

Object Detection in Fog Environment



P. Amarendra Reddy, G. Sowmya, S. Spandana, V. Sri Durga

Abstract—On the increasing count of accidents in fog, we came up with an idea of reducing them with the use of IOT. Our project is designed in such a way that the driver can be notified through voice assistance regarding any objects if present ahead of the car. In addition, in case the driver is met with an accident the system will send a message to the emergency contact regarding the location of the driver. To implement this we have used ultrasonic sensor to detect the object and the distance between them so that the driver can be notified. We used vibration sensor to detect accidents and Bluetooth to provide voice assistance through app. We also used an LCD screen to display the result for convenience.

Keywords—Bluetooth, Ultrasonic sensor, Voice assistance, App, Accidents, Fog

I. INTRODUCTION

In India, Road accidents on highways are increasing day by day and so there is a need to design a system that allows detecting vehicles on the roadways. Speaking about the transportation system in India, we have roadways, railways, airways and waterways. In spite of many glitches, we Indians consider roadways as one of the convenient ways of travelling. Our project is aimed to overcome these road traffic woes by using the latest technology. Recent study on road accidents for 10 years shows (2002-2018), twenty per cent (20%) of climate-related incidents happened due to fog. There are also self driven vehicles that are automated and made in such a way that they detect any possibility of accidents and road traffics as well but they proved they are not capable completely to let it be automated. There is no existing system that has been developed to let self drive vehicles out in the fog. We have developed our project in a way that it can notify or rather alert the driver in case of presence of objects in a foggy environment when a driver cannot see.



The driver is informed about the vehicle at what distance it is so that the speed of the vehicle can be reduced to avoid the number of accidents on the highway.

II. LITERATURE SURVEY

A. Existing System

After research on the existing system of our project, we came across fog lights that could help in avoiding the accidents. FOG Lights are designed to use when the visibility is restricted, mainly in fog, snow or heavy rain. They can be used to look ahead when the way is not clear and its range is restricted for a short path. However, the point, which helped us with our project's development, is that- brake lights. Rear fog lights usually make the other motorists uncertain about brake lights and may prevent drivers from behind realize that our vehicle has come to a stop. Both, the front and rear fog lights create unnecessary glare in good visibility. Therefore, whenever we have good visibility, one must turn their fog lights off manually remembering it.

B. Proposed System

Our project is designed to avoid the number of accidents that take place during a foggy environment. With the help of IOT, we will be able to detect the objects ahead while driving and it can come to the driver's notice with the help of a voice assistant mentioning the presence of object from a certain distance. The distance between the object and the vehicle is calculated by the ultrasonic sensor. There are major accidents that took place in the fog environment, which drew our concern towards it, and we would like to put forth a solution to avoid these accidents. We, apart from only notifying the drivers about the object, provide assistance to notify the driver's emergency contact regarding the location of the driver in case an accident takes place. With the help of GPS module, we track the location of the driver and share it to the GSM module through which the details are sent.

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III. SYSTEM DESIGN

This chapter deals with working and circuits of “Object Detection in Fog Environment with warning messages using GPRS/GSM”. It can be understood by its block diagram & circuit diagram.

C. Requirements

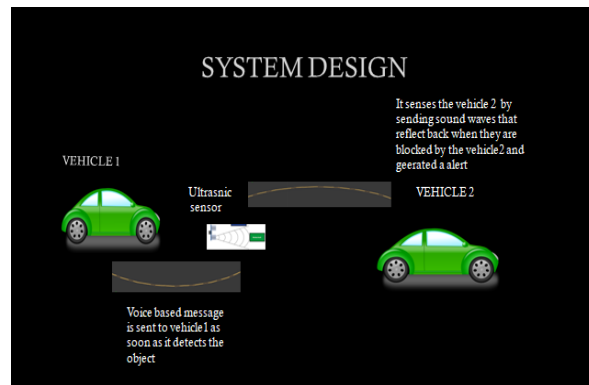
- ❑ Software
 - Arduino IDE
 - Arduino programming
- ❑ Hardware
 - Arduino UNO
 - GSM module
 - Buzzer
 - vibration sensor
 - Mobile phone
 - 7805 for external power supply
 - ultrasonic sensor
 - Bluetooth

The advantage of this proposed system is to avoid accidents in fog environment. Bluetooth is used to receive the notification when the object is detected. Here vibration sensor is used for Accident detection and Ultrasonic sensor is used for detection of vehicles when they get closer to us. It raises a buzzer alarm and Message to the particular number via GSM when the person meets with an accident.



All the basic components of the system are shown in the above block diagram. Arduino AT Mega 328 an AVR core is the microcontroller to which all the sensors and other components of the system are connected. The microcontroller reads all the data from sensors. The transmitter section consists of four sensors, one microcontroller, one GSM modem. When any of these sensors receive signal, they are sent to Arduino and through Arduino any notification is passed to the driver based on the type of signal initiated. A microcontroller is the heart of the system. It controls all the operation related to the accident or vehicle detection. The message will be sent to ambulance, police station and to one of the emergency contacts with GSM modem when an accident takes place i.e., when the vibration sensor receives signal.

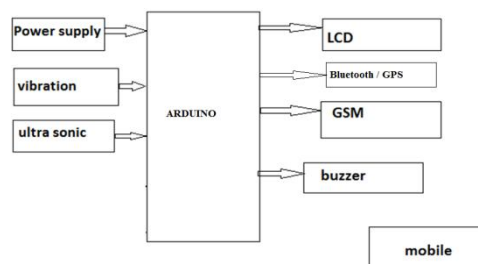
Ultrasonic sensor module HC - SR04 ranges between 2cm - 400cm providing non-contact measurement function, the ranging accuracy can reach to 3mm. This short scale ultrasonic sensor might have only short distance range. There are other ultrasonic sensors that can detect objects from 3 to 13 feet. The modules include ultrasonic transmitters, receiver and control circuit.



D. Working

The foremost module in our project was to detect an object ahead of the driver. This detection is done using the ultrasonic sensor. Not only does this sensor detect but also calculates the distance between the object and the sensor. As soon as it detects the object, the distance is cast on to the LCD screen and a signal is transmitted to Bluetooth module.

As soon as the Bluetooth module's state changes on receiving a signal through a mobile application, the message from the Bluetooth module is sent to the app by synchronizing with the mobile's Bluetooth. Here, the mobile app acts as a voice assistant and alerts the driver by speaking out the distance calculated by the ultrasonic sensor when an object is detected.



There are no predictions for the safety of a vehicle, so in case of accidents, the product has to notify the emergency contact with the location of the driver. To send the location, we use GPS and a GSM module is used to send the location to an emergency contact. The coordinates can be opened in google maps or any other map application to know the location of the incident. In addition, a buzzer is activated when an accident takes place and the coordinates are displayed on the LCD screen while parallel sending the message to the contacts.

IV. FEASIBILITY

A. Feasibility Analysis

An important aspect to discuss about the system is its feasibility. Feasibility depends on the resources and time the system is limited to. There are three brief types of feasibility that are discussed here:

- Operational Feasibility
- Economic Feasibility
- Technical Feasibility
- **Operational Feasibility**

Operational Feasibility is the study of lookouts of the system to be developed. This system eliminates or rather reduces human stress while driving in the fog by notifying the driver through a mobile app by providing voice assistance.

