Vehicle Navigation and Accident Identification in Foggy Weather Condition using GSM and GPS

S. Iyyappan[1], D. Deepak[2], K. Vijayakumar[3], Bakkiyalakshmi[4]
[1,2,3]*Assistant Professor, Dept. of EEE, Ganadipathy Tulis's Jain Engineering College, Vellore, India*
[4]*Assistant Professor, Dept. of ECE, Ganadipathy Tulis's Jain Engineering College, Vellore, India*

Abstract - The objective of this project is to efficiently avoid early accidents in bad weather conditions such as snow fall and rainy. In our proposed method the relative distance of all the vehicles around a particular vehicle is estimated and alerts the driver to avoid early collisions. Besides this facility, we also provide an accident detection system which detects the accidents and sends the information about the location of the accident to the control station and relatives. It is most useful information to save the persons.

Keywords - Vehicle Navigation, Foggy Weather, GSM, GPS.

1. INTRODUCTION

The increasing demand for flexibility as well as technological Even though there are several advanced technological innovations are available today for vehicle safety, the growth in the number of accidents is continues regularly. And most of these accidents are especially due to collision or intersectional accidents. One of the most important causes behind the intersectional accident is bad weather conditions. Recently it has been reported that nearly 36% of the accidents in the India are occurred due to bad weather conditions. Here bad weather condition means a high rain or high snow falling or bad dark light etc. in those specific conditions the drivers feel very hard to drive to recognize the vehicles and speed of the vehicles which passing around them and may cause to severe accidents. Therefore using this paper we proposes a systematic architecture to reduce the accidents occurred due to adverse bad weather conditions and we also provide an accident detection system and as well as we send the location information of accident to the police station and to relatives to save the lives by using GPS and GSM. Our proposed collision avoidance system is operates in the following way: Initially the humidity sensor is used to sense the weather conditions. If the weather conditions are adverse or bad then a warn signal will alerts the driver. Similarly ultrasonic sensors are placed in all directions of the vehicle except in back side and these sensors are regularly scans the road ahead for obstacles or vehicles and if any obstacle or vehicle find, then warning is given to the driver.

If any vehicle is very near than predefined threshold value then automatically the speed of the vehicle reduces abruptly. Another facility that we provide besides it is an automatic accident detection and information passing system. Using automatic accident detection system, if an accident occur then we can immediately transmits the location and time of the accident to the ambulance control room and to the relatives which is very helpful information in saving their lives.

2. PROPOSED SYSTEM

In our proposed method the relative distance of all the vehicles around a particular vehicle is estimated using Ultrasonic sensors. This distance information alerts the driver to avoid early collisions. Besides this facility we also provide an accident detection system which detects the accidents by using vibration sensor and GPS and we send the information about the location of the accident place to a predetermined number using GSM. The mist formation is avoided using the humidity sensor by which air conditioner turns on to clear the mist on the front glass of the vehicle.

3. HARDWARE IMPLEMENTATION

A. BLOCK DIAGRAM

If a vehicle has met accident, vibration sensor gives the electric signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to control section through GSM. Ultrasonic sensor gives the electric signal to microcontroller through signal conditioner. Ultrasonic sensor is placed in front of the vehicles in three positions and senses the nearby vehicle or obstacle. Humidity sensor gives the electric signal to microcontroller through signal conditioner, and then it can sense low temperature after they start the dc motor.

