SMART INTELLIGENT ACCIDENT-AVOIDANCE SYSTEM USING CAN PROTOCOL

***Nikhil Chaudhari, *Prajakta Bhand, *Aishwarya Gharat, *Kunal Sonawane, **Prof.A.T.Sonawane**

**U.G. Student, **Associate Professor,*

Department of Information Technology, SKN Sinhgad Institute Of Technology And Science, Lonavala, Maharashtra, India

ABSTRACT

Current condition of road accidents is increasing day by day. Cars on the same direction in highway usually keep a safe distance one another with a similar speed. However, due to the driver's distraction, long-time driving fatigue, flake out, or even a sudden deceleration of the previous car, a serious collision accident may occur if the driver can not react in time to brake. On the other hand, drivers need the mirrors to know other approaching cars from two-side or from the rear end. Even the driver checks around carefully, he cannot take an immediate respond, except push the horn, to a sudden approaching car and an accident is thus unavoidable. Therefore, developing a front-obstacle warning system and a rear end collision avoidance system subject to all directions are important in collision avoidance. For the front-end collision avoidance subsystem, Ultrasonic sensor is adopted to measure the distance with respect to the previous car. For rear-end end collision avoidance subsystem, the currently available ultrasonic sensors for vehicles are adopted for approaching cars with relatively low speed. While the rough reading of distance data cannot be applied directly, an intelligent approach is proposed to process the raw distance readout of sensors to produce appropriate warning signals. CAN (Controller Area Network) Board is an important device for the communication between two micro-controllers. Using CAN Technology, it is easy to communicate with sending the information sender to receiver with high accuracy and easy to implement in all vehicle to reduce the rate of road accident. Previously CAN is used for AIC (Autonomous Instrument Cluster) to indicating the error in vehicle and showing the warning of the low fuel, oil temperature, engine temperature and so on. This protocol can use in different way for communication purpose. As per the previous work implementation of CAN to avoid vehicle accident is need of world. Using sensors like ultrasonic sensor, speed sensor, alcohol sensor rate of the road accident can prevent. At the place where accident happens emergency need is important but due to lack of communication it seems to be delay to overcome this situation, we can make automated system which can send message directly to emergency department. To complete that overall scenario GSM module is connect to micro-controller through which message send to police emergency department to reach at the place as soon as possible.

***KEYWORDS**: CAN(Controller Area Network),GSM(Global System for Mobile Communication)Module, Arduino UNO R3,Ultrasonic sensor, Speed sensor, AIC(Autonomous Instrument Cluster).*

INTRODUCTION

In the World most of accidents are occur due to over speeding, drink and drive, due to distraction, panic stops and foggy conditions. In world daily 1% of population die due to over speeding. According to this type of situations most of the people died in the road accident. To avoid this type of conditions,

accident-avoidance system is a safety system designed to alert or help drivers to avoid imminent accidents and reduce the risk of incidents. The manufacturers necessarily require a monitoring system in the vehicle that helps to avoid accidents and to prevent the life of driver. Accident-avoidance systems uses a different technologies and sensors, such as ultrasonic sensor, speed sensor, CAN board, Arduino UNO R3, DC motor, Buzzer, LCD display, Power supply, Mobile, GSM SIM, GSM module. In this project we have used ultrasonic sensor. This sensor detects the obstacle in front of the vehicle and send message to the display, alerting the device by using Arduino uno. An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Speed sensor we depend on the ultrasonic sensor this senor is used for detecting the speed of the vehicle. The CAN board is a Controller Area Network this board act as a CAN transceiver and sender. The CAN protocol is a standard designed to allow the micro-controller and other devices to communicate with each other without any host computer. The feature that makes the CAN protocol unique among other communication protocols is the broadcast type of bus. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs.

