

Sensor Fusion for Obstacle Detection using Machine Learning: Review

Namita Surkar¹, Pratiksha Gadge², Rasna Karemore³, Shreya Sahare⁴ Siddhant Jaiswal⁵

Department of Computer Science and Engineering

Jhulelal Institute of Technology, Lonara , Nagpur, India

Abstract-

Now-a-days accident is a major concern. One of the reason behind the deaths of people is due to accidents which happens when the vehicle is in high speed, heavy rain, wrong driving, improper turns, drunk driving, etc. There are multiple techniques also used to detect the obstacle but accident was not prevented successfully and those methods were not useful. In this system we are using fusion of sensors like ultrasonic sensors, power steering sensor which are attached to the embedded system. when there is a possibility of an accident this sensors will detect the obstacle and alert the driver. A system consisting on ultrasonic sensors, Arduino can be used to detect obstacle which will help to reduce accidents. In this paper various existing applications of sensor fusion for obstacle detection using machine learning are discussed.

Keywords: Obstacle detection, Arduino, ultrasonic sensor

I. INTRODUCTION:

Due to advanced technology and increasing population the number of vehicles increasing rapidly, accordingly the number of accidents have increased. Now-a-days it is important to secure the lives and accident prevention is very difficult. In India, Every year 150,000 people dies and 400 people per day. Road accidents often happen when vehicle comes very close and driver is asleep or not aware of the vehicles coming close. This may happen while in traffic or when driving with high speed and cross each other on road.

Another system had ultrasonic sensors mounted on front and back of four wheeler but sensor position was inappropriate for detecting the obstacle resulting in less accuracy of the system. Some system used LED light for curve road which glows when vehicle comes from the other side of the curve but it is suitable only used for curve roads. The efficiency was reduced when used on intersecting roads.

The main aim of this system is to detect and prevent the accidents which involves Ultrasonic Sensors which will detect the coming vehicles, Accelerometer(ADXL-345) is used to measures the static acceleration in tilt sensing and to detect the sudden change in the axes of vehicles, Adapter is used to increase the range of ultrasonic sensor. when the vehicle come from other side this sensors will detect the obstacle alert the driver by blowing the buzzer and this method is cost effective and time efficient. The existing methods for obstacle detection using machine learning has been discussed in next section.

II. LITERATURE REVIEW:

The proposed system [1] which contains sensors that have many aims like detect the objects and check the driver health conditions such as (heart rate, drunk, & illness). In this project the addition is that the system were added by camera, RADAR and laser by (GPS) and (GSM). The main goal of this system can save thousands of life and this system play a big role in safety technology for the vehicles. Using all these tools and technologies they made one system to avoid the accident as much as possible and send the useful report for drivers family or the police if any cause happen with driver.

In the article [2] a system that automatically detect and accident in appreciably less amount of time and sends information about accident to the emergency centre they used GSM and GPS, VANET, mobile and smart phones. They uses two ultrasonic sensors attached to the embedded system one

sensor in front side and another is at the back. When accident happens this system sends information to the emergency service.

In the work [3] the system is made for the preventing accidents from the various dangerous road like narrow curve road and also for the roads which is in remote areas. For avoiding this problem the solution is alerting the driver about the vehicle coming from opposite direction. This all done by alerting the drivers by LED light that light glows when vehicle comes from the other side of the curve. The vehicle detect by the ultrasonic sensor that are interfaced to the microcontroller and Arduino UNO. By this system we can save the thousands of live in mountain road.

The article[4] consists of radio detection and ranging (RADAR) sensor, collision avoidance system, laser imaging detection and ranging (LIDAR) sensor, camera sensor, Azimuth - Elevation system field of view . This system is proposed for preventing the forward collision for avoiding forward collision. They assist drivers in two ways, warning and overriding accordingly to dynamic situations. Sometimes system can be complex and critical to detect collision and also due to using lots of sensors the system is complexed.

The proposed system [5] detects the traffic jam and accidents on the road. This system measures the density on either side of roads and control the traffic lights accordingly. It is implemented with the help of the image taken from the camera or mobile phone using image processing.

III. PROPOSED SYSTEM:

This system proposes a method using ultrasonic sensor technology that will detect the vehicles or obstacle and alert the driver with the help of buzzer about vehicles that approaches on all sides using four ultrasonic sensors attached to the embedded system. Two ultrasonic sensors are placed at the front side of the vehicle and another two are in back side of the vehicle. When the ultrasonic sensor detect the obstacle or vehicle in two meters range this will alert the driver with the direction of steering i.e the direction of coming.

Below figure shows the data flow diagram of hardware design of Arduino UNO which is programmed by using Arduino 1.8.1 IDE tool which is open source software. Programming can be done by using embedded C.

As shown in the data flow diagram, the system start with sensing the signal for obstacle detection using ultrasonic sensors, if the signal found then the system will alert the driver by blowing buzzer otherwise it will continue sensing the signal.

Data flow diagram:

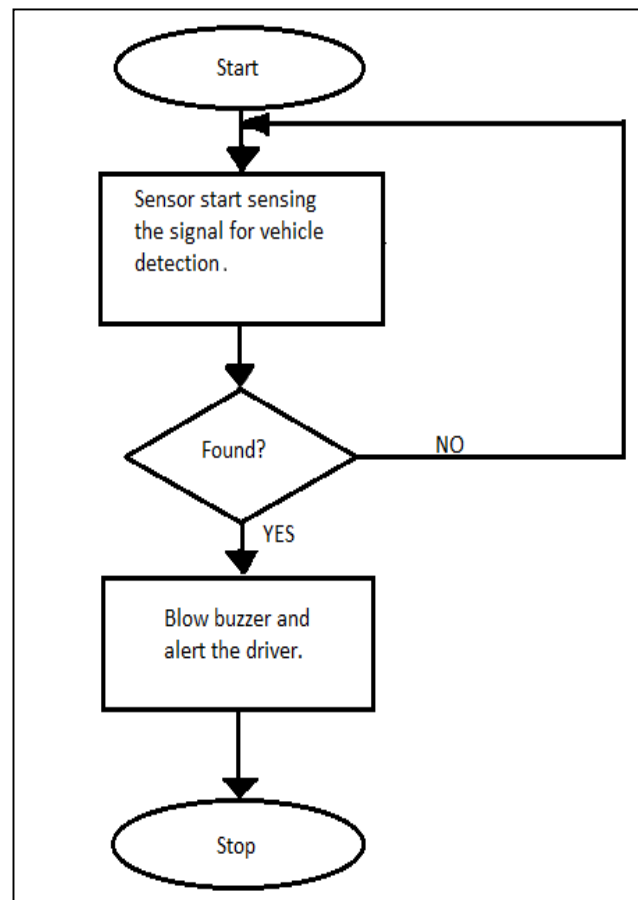


Fig: Data Flow Diagram of proposed system

The main advantage of ultrasonic sensor is that it provides highest reliability in getting proximity and has lesser absorption than Radio and Infrared frequencies. To extract this information, it uses different sensors (Ultrasonic sensor, Accelerometer, power steering sensor, driving switches) to acquires road traffic data followed by detection and clarification of vehicles. The main aim of this project to avoid loss of life and this project play a big role in safety technology for the vehicle.

IV.CONCLUSION:

Various techniques of accident detection and prevention has discussed lots of systems which try to reduce accident by using various sensors at different position in four wheeler. Some solutions included using camera and image processing for detection of obstacle but the process was time consuming. It resulted in late detection of obstacle and probability of accident occurrence increased. Also the proposed system has been described.

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