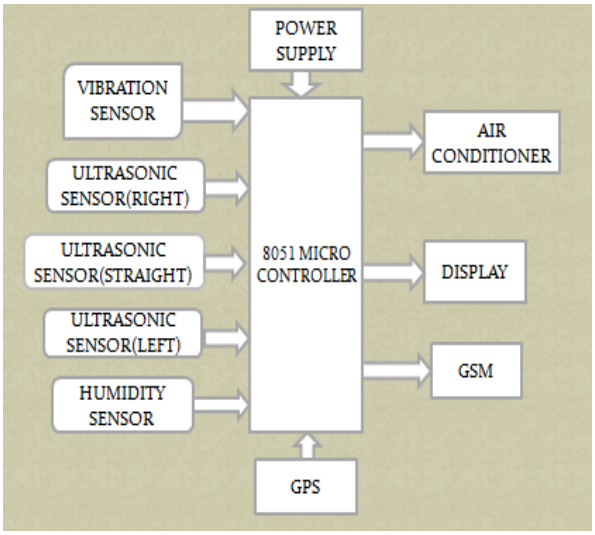

Fig 2.1 Block diagram

B. CIRCUIT DIAGRAM

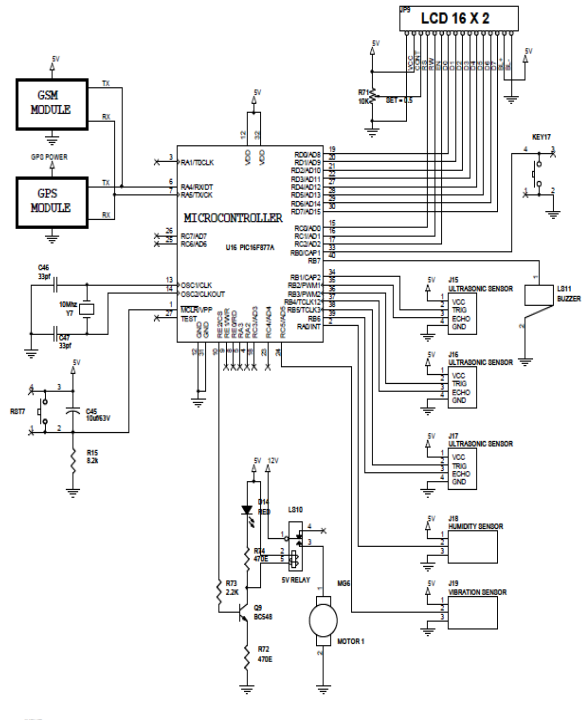

Fig 2.2 Circuit diagram

C. ULTRASONIC SENSOR

Ultrasonic sensors (also known as transceivers when they both send and receive) 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. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

D. HUMIDITY SENSOR

The Humidity Detector is designed to monitor the current temperature and humidity of ambient environment. The reading of humidity can be reported to you on a regular base at your disposal.

If humidity reaches set points, the detector will send alerts to associated devices for further execution.

Since sudden humidity change may cause health problems to people such as elderly or very young children.

Choosing a Suitable Location

The Temp./Humid. Detector can either be mounted on a wall or can be freestanding on a table. Please consider a most suitable way before mounting/ placing it.

E. VIBRATION SENSOR

Despite the advances made in vibration monitoring and analysis equipment, the selection of sensors and the way they are mounted on a machine remain critical factors in determining the success of any monitoring program. Money is saved by installing inferior sensors is not a prudent investment since the information provided about the machine of interest often is not accurate or reliable. Poor quality sensors can easily give misleading data or, in some cases, cause a critical machine condition to be completely overlooked.

Selection of Vibration Sensors

The three parameters representing motion detected by vibration monitors are displacement, velocity, and acceleration. These parameters can be measured by a variety of motion sensors and are mathematically related

(displacement is the first derivative of velocity andvelocity is the first derivative of acceleration). Selection of a sensor proportional to displacement, velocity or acceleration depends on the frequencies of interest and the signal levels involved.

F. DISPLACEMENT SENSORS

Eddy current probes are non-contact sensors primarily used to measure shaft vibration, shaft/rotor position and clearance. Also referred to as displacement probes, eddy current probes are typically applied on machines utilizing sleeve/journal bearings. They have excellent frequency response with no lower frequency limit and can also be used to provide a trigger input for phase-related measurements.

G. VELOCITY SENSORS

Velocity sensors are used for low to medium frequency measurements. They are useful for vibration monitoring and balancing operations on rotating machinery. As compared to accelerometers, velocity sensors have lower sensitivity to high frequency vibrations. The mechanical design of the velocity sensor; an iron core moving within a coil in a limited magnetic field, no clipping of the generated signal occurs, but smooth saturation. In an accelerometer with ICP electronics, sensor resonance excitation can cause saturation and clipping of the electronic circuit generating false low frequency components. Integrating to velocity from the acceleration signal leads to large low frequency components. Resonance damping circuits between sensor element and amplifier can minimize that effect.

THE SENSITIVITY RANGE

The sensitivity of industrial accelerometers typically range between 10 and 100 mV/g; higher and lower sensitivities are also available. To choose the correct sensitivity for an application, it is necessary to understand the range of vibration amplitude levels to which the sensor will be exposed during measurements. As a rule of thumb, if the machine produces high amplitude vibrations (greater than 10 g RMS) at the measurement point, a low sensitivity (10 mV/g) sensor is preferable. If the vibration is less than 10 g RMS, higher than 10 mV/g up to 100 mV/g should be used. In no case should the peak g level exceed the acceleration range of the sensor.

