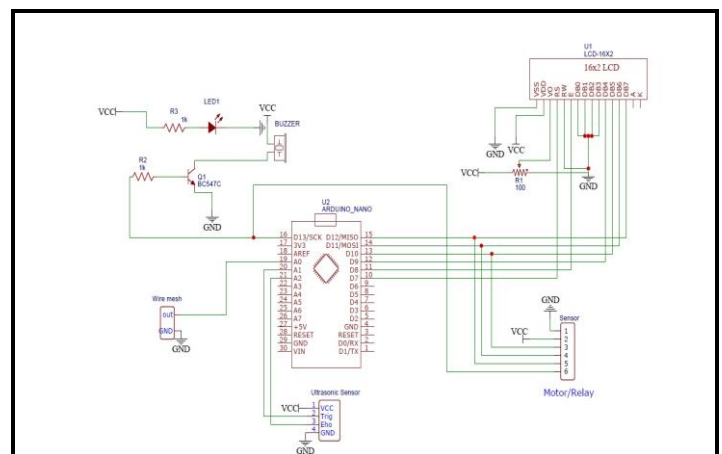
- Arduino Nano
- Programming Language: C

Figure - 1: Circuit diagram of Accident Avoidable System using Arduino Nano and GSM

2. PROBLEM STATEMENT

A large number of precious lives are lost due to road traffic accidents every day. The common reasons are driver's mistake and late response from emergency services. There is a need to have an effective road accident detection and information communication system in place to save injured persons. A system that sends information messages to nearby emergency services about the accident location for timely response is absolutely in need. These include accident detection using smart phones, GSM technologies, vehicular ad-hoc networks and mobile applications. The implementation of an automatic road accident detection and information communication system in every vehicle is very crucial. This paper presents a brief review on automatic road accident detection techniques used to save affected persons. An automatic road accident detection technique based on low cost ultrasonic sensors is also proposed.

3. ARDUINO NANO

Arduino Nano is a microcontroller board designed by Arduino.cc. The microcontroller used in the Arduino Nano is Atmega328, the same one as used in Arduino UNO. It has a

wide range of applications and is a major microcontroller board because of its small size and flexibility

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.
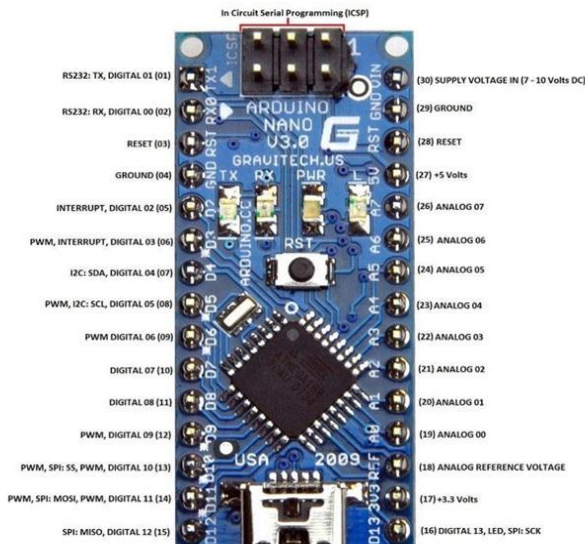

Figure - 2: ARDUINO Nano

Basic Features of Arduino Nano:

- It has 22 input/output pins in total.
- 14 of these pins are digital pins.
- Arduino Nano has 8 analogue pins.
- It has 6 PWM pins among the digital pins.
- It has a crystal oscillator of 16MHz.
- It's operating voltage varies from 5V to 12V.
- It also supports different ways of communication, which are:
    o Serial Protocol.
    o I2C Protocol.
    o SPI Protocol.
    o It also has a mini USB Pin which is used to upload code.
    o It also has a Reset button on it.

Memory in Arduino Nano

- Flash memory of Arduino Nano is 32Kb.

- It has preinstalled bootloader on it, which takes a flash memory of 2kb.
- SRAM memory of this Microcontroller board is 8kb.
- It has an EEPROM memory of 1kb.

4. GSM MODULE

GSM, Global System for Mobile communications, is today the most successful digital mobile telecommunication system. This second-generation (2G) system provides voice and limited data services and uses digital modulation with improved audio quality.