□ **Economic Feasibility**

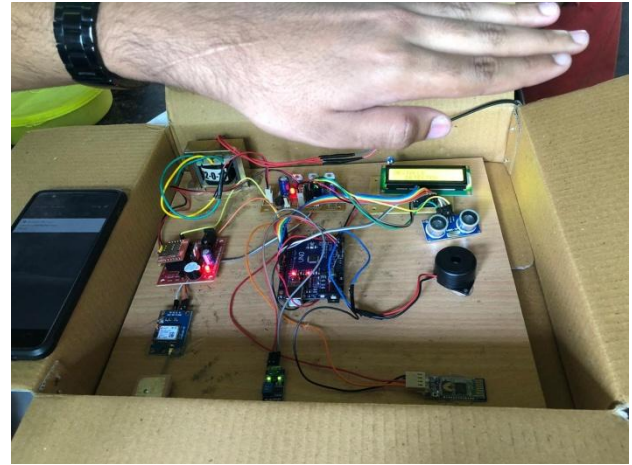
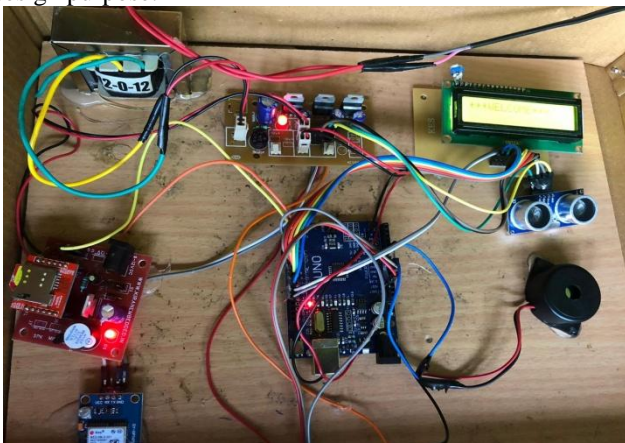
Economic Feasibility or Cost-benefit is a work of the economic justification for an IOT based project. Hardware is the building block of this project. The cost of hardware is less and affordable by common people and also with the innovation for society, we look forward to use hardware at an affordable cost. The sensors are not too costly when compared to other technologies, so the project is economically feasible. With future enhancements, we look forward to making it cost-effective so that it can be availed by all the commoners.

□ **Technical Feasibility**

According to Roger S. Pressman, Technical Feasibility is the assessment of the technical resources we use to develop the project. We have used the Internet of Things for the detection of objects and mobile application to actively interact with the driver. In addition, the Internet of Things has created a growing era where humans interact with smart devices through the internet. We also look forward to collaborating the project with chatbot by using artificial intelligence, which might increase the cost but would totally be worth for a product like this.

V.IMPLEMENTATION

The ultrasonic sensor detects if an object is there and calculates the distance and alerts the Bluetooth, which shares this information with the mobile and the app, provides the voice assistance and notifies regarding the object. The vibration sensor is activated if the car undergoes an accident and the Arduino activates the GPS module and after tracking the location, it sends it to GSM module and the GSM module sends the location of the driver to one of his emergency contacts. The ultrasonic sensor we have used is set for a distance of 40cm at maximum in this project for design purpose.



V.LIMITATIONS

- The ultrasonic sensor currently works for only small distance around 20-40cm, when this project overcomes all the barriers, ultrasonic sensors of a range up to 400cm, 13 feet based on our requirement.
- We have set the range in real time to 50 meters to reduce the speed of the car before it approaches the object.
- The sensitivity of the vibration sensor must be altered when it comes to a real-time project in order to detect the accidents.

VII. FUTURE ENHANCEMENT

- In this project, we just designed a prototype to detect objects ahead of the moving vehicle, notify the driver, and in case of accident to contact, the emergency contact regarding the location at which accident took place.
- We look forward to bring it into the limelight in order to help the society for a better living.
- We would like to enhance it to detect potholes or water bodies around the moving vehicle and notify the driver in the language he is convenient to communicate with the app.
- A communicative chatbot would be effective to keep the driver awake while driving.

VIII.CONCLUSION

Based on our research from 2002-2018, we have come across too many accidents to count and found no real time measures taken to regulate these accidents and here we are proposing a project that would help in reducing the number of accidents taking place in foggy environment, putting our effort to make it a real time project. Ultrasonic sensors are usually used to detect objects and calculate the distance, whereas the Bluetooth notifies the driver through an app regarding objects while driving in fog environment, in this project. As compared with others, the benefit of this approach is to utilize the structural information to help vision based techniques for vehicle detection and classification.

Here Verified with GPS location through GSM when accidents occurs.

ACKNOWLEDGMENT

We would like to thank our college for providing us this platform to bring our idea into real time with more effort and we look forward to put life into it. The idea of developing "Object Detection in Fog Environment" came to us while researching about innovations for society. Overcoming all the pebbles, we ought to provide maximum support for society to avoid accidents in case of Fog. We also look forward to provide voice assistance in local languages for easy interaction with the driver and use of Artificial Intelligence would help us create magic on hands.

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