Velocity sensors with sensitivities ranging from 20 mV/ in/sec to 500 mV/in/sec (0.8 mV/mm/sec to 20 mV/mm/sec) are available. For most applications, a sensitivity of100 mV/in/sec (4 mV/mm/sec) is satisfactory.

THE FREQUENCY RANGE

The high frequency range of the sensor is constrained by its increase in sensitivity as it approaches resonance. The low frequency range is constrained by the amplifier roll off filter, as shown in Figure 3. Many sensors have a passive low pass filter between sensor element and the amplifier in order to attenuate the resonance amplitude. This extends the operating range and reduces electronic distortion. The user should determine the high frequency requirement of the application and choose a sensor with an adequate frequency range while also meeting and amplitude range requirements.

H. GSM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities. For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.A GSM modem exposes an interface that allows applications such as NowSMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an “extended AT command set” for sending/receiving SMS messages.

Mobile Station

The mobile station (MS) consists of the mobile equipment (the terminal) and a smart card called the Subscriber Identity Module (SIM). The SIM provides personal mobility, so that the user can have access to subscribed services irrespective of a specific terminal. By inserting the SIM card into another GSM terminal, the user is able to receive calls at that

terminal, make calls from that terminal, and receive other subscribed services

I. GPS

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth.It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. The GPS program provides critical .capabilities to military, civil and commercial users around the world GPS is the backbone for modernizing the global air traffic system. A GPS navigation device is any device that receives Global Positioning System (GPS) signals to ascertain the device's location on Earth. GPS devices provide latitude and longitude information, and some may also calculate altitude, although this is not considered sufficiently accurate or continuously available enough (due to the possibility of signal blockage and other factors) to rely on exclusively to pilot aircraft. GPS devices are used in military, aviation, marine, and consumer-product applications.

4. HARDWARE RESULT

The best way to implement our ideas and view is to develop them in form of hardware, which will be useful or us to drive and find any practical difficulties in the implementation.

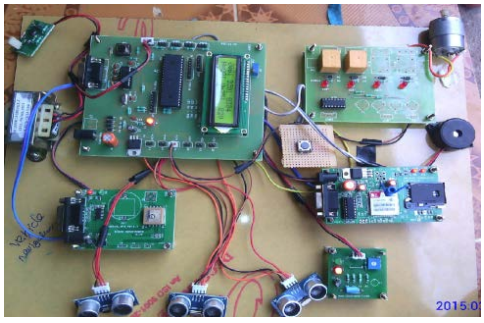

Fig 4.1 Hardware image

As per the conditions it is the best way to develop co-designing process where both the hardware and software programming should synchronize mutually the hardware and software design specification is done initially such that which is suitable for what sort of operations to be performed. As far as this project is concerned the hardware is basically designed for automatic accident detection and avoiding delay to reach hospital as a result the loss of human life is prevented.

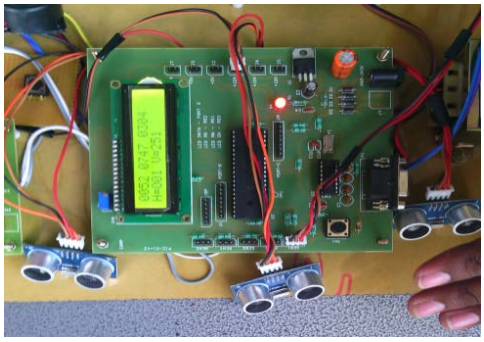

Fig 4.2 Vehicle navigation

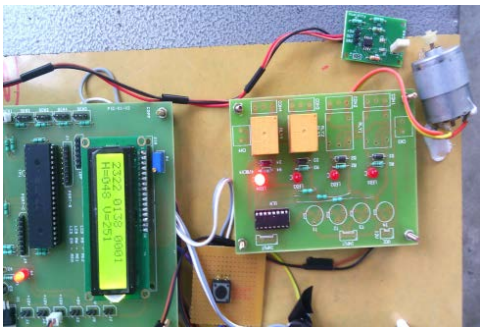

Fig 4.3 Clearing mist on the front glass

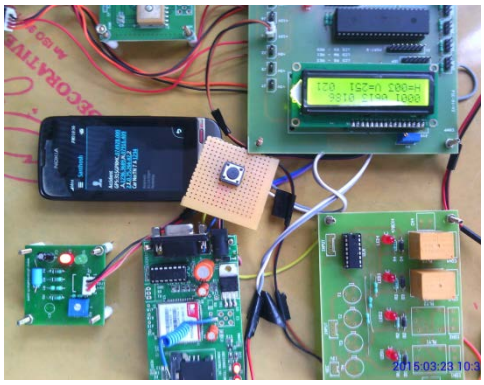

Fig 4.4 Accident detection and alert

5. CONCLUSION

In this project a novel idea is proposed to efficiently avoid early accidents in bad weather conditions such as snow fall and rainy by sensing the relative distance of all the vehicles around a particular vehicle is estimated and alerts the driver to avoid early collisions. We also provide an accident detection system which detects the accidents and sends the information about the location of the accident to the control station and relatives. It is most useful information to save the human life. And also senses the weather conditions which create mist on the front glass of the vehicle to clear the mist by controlling the air conditioner. If this system is implemented in snow fall and rainy areas like DELHI, KASHMIR can produce better results. This project is more

accurate with no loss of time. But there may be a delay caused because of GSM messages since it is a queue based technique, which can be reduced by giving more priority to the messages communicated through the server.

6. ACKNOWLEDGEMENT

I articulated my gratitude to Mr. M.Sudhakaran, M.E (PhD), Head of the Department of Electrical and electronics engineering who had thought as the way to do a successful project and without whose constant encouragement and whole idea, the project would not have been possible. I wish to express my sincere thanks to our colleagues who had helped me lot and has given valuable suggestion, which made us to accomplish this project in very successful and next way.

REFERENCES

[1] Advanced Accident Avoidance System for Automobiles

[2] Automatic accident detectionAnd ambulance rescue with Intelligent traffic light system

[3] Train Collision Avoidance System Using Vibration Sensors And Zigbee Technology

[4] Internet of Car: Accident Sensing, Indication and Safety with Alert system

[5] Malik Tubaishat, Qi Qi, Yi Shang, Hongchi Shi "Wireless Sensor-Based Traffic Light Control" IEEE CCNC 2008 proceedings 1-4244-1457-1/08

[6] Qingfeng Huang and Ying Zhang. "Dynamic balancing of push and pull in a distributed traffic information system." In IEEE Consumer Communications and Networking Conference (CCNC 2007), 2007.

[7]. Xu Li, Wei Shu, Minglu Li, Hong-Yu Huang, Pei-En Luo, Min-You Wu, "Performance Evaluation of Vehicle-Based Mobile Sensor Networks for Traffic Monitoring" IEEE transactions on vehicular technology, May 2009, vol. 58, no. 4, pp. 1647-1653

AUTHOR'S PROFILE

Mr. S. Iyyappan has received his B.E degree (Electronics and instrumentation Engineering) in 2011 from Arunai Engineering College, Anna university, Chennai, India and M.E degree (Embedded System Technologies) in 2013 from Ganadipathy Tulsi's Jain Engineering College, Anna university, Chennai, India. Currently he is working as assistant professor at Ganadipathy Tulsi's Jain Engineering College, vellore. His areas of interests are industrial automation, Digital Electronics and Embedded Systems.

Mr. D. Deepak has received his B.E degree (Electrical and Electronics Engineering) in 2008 from Ganadipathy Tulsi's Jain Engineering College, Anna University, Chennai, India and M.E degree (Applied Electronics) in 2010 from Sri Balaji Chokkalingam, Engineering College, Anna University, Chennai, India. Currently he is working as assistant professor at Ganadipathy Tulsi's Jain Engineering College, vellore. His areas of interests are Electrical machines and Protection and Switchgear.

Mr. K. Vijayakumar has received his B.E degree (Electrical and Electronics Engineering) in 2009 from Mailam Engineering College, Anna University, Chennai, India and M.E degree (Applied Electronics) in 2013 from Dr. Paul's Engineering College, Anna University, Chennai, India. Currently he is working as assistant professor at Ganadipathy Tulsi's Jain Engineering College, vellore. His areas of interests are Electrical machines and Protection and Switchgear.