Arduino projects can be stand-alone, or they can communicate with software running on your computer. The boards can be assembled by hand, the open-source IDE can be downloaded for free. A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. A GSM module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM system. DC motor is any of class of rotary electrical motors that converts direct current electrical energy into mechanical energy. DC motors are used in tools and appliances. Dc motors feature a speed, which can be controlled smoothly down to zero, immediately followed by acceleration in the opposite direction without power circuit switching. And dc motors respond quickly to changes in control signals due to the dc motor's high ratio of torque to inertia. A 16x2 LCD display is commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. Warning message will be displayed on lcd screen, it will help driver to stay alert. Buzzer is an audio signalling device. It will alert the driver by calling alert alarm. A variable regulated power supply, also called a variable bench power supply, is one where you can continuously adjust the output voltage to your requirements. Varying the output of the power supply is the recommended way to test a project after having double checked parts placement against circuit drawings and the parts placement guide.

In this project any obstacle (like human body, vehicle, and other object) comes in front of the vehicle, speed control of the vehicle is the viable solution to avoid accident. We propose a solution in our project to avoid road accidents and to control speed of vehicles. Ultra-sonic sensors of the vehicles detect obstacles, if any obstacle from the backside come closer to vehicles, immediately a buzzer will alert the driver. Speed sensor will detect the vehicle speed. Then if speed exceed the limit the buzzer will activate and transfer the data from sender module to receiver module through the CAN board. On the receiver side GSM module will transfer the message to the owner of the vehicle or driver. After that the speed of the vehicle slow down.

LITERATURE SURVEY

Yi Yun Lau states that how CAN protocol is used using CAN board in vehicle. The technique which is used in this paper to described the Autonomous Test System for CAN based automotive instrument cluster which is nothing but Automotive Instrument cluster which is device of vehicle to give the current condition of vehicle.as we know that in front of driver there is one instrument cluster panel which includes various sign which indicates some error in vehicle. In simplicity we can assumed the example of low fuel warning light. Whenever our fuel goes down we get exact or current condition of fuel presence in our vehicle, so this all functionality is done using controller area network. This CAN board is mediator of vehicle and the driver. Sensor get the information as per there sense and sent it to the Canin this system they make one software which get the information of vehicle to checked the fault in vehicle just like Engine temperature , Fuel gauge, Coolant level, Water level, Engine oil level. They mention there different modules like study of CAN bus communication to communicate between two micro-controllers Like Arduino UNO.Design the inspection list which is in autonomous and manual mode. In autonomous mode structure is in sequence but in case of manual mode it is not in sequence. They build autonomous test system for instrument cluster which is used in every vehicle and motor cycle. GUI (graphical user interface) is used to show warnings to the users as per data fetch from the sensors through controller area network.[5]

Joseph Azeta states that the idea proposed by using machine vision to guide the robot. The field of machine vision has growing at a fast pace. Machine vision applications can be divided into four types from a technical point of view. They can be used to locate, measure, inspect and identify. The robot proposed in this paper is guided with the help of machine vision. The best part of project is that if any obstacle is encountered by the robot the robot automatically stops.[16]

Fatima Nadhim Ameen states that they have used GPS Module, GSM module and micro-controller. So, GPS module send the co-ordinates to the micro-controller and micro-controller read the vehicle co-ordinates and the sent the SMS using GSM module. Then, Contentiously you will see the longitude and latitude value on the display and after particulate interval of time it send the SMS to the vehicle owner. In this paper they have mainly used GPS and GSM system.[11]

Vipul Parihar states that they used three ultrasonic sensors and they are connected in three different directions. The ultrasonic sensors are used to avoid obstacles and they has two parts trig and echo. The trig releases the wave and after hitting an object the wave reflects and received by the echo. The trig acts as a transmitter and echo acts as a receiver. The three ultrasonic sensors take the readings and send it to Arduino UNO. Arduino Uno calculates the distance of the object from the ultrasonic sensor. If the distance is less than 1m then the buzzer sounds and if the distance is more than 1 m then buzzer remains silent. For all three directions buzzer sounds with different delay time. With this user can understand the correct direction of the object and they can act accordingly. It is easy to access for blind people to use this smart cap in daily life.[2]

METHODOLOGY

Fig.3.1 shows that, system has one transmitter part and one receiver part. Transmitter part consists of ultrasonic sensor, speed sensor, Arduino UNO board(sender),CAN trans-receiver sender board

and LCD display. Receiver part consists of DC motor,Arduino UNO board(receiver) ,GSM module and alarm. In a transmitter unit on moving vehicle speed sensor will detect the vehicle speed and ultrasonic sensor will detect the obstacle in front of the vehicle. Then if speed exceed the limit the buzzer will activate and transfer the data from sender module to receiver module through the CAN board. On the receiver side GSM module will transfer the message to the owner of the vehicle or driver. After that the speed of the vehicle slow down.

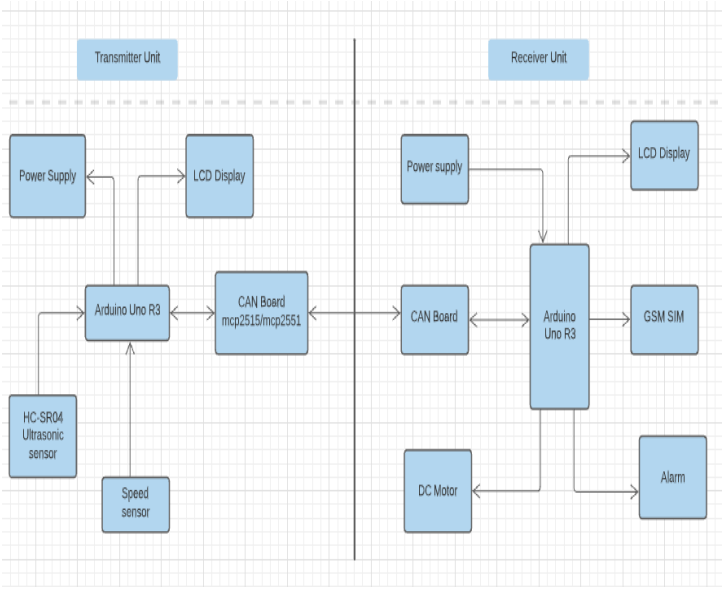

Fig.3.1.System architecture diagram

EXPERIMENTAL RESULT

Figure 4.8 shows the results of the speed limitation and sending SMS to the driver or owner of the vehicle and police station. Fig 4.9 shows the messaging window there you can see alert messages. If the vehicle crosses the speed limit, then immediately car slows down and buzzer will be activated.

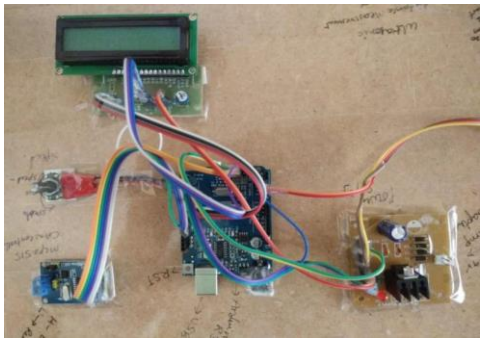

Fig.4.1 Transmitter Side

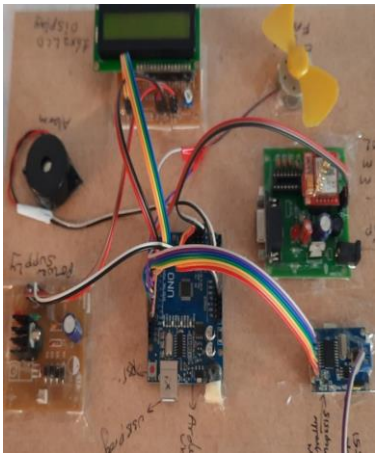

Fig.4.2 Receiver Side

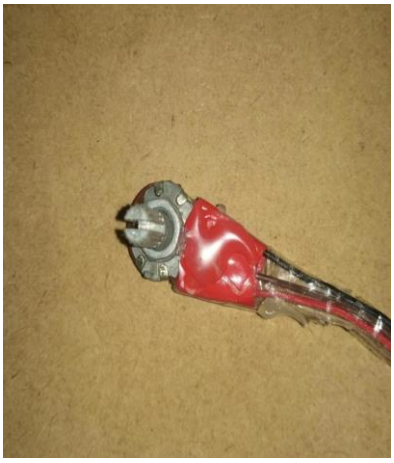

Fig.4.3 Speed sensor

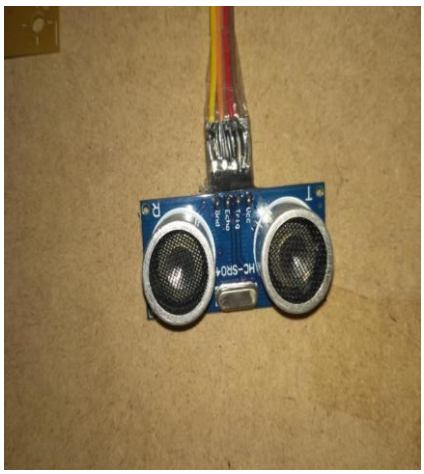

Fig.4.4 Ultrasonic sensor

Fig.4.5 Power Supply

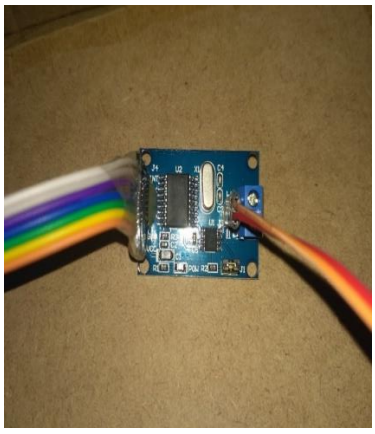

Fig.4.6 CAN Controller

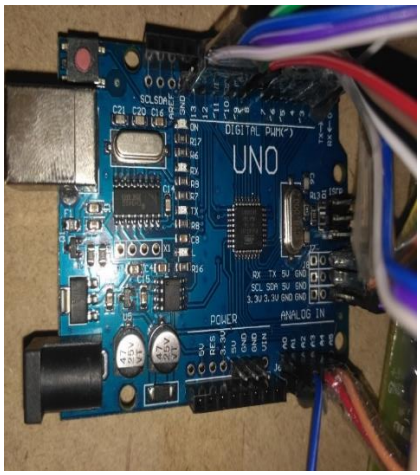

Fig.4.7 Arduino UNO R3

Fig.4.8 LCD Display

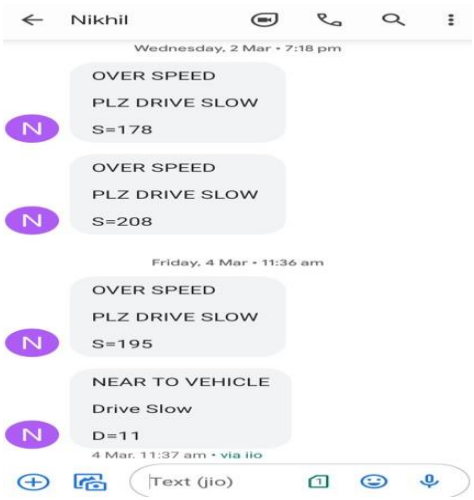

Fig.4.9 Messaging window

CONCLUSION

We have implemented a smart intelligent accident-avoidance system using CAN protocol. From this overall project we conclude that using this technique we can implement the safety measures regarding road transport.V2V (Vehicle to Vehicle) communication enable intelligent transport system that will provide better vehicle environment.

REFERENCES

[1] Rachana Khamamka, Ashru Jadhav, Shreyas Thoke, Prof. Girish Chaple, “Smart Vehicle Safety Monitoring System Using CAN Protocol”, IEEE 2020.

[2] Vipul Parihar, Yogesh Rohilla, Kusum Kumari, "Ultrasonic Sensor based Smart Cap as Electronic Travel Aid for Blind People",Third International Conference on Smart Systems and Inventive Technology (ICSSIT 2020) IEEE Xplore Part Number:CFP20P17 ART;ISBN:978-1-7281-5821-1.

[3] Waladur Rahman, Md. Raseduzzaman Ruman, Khan Roushan Jahan, Md. Jamil Roni, Md. Foyjur Rahman, Md. Abu Hasnat Shahriar, "Vehicle Speed Control and Accident Avoidance System Based on Arm M4 Microprocessor", 2020 International Conference on Industry 4.0 Technology(14Tech) Feb 13-15, 2020.

[4] Abhi B. Amin, Harsh P. Patel, Suken P. Vaghela, Prof. Ronak R. Patel,"IOT Based Vehicle Anti-Collision And Pollution Control System", Third International Conference on Electronics Communication and Aerospace Technology[ICECA 2019].

[5] Yi Yun Lau, Muhammad Nasiruddin Mahyuddin, Bakhtiar Affendi Rosdi, Noor Hafizi Hanafi, "Autonomous Test System for CAN-based Automotive Instrument Cluster", 4th International Conference and Workshops on Recent Advances and Innovations in Engineering, 27-29 November 2019.

[6] Yves Lean Krishner Macayana, Vance Anthony Coronel,Ian Christian Fernandez, Kenneth Ung Carlo Miras, Chris Vincent Densing, Darvy Ong, Isabel Austria, Marc Talampas Nestor Tiglao, Maria Theresa De Leon, Percival Magpantay Jr., Marc Rosales, "Implementation of 6LoWPAN and Controller Area Network for a Smart Hydroponics System".

[7] Azmyin Md. Kamal, Salman Habib Hemel, Mohsan Uddin Ahmad, "Comparison Of Linear Displacement Measurements Between A MEMS Accelerometer And HC-SR04 Low-Cost Ultrasonic Sensor",1st International Conference on Advance in Science, Engineering and Robotics Technology 2019(ICASERT 2019).

[8] Yimeng Feng, Guoqiang Mao, Bo Cheng, Baoqi Huang, Shangbo Wang, Junliang Chen,"MagSpeed: A Novel Method of Vehicle Speed Estimation Through A Single Magnetic Sensor", 2019 IEEE Intelligent Transportation Systems Conference(ITSC) October 27-30,2019.

[9] Md Habib Ullah Khan, Md Mamun Howlader, "Design of an intelligent autonomous accident prevention, detection and vehicle monitoring system", 2019 IEEE International Conference on Robotics , Automation, Artificial-intelligence and Internet-of-Things(RAAICON) 29 November – 1 December 2019.

[10] Vibin V, Sivraj P, Dr.V.Vanitha, "Implementation of IN-Vehicle and V2V communication with basic safety message format" , International Conference on Inventive Research in Computing Applications(ICIRCA 2018).

[11] Fatima Nadhim Ameen, Ziad Saeed Mohammed, Abdulrahman Ikram Siddiq, "Cost Minimization of GPS-GSM Based Vehicle Tracking System", 2018 International Conference on Advanced Science and Engineering(ICOASE).

[12] Begum Korunur Engiz, Rakan Bashir, "Implementation of a Speed Control System Using Arduino", 2019 6th International Conference on Electrical and Electronics Engineering(ICEEE), IEEE 2019.

[13] Anyu Cheng, Lin Qin, Qiuhan Xiong, Youguo Li, "Design of Communication Module pf Vehicle Controller Based on ISO26262 Standard", IEEE 2019.

[14] Arun Kant Singh, Ramprasad Potluri, "CAN – Based Networked Path – Tracking of a 4WS4WD Electric Vehicle: Maximum Sampling Period", 2018 Indian Control Conference(ICC), IEEE 2018.

[15] Woranon Rassameepaiboon, Wudhichai Assawinchaichote,"Vehicle Avoidance Reaction By Two Step Motion Flow Cluster", IEEE 2018.

[16] Joseph Azeta, Christian Bolu, Daniel Hinvi, Abiodun A Abioye,"Obstacle detection using ultrasonic sensor for a mobile robot", 2019 8th International Conference on Mechatronics and Control Engineering.