GSM Mobile communication system can be intelligently used by electronic devices that can collect some data and send it to the central place using SMS or GSM data call. It's required In-Vehicle Tracking Systems because GPS (Global Positioning System) can normally only receive location information from the satellites but cannot communicate back with them. Hence we need some other communication system like GSM to send this location information to the central control room. Other technologies can also be used but they are more costly.
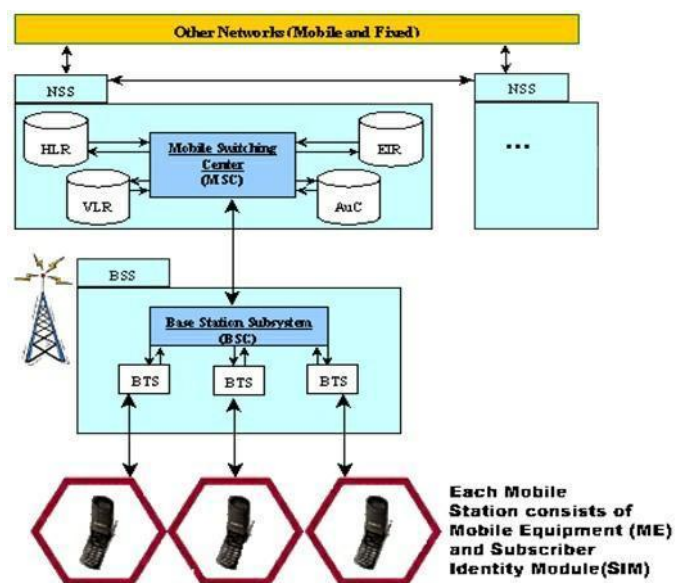
4.1. GSM Network Architecture

Figure - 3 : Block diagram of GSM Network Architecture

GSM Network consists of three main parts:

- Mobile Station (MS) carried by the subscriber
- Base Station Subsystem (BSS) controls radio link with mobile station
- Network & Switching Subsystem (NSS) mobility management and switching of calls between mobile users, and between mobile and fixed network users.

Mobile Station consists of:

- Mobile Equipment (ME) such as hand portable and vehicle mounted unit
- Subscriber Identity Module (SIM), which contains the entire customer related information (identification, secret key for authentication, etc).

Base Station Subsystem consists of:

- Base Transceiver Station (BTS) defines a cell and is responsible for radio link protocols with the Mobile Station
- Base Station Controller (BSC) controls multiple BTSs and manages radio channel setup, and handovers. The BSC is the connection between the Mobile Station and Mobile Switching Center.

5. METHODOLOGY

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

1. The Complete Setup is depicted in the form of block diagram.

2. Piezoelectric sensor detects the first occurrence of the accident through wire mesh used and it is intimated to the Arduino Nano system.

3. The Latitude and Longitude are displayed on the LCD display and a message is sent to the emergency numbers through GSM giving a warning of the distance.

4. The message receiver number is pre stored in the GSM system.

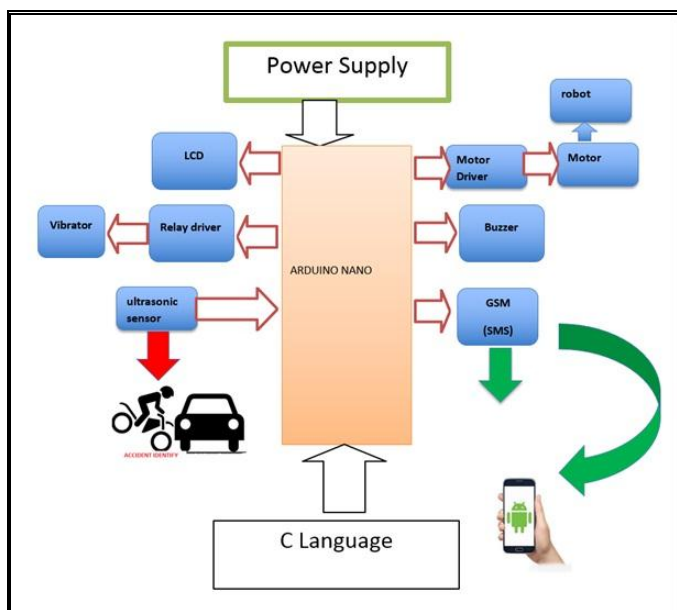5. A OFF Switch is also provided at times of need to avoid false message

Figure - 4 : Block diagram of Accident Avoidable System using Arduino Nano and GSM

5.1 WORKING

To overcome the existing problem we will implement a new system in which there is automatic detection of the accident. A vibration sensor is fitted in every vehicle and when an accident occurs, signals from the vibration sensor are sent to the Arduino Nano. The signal is transferred from Arduino to the central unit using IoT platform. The GPS module provides the latitude and longitude coordinates of victim vehicle which are sent to the control using IoT platform. The central unit sends the location coordinates to the mobile phone to the emergency numbers registered in the system.
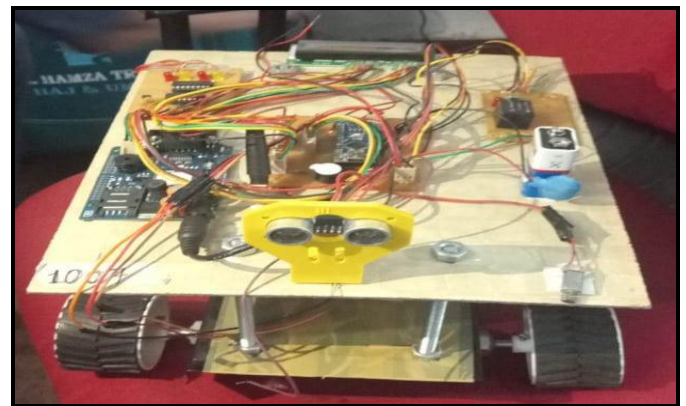

Figure – 5: Actual model of the project

5.2 ADVANTAGES

- It is easy to design and manufacture as all the components are easily available.

- It is highly accurate and precise and also very reliable.

- It is portable and hence can be placed anywhere.

- The use of a micro-controller increases its scope of applications and modifications.

- Power consumption is less

- It has low cost of manufacturing

- The uC can be reprogrammed if any modification

5.3 DISADVANTAGES

- If power supply fails; system won't work.

- Failure of device/components may have dire consequences, fatal accidents can occur.

6. CONCLUSIONS

The proposed system deals with the accident alerting and detection. Microcontroller is the heart of the system which

helps in transferring the message to different devices in the system. Impact sensor will be activated when the accident occurs and the information is transferred to the registered number through GSM module. Using GPS the location can be sent through tracking system to cover the geographical coordinates over the area.
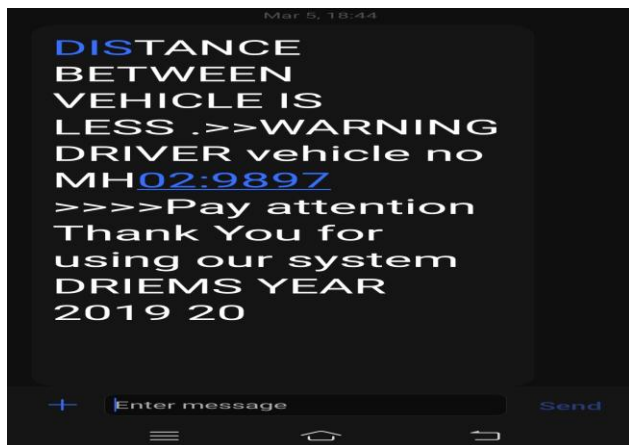
7. RESULT

Figure - 6: Warning SMS sent to the emergency numbers

The above us the SMS received as the result of less distance between the vehicle and the obstacle.
Emergency numbers can be added while coding the program.

8. FUTURE SCOPE

In future they developed android application system will ensure the safety of the old aged people and reduce risk of physically challenged people by alerting the user fall detection and the abnormal health condition. The system supports independent living and confidence of the old aged people effectively. And also the system is greatly user interface. The sensors used in this project also wearable and light weight and the transmission range of the system is very high because of the GSM, is the major highlight of the project.

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

9. ACKNOWLEDGEMENT

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