

Intelligent Transportation System for Drivers Using IoT

Sindhu A S¹, Namitha N¹, Neethushree M K¹, Pavithra P¹, Mahima Bhaskar¹

¹Student, Department of Computer Science and Engineering, Maharaja Institute of Technology Mysore, Karnataka, India.

Corresponding Author: nnamitha0711@gmail.com

Abstract: Road accidents on highways are very frequent these days as there is increased in the number of vehicles. Accidents is one of the major causes for mortality around the world and over 1.35 million of people are losing their life annually due to the road accidents. So, the project is developed in vision of preventing the accidents on highways by making use of signboard and also obstacle detection was done and sends the related information to the driver through android application. Signboard images will be displayed on the android smartphone and also voice based output message will be given to the driver in order to take further decisions. Thus, we can prevent the accidents by controlling the vehicle automatically and reduce the accident rates.

Key Words: - *Prevention of accidents, Signboard information, Obstacle detection, Android application.*

I. INTRODUCTION

The causes for road accident is driving too fast, traffic violation, due to driving vehicle with inappropriate speed and many more. But sometimes like when there is heavy rainfall or fog and if the driver un notices what kind of signboards is present on the road side there might be a chance for accident taking place which indeed cause a loss to the victim's family. So, there is a need to design a system which can control the vehicle speed automatically and gives proper information to the drivers in order to take the decisions. We designed a system for vehicles which can inform the driver about the signboards and control the speed of the vehicle automatically. The system can monitor the vehicle speed and appropriate action will be taken when the vehicle encounters the particular sign boards. The driver should pay more attention on the speed of the vehicle especially while driving through busy junctions, school, hospital and college zones etc. The proposed system is designed in such a way that the vehicle speed is automatically controlled. A prior indication will be given to the driver about school zone, hospital zone, Bangalore 50km, work on progress etc. to avoid accidents by detecting the signboards.

II. LITERATURE SURVEY

Akshatha.V, K.Nirmala Kumari., [1] in this paper a prototype called e-NOTIFY is proposed which is designed to improve

the survival chances for passengers involved in vehicular accidents. It has an automated crash detection and gives assistance to passengers. It will send blood group details of vehicle users and location of crash to hospital server and to ambulance.

Arun Francis G, Dharani S K., [2] have presented the idea of accident detection by using Arduino which will send an alert message to the given number and also they have used LCD display to show the message. It is user friendly and reliable.

Dairi, Abdelkader; Harrou, Fouzi., [3] Obstacles can be detected by the KNN algorithm only if they are within operating area. An essential element in development of automatic driver assistance tool is Obstacle Detection.

Bharath P, Saravanan M., [4] have presented no pre-intimation to drivers about accidents is given. An IoT accident prediction and detection using supervise ML algorithm which will collect the information from sensors is used.

Ramya Mary.E, P.B.Pankajavalli., [5] have proposed that current accident avoidance approach is used a lot more than other methods. In this method, web services are one way of providing interoperability by minimizing complexity and maximizing the network efficiency.

Manjunath Chincholi, Dr K.Chandrashekara., [6] According to Manjunath Chincholi, What he said in one of the

International advanced research journal, he had used RFID technology to receive the signal from the different sign board which helps in identifying the signboards uniquely. The drawback of this research was the redundant use of RFID tags and the maintenance.

Greeshma Krithi K.J., [7] The author Greeshma, Krithi and other fellow authors made a research to prevent the accidents in ghat section. They have used a LED screen, LCD displays, buzzers and IR sensors to detect the opposite side vehicles coming through and also make use of systems that send SMS to nearby ambulance, Police station and Fire station by using GSM model. The major drawback here is the insufficient data.

Mubashir Murshed., [8] Similarly, Mr. Mubashir Murshed proposed a system which can detect and prevent the accidents with smart vehicles using IoT. They have used alarms and triggers when encounters slow down, safe, brake etc. To achieve this, they used Raspberry pi, sensors, buzzer etc. helps in preventing car accidents.

Abdul Rahim Makandar, Deepa B Chavan, [9] made a research and proposed a system that can reduce the speed of the vehicle automatically. They have used RF technology to achieve this. They thought the sensors will be the best option when compared to the cameras and also they have used IR sensors to detect the obstacle which takes more computational time to reflect back from the obstacle which itself is one of the disadvantages and also the maintenance.

Anas A. Al Jallad, Zaer, Othman M.K. Alsmadi, [10] proposed a safety vehicle control system by using Arduino. They have thought of a Virtual Reality (VR) for voice recognition and training and also Arduino to control the whole system. The major disadvantage of this paper was miscalculations of the distance between the vehicles and also the inappropriate capturing of the images.

R.U.Ahmed, Taieba Taher., [11] proposed the Smart Traffic signaling System which uses RF Trans receiver at the traffic post and controls the vehicle which display message on LCD screen and further action will be taken by Arduino. Also, proposed many systems use ultrasonic sensor (HC-SR04) to measure the distance between the vehicles or obstacles to prevent the accidents.

Mr.R.Manojkumar, M.Suresh., [12] presents that the system was designed to control the vehicle speed automatically over a wireless communication. Used RF signals are used to control the vehicle based on its location. Speed restriction are changed over time and area and enhances safety for drivers and pedestrians. This system was developed for controlling the speed of the vehicle. The drawback was that there was no obstacle detection which may also lead to accidents.

Sivakami. T, Sathyanandhi. B., [13] proposed the system which can control the speed of the vehicle using RF module. Tells that if the vehicle is running below the threshold, then there is no need to change speed of the vehicle. Otherwise, the speed needs to be controlled.

R. Ramkumar, S.Dinesh, [14] presents that the proposed system is designed to detect the accidents. GPS gets activated and it will give information of the accident spot location in terms of latitude and longitude. So those values will be sent to mobiles using GSM and also the message will be displayed on LCD.

S.Stephen raj. S, Sri Priya.P., [15] presents that the proposed system is to identify accident spot of the driver and notifying this recognition of driver accident spot to nearby police station that are sufferers for identifying driver and give information for police records. Tells about the accident spot and sends the information to police station and there is no accident prevention system involved over here.

Dr.D.Selvathi, P.Pavithra., [16] presents that this system indicates that Intelligent System for 2 wheeler accident detection and prevention for human life safety. This needs smart helmet. It will check whether the person is wearing helmet or not and has non- alcoholic breath. Without these conditions checked, the engine will not 'ON'. Microcontroller controls the ignition. Using GSM module, this system enables the detection of accident at any place and reports to the predefined number.

Aravinda B, Chaithralakshmi C., [17] presented a system that can prevent accidents on ghat sections. They have used LED lights to detect the vehicles coming from the other side. This can be achieved by using Ultrasonic sensors. And also they have used microcontroller Arduino to control the whole system.

Abhirup Das, Abhisek Ray., [18] presents that the major problems for the accidents are drowsiness of driver and alcohol consumption. So, the author provides a solution to monitor state of the driver. So, the traffic police control need to install the detecting unit.

K.Meena, C. Amuthadevi, G.Sai Kumar., [19] In this paper, It will monitor vehicle performance continuously. Used to avoid accidents and to maintain speed balance. The camera used here will capture the images. GSM modem used here can send the location to nearest police station, ambulance and relatives.

Vijaykumar Gupta, Trilok Patel., [20] presents that this system has 2 sections: A: transmitter is used to transmit data coming through encoder in the form of RF signals. B: Receiver will receive the signal and those are mounted on vehicle which is given to decoder to get signal which will help to alert the driver. Ultrasonic sensors are used to detect obstacles. Real time, ultrasonic data, alcohol values are displayed using LCD.

III. SYSTEM ARCHITECTURE

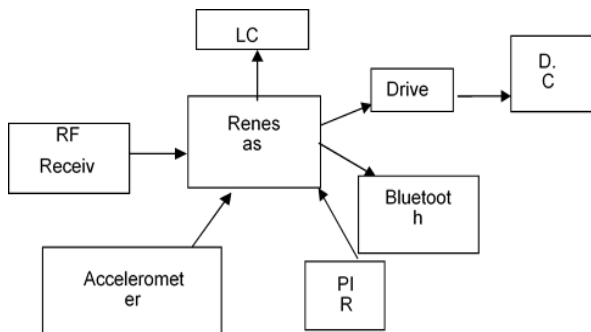


Fig. 1 Embedded system inside the vehicle

Renesas microcontroller controls the overall activity of the system. Consists of a detachable sub-board that is the LCD display.

PIR Sensor - PIR sensor is used to detect the presence or movement of any human beings or animals or the obstacles.

DC Motor - DC Motor will replicate the rotating speed of the vehicle.

DIP Switch - Creates unique sequence number and send it to RF Transmitter.

ALCD - ALCD will display the message and also gives the signboard information to the driver. It consists of numbers and characters.

RF Transmitter - It will receive signals from DIP Switch and transmit the signals to the RF Receiver.

RF Receiver - RF receiver will receive the signals from RF transmitters and sends to the Bluetooth module.

IV. PROPOSED WORK

The project is developed in order to inform the driver of the vehicle about the obstacles, busy junctions such as steep curve, bends, school zone, hospital zone etc where the user need to pay more attention and control the vehicle carefully. For that purpose, we are making use of signboards present on the road side and making the system to control the speed automatically. So, we are installing the embedded system inside the vehicle and DIP switch as well as RF Transmitter will be placed inside the signboard to identify the signboards uniquely. Manually we will set the code for DIP switch for each signboard uniquely. When moving vehicle encounters the signboard then DIP switch creates the unique sequence and sends it to the RF Transmitter. Once the signboard information is received, the RF receiver accepts the signals from RF transmitter and the vehicle's embedded system inside the vehicle automatically reduces the speed according to the signboard. When an RF signal is received by receiver within the vehicle, from a transmitter used by digital signboards, the microcontroller, based on the program embedded within it, slows down the speed of the vehicle while it simultaneously passes the message to Bluetooth module which further transmits the message to the android smart phone of the driver, about the particular signboard. Through the use of Android application, developed for this particular project demonstration, the driver of the vehicle is informed via voice about the presence of particular signboard along the road taken. Even a picture of the particular signboard is displayed on the smart phone screen. PIR sensor is used which generates an output voltage whenever there is presence of any movement by human being or animal. This output voltage is fed to an input pin of the microcontroller. Based on the

program within the microcontroller, the speed of the vehicle (i.e D.C motor) is reduced to nil. At this particular time instant, even if the accelerator of the vehicle is increased the engine will remain neutral.

Once there is no output voltage from PIR sensor, the vehicle starts to move.

V. WORKING PROCEDURE

Signboard Unit consists of DIP Switch and the RF Transmitter. So, when the moving vehicles encounter the signboard, DIP Switch identifies the different signboards and creates the sequence. That sequence will be sent to the RF transmitter. Vehicle unit consists of RF Receiver and Bluetooth Connection. RF receiver receives the signal from Transmitter. The received signal will be sent to the Bluetooth module and sends voice output message to the driver.

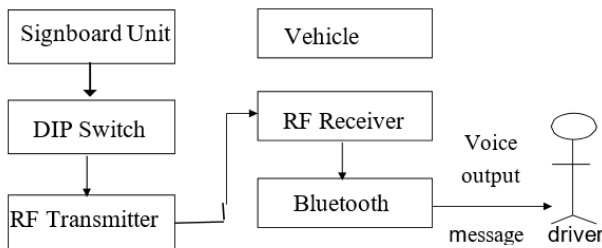


Fig. 2. Data Flow Diagram for detecting Signboard

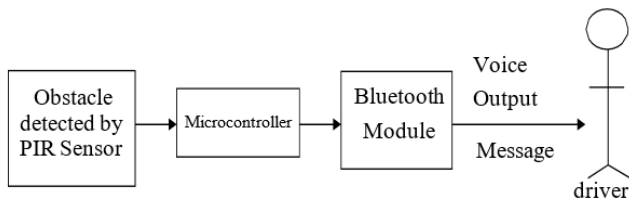


Fig. 3 Data Flow Diagram for detecting Obstacle

Vehicle unit will be having the PIR Sensor to detect the Obstacle. Whenever the moving vehicle encounters the obstacle, the PIR sensor generates the high voltage output (i.e., 1V) in terms of binary output i.e., either 1V or 0V. The output voltage generated will be fed back as an input to the

microcontroller. Then microcontroller sends the information through Bluetooth module. Finally, driver will get the voice output message and can take the further decisions. Once PIR Sensor stops generating output voltage (i.e., 0V), then the driver can move the vehicle.

A. Android Login

When the user opens the android application, he will be prompted to enter the username and the password. If both the username and password are correct (matches) the login is successful, then the user will be taken to the main page and displays the information on the screen. Otherwise the login will be failed and the user needs to try again to login. The user can stop the application after reaching to the desired destination.

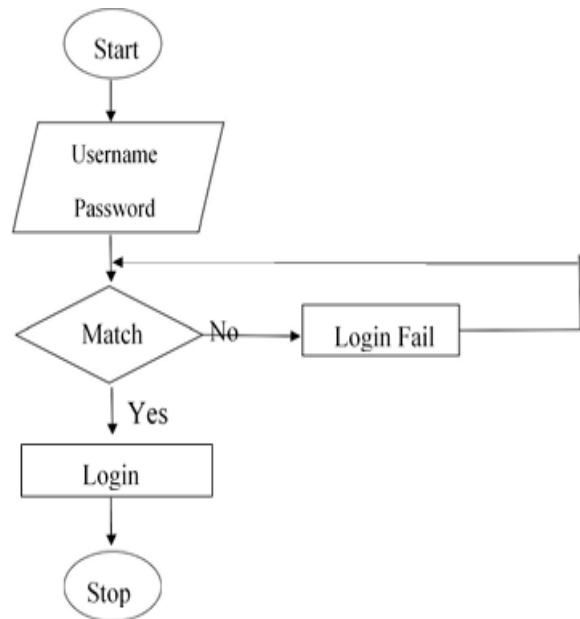


Fig. 4 Flow Chart of Android Login

B. Android Bluetooth

In order to do the data transfer first, the Bluetooth connection must be set up. If the Bluetooth connection is on then it will search for the devices to do the device pairing, otherwise the connection must be set up. Once the device is found and paired then the data transfer can be done in order to give the caution to the driver. Data transfer takes place until the

devices are paired once the connection is lost the device will be disconnected and it will stop sharing the data.

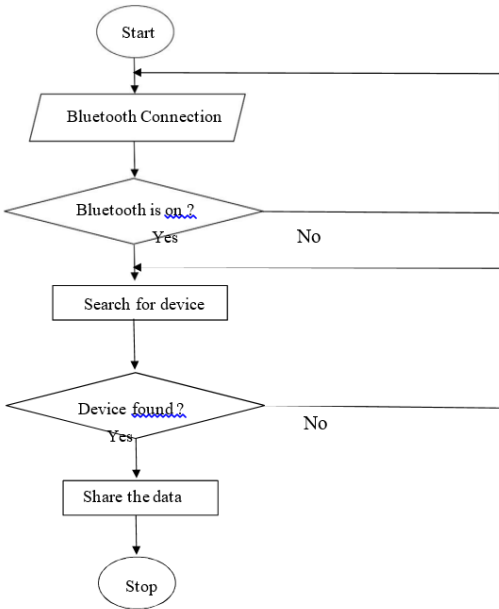


Fig.5. Flow Chart of Android Bluetooth

C. Android Voice Output

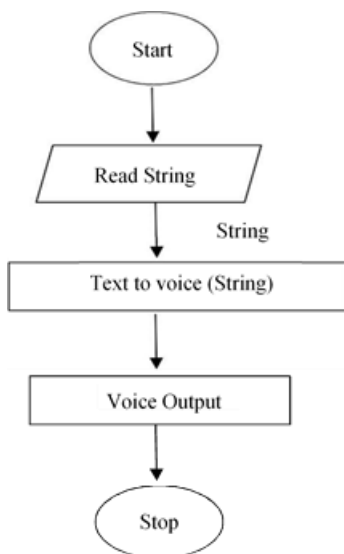


Fig. 6 Flow chart of Android voice output

The device must be paired and connection must be setup. Then the android application will start reading the string. That string will be converted from text to voice with the help of some API's. Finally, the voice based output will be given as a guidance to the driver.

D. Advantages:

- Displaying of signboard images on the android smart phone and voice - based output message gives the guidance to the driver to take further decisions.
- The hardware components deployment will be used and it will be like a one - time investment and can be used by all kinds of vehicles to prevent accidents.
- The system works well even when there is heavy rainfall or fog or any kind of climatic changes in the environment.
- Obstacle detection can also be done.

VI. CONCLUSION

The proposed system is mainly designed to prevent accidents by giving alert message to the drivers about the obstacles. Developed android application which will display the image of the particular signboard whenever the moving vehicle encounters the signboard present on the road side and also gives the voice based output message as a guidance to the driver to take the further decision. The system is so friendly and economical to use and gives the information about the spot and situation to control the vehicle automatically and avert mishaps.

VII. FUTURE WORK

The proposed system can further be enhanced by adding other sensors which are capable of detecting obstacles like barricades, driver's drowsiness or detecting alcohol etc. And by using GPS and GSM module, this system can help in sending the location, if he drives twice. So, that this system can alert the driver if there is no signboard the next day. So, this model helps in future by adopting these details.

REFERENCES

- [1]. Automatic Accident Detection and Intelligent Navigation System, Akshatha.V, K.Nirmala Kumari, International Journal of Engineering Trends and Technology (IJETT), Volume 49 Number 7 July 2017.
- [2]. IoT based accident identification and alerting system, Arun Francis G, Dharani S K, Manikandan P, Monica R J, Vaishahi S K, International Journal of Pure and Applied Mathematics, Volume 118 No. 20 2018.
- [3]. Obstacle Detection for Intelligent Transportation Systems Using Deep Stacked Auto encoder and k- Nearest Neighbor Scheme, Abdelkader Dairi, Fouzi Harrou, Ying Sun, and Mohamed Senouci, IEEE sensors journal, vol. 18, no. 12, June 15, 2018.
- [4]. Literature Survey On Smart Vehicle Accident Prediction Using Machine Learning Algorithm, Bharath P1, Saravanan M2, Aravindhan K3 2Assistant Professor, Dept. of Computer Science and Engineering, KPRIET, Tamilnadu, India.
- [5]. Survey of accident avoidance prevention and detection scheme using IOT, Ramya Mary.E, P.B.Pankajavalli.
- [6]. Design & Analysis of Vehicle Speed Control Unit Using RF Technology, Manjunath Chincholi, Dr. K.Chandrashekar.
- [7]. Road Safety in Ghat Section, Greeshma, Krithi K. J., Sahana, Sudhakara B., Thirthashree Shetty.
- [8]. An IoT Based Car Accident Prevention and Detection System with Smart Brake Control, Mubashir Murshed 2019.
- [9]. Automatic Vehicle Speed Reduction System Using RF Technology Deepa B Chavan, Abdul Rahim Makandar, Faizul Hakeem Khan, Syed Azimuddin Inamdar.
- [10]. Arduino-Based Automatic Safety Vehicle Control, Othman M.K.Alsmadi, Anas A.Al Jallad, Zaer S.Abo-Hammoud, and Fares J. Al Majali.
- [11]. Accident Prevention Smart Zone Sensing System, Taieba Taher, R.U.Ahmed, M.A.Haider, Swapnil.Das, M.N.Yasmin, Nurasdul Mamun.
- [12]. Speed Reducer for Two Wheelers Using Radio Frequency Sensors, M.Suresh, M.Siva, Mr.R.Manojkumar, S.Nanthakumar, Quest Journals Journal of Research in Mechanical Engineering Volume 2 ~ Issue 8 (2015).
- [13]. Zonal Based Control of Vehicle using Radio Frequency, Sathyanandhi. B, Sivakami T, Ananda Sundaravalli. P, Ranjani. M, International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 4 Issue 03, March-2015.
- [14]. Smart Alert System For Vehicles, R.Ramkumar, S.Dinesh, S.Naveen Kumar, Mrs. G.Prathipa, IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278- 8735 PP 32-39.
- [15]. Automatic Vehicle Detection Using GPS And Challenges In Image Processing, Stephen raj.S, Sri Priya.P.
- [16]. Intelligent Transportation System for Accident Prevention and Detection, Dr.D.Selvathi, P.Pavithra, T.Preethi, International Conference on Intelligent Computing and Control Systems 2017.
- [17]. Sensor Based Accident Prevention System Aravinda B, Chaithralakshmi C, Deeksha, Ashutha K.
- [18]. Vehicle Accident Prevent cum Location Monitoring System, Abhirup Das, Abhisek Ray, Abhisek Ghosh, Swarasree Bhattacharyya, 2017 IEEE.
- [19]. Internet of Things based Accident Prevention and Detection System K.Meena, C. Amuthadevi, G.Sai Kumar Rangarajan and Dr. Sagunthala .
- [20]. Revolution in travelling with Intelligent Road Safety System Vijaykumar Gupta, Trilok patel, Tanay Ash, and Suraj Yadav.