Yaana- A Smart Traffic Rule follower for Vehicles

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Abstract: - Nowadays, with the rapid development of society and economy, automobiles have become almost one of the convenient modes of transport for every household. This makes the road traffic environment more and more complicated and hence requirement of an intelligent assisted system to reduce all the complications and accidents has been increased. This paper is to develop an early alert system for the approaching traffic signs, emergency vehicles, providing low light driving assistance and also anti-theft mechanism. Radio frequency transmitters being installed in traffic signs and emergency vehicles transmit Radio frequency signals which are received by radio frequency receivers in the vehicles, discriminate between the different road signs as well as emergency vehicles and alert the same respectively to the driver. This in turn guides the driver accordingly whereas these parameters are recorded in order to maintain discipline on the road and necessary actions are taken wherever required. Installing of ultrasonic sensors all around the vehicle in order to provide low light driving assistance is proved to be efficient whereas the servo motors help in anti-theft mechanism by cutting of fuel to engine. The usage of GPS and GSM system makes it helpful to achieve all these features efficiently. These mechanisms provide an intelligent assistance to drivers with traffic sign information, alerting of emergency vehicles, regulate driver applications or assist in vehicle control and also security of vehicles from theft to ensure road safety.

Key Words — Automobiles, Traffic Environment, GPS, GSM.

I. INTRODUCTION

YAANA is a paper which in solving the problems faced by drivers of transportation department and to make the drivers follow traffic rules by alerting them, fining them if not so. The number of accidents occurring can thereby be reduced by providing low light driving assistance. Emergency vehicles need to be given priority which is implemented by the usage of modern technologies here [7]. Vehicle theft is one of the major issue in the current world which needs to be addressed and solved. To achieve this, there is usage of high efficiency tracking systems and GSM modules for communication with the stolen vehicles remotely. Drivers need to follow traffic rules for their safety as well as safety of people on present on the road. To ensure this, yaana implements the technology to make drivers follow traffic rules by alerting them about the approaching traffic rule through display as well as voice commands. It makes sure that this rule is followed by the vehicle until and unless it comes out from that zone failing to which there will be fine imposed automatically on the vehicle which gets updated in the list of fines which traffic police use [4]. One more major reason for the cause of accidents is due to low light visibility which occurs during night times, foggy weather, extreme rain conditions and hence they need to be addressed and solved in order to reduce the rate of accidents caused due to low light visibility which is implemented with the help of the developed device here.

Vehicle theft is one of the main problem which vehicle owners are facing in the recent times due to which they are not able to ride or drive peacefully. In order to provide Anti-Theft, feature the following way is selected as to when the vehicle gets stolen, then there is an option given to cut-off fuel flow in the vehicle remotely using GPS and GSM systems. Emergency vehicles are usually equipped with warning sirens or beacons which include ambulances, fire engines are still often impeded by other traffic and are involved in numerous collisions. An effective warning system for alerting other vehicles that an emergency vehicle is approaching is therefore crucial thereby resulting in current research of investigating the use of wireless communication from emergency vehicles to warn other traffic. When such a situation emerges, vehicles around them should be informed and alerted about the emergency vehicle in their vicinity to make way for them [7].

II. OBJECTIVE

- The main objective of this paper is to overcome the problems faced by drivers in all forms of transportation department and prevention of accidents occurring due to various reasons.

- Letting the driver know about the approaching traffic zone by identifying the traffic sign and assisting them with the rule in the form of voice commands as well as display commands so that they are able to recognize the zone and their limitations in it.
- Monitoring the drivers until and unless they follow the respective rules in that particular zone so that they contribute to reduce the misshapen and be disciplined in all ways possible. If they are found guilty by not following the rules, then there is a provision of penalize them automatically as per the regulations.
- Assisting the driver in driving during low light condition so that the rate of accidents reduces due to low light visibility and thereby decreasing the rate of accidents.
- Providing Anti-theft mechanism by giving the owner of the vehicle an option to cut off the fuel control from tank to engine whenever there is an illegal access to the vehicle from a stranger.
- Alerting the vehicles around an emergency vehicle to make way for them due to the increased rate of deaths caused by these vehicles getting stuck in traffic.

III. METHODOLOGY

The block diagram of Yaana- A smart traffic follower for vehicles. Arduino mega is the brains of the paper. It controls all the operations of the paper. It is connected to the GPS and GSM module via a bidirectional connection. The block diagram consists of RF transmitters and receivers which will be used for road sign detection. The RF transmitter will send data to the arduino via the RF receiver. The road sign will be identified and sent to the arduino mega by RF transmitter Receiver. The arduino Mega will notify the road sign with the LCD display and speaker. Servo motor is used to cutoff fuel if any theft occurs. To control the fuel cutoff mechanism GSM Module is used. GPS Modules is used to track the vehicle in case of theft. Low light driving assistance is provided by ultrasonic sensor. It communicates directly to the arduino.
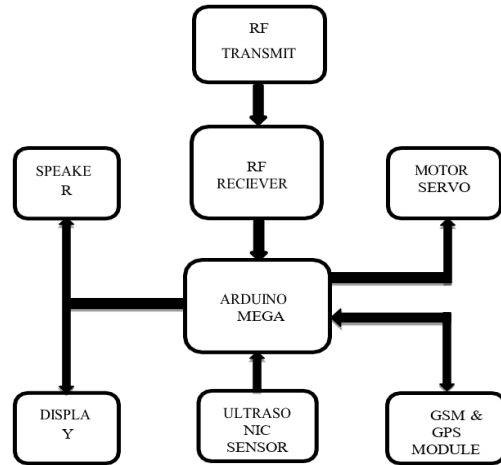

Figure.1 Block Diagram

A. *Flow Charts*

The anti-theft mechanism in our paper works on the basis of authorization from the user. When the car is started without any authorization the anti-theft mechanism identifies the threat to the vehicle and it automatically cuts of the fuel supply of the vehicle and tracks the vehicle with the GPS module and sends the GPS data to the user. The Low light driving assistance judges the presence of obstacle by the feedback from the ultrasound sensor placed around the vehicle. If it senses the presence of any obstacle it displays the direction of the obstacle from the vehicle and also its direction to the user via the LCD display.
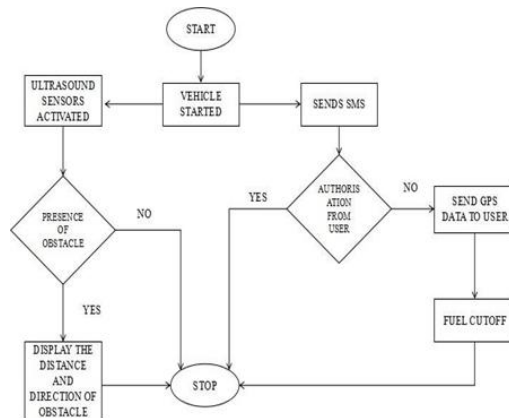

Fig.2. Flowchart for anti-theft and low light assistance mechanisms

The Road sign detection mechanism first identifies the presence of any road sign by detecting the presence of a RF signal transmitted by the transmitters present in the road signs. If any road sign is presence in the vicinity, the mechanism alerts the user about the road sign with the help of LCD display present near the user.

Similarly, the emergency vehicle alerting system receives the GPS data from any emergency vehicle present nearby via RF transmitters and receivers and displays the direction of the emergency vehicle to the user along with its GPS data through the LCD display.

IV. RESULTS AND DISCUSSION

A. Low Light Driving Assistance System

The ultrasonic sensor detects the presence of any obstacles around the vehicle along with its distance from the vehicle. The data from the sensor is displayed by the device in the display unit along with the distance from the vehicle as shown in Figure.ure.
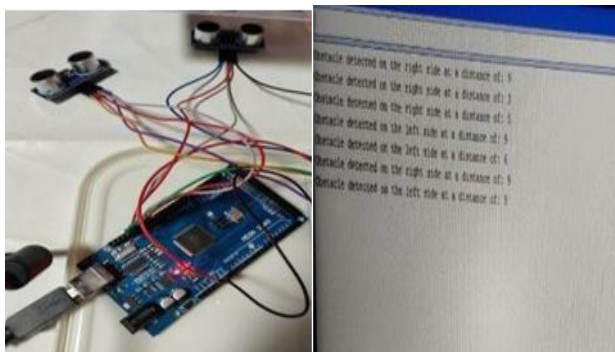

(a)   (b)

Fig.4. (a) Obstacle Detection Using Ultrasonic Sensor (b) Output Data

B. Anti-Theft Mechanism and GPS Tacking System

The Antitheft mechanism consist of an assembly of GPS and GSM modules. When an authorization is not given for vehicle to be started the device sends an SMS to the user along with the GPS location of the vehicle via an SMS to the mobile number predefined by the user.
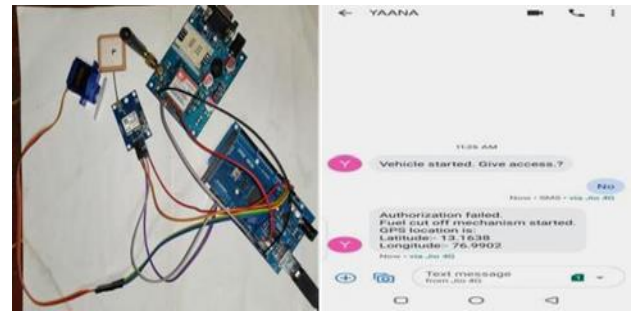

(a)   (b)

Fig.5. (a) GPS and GSM module assembly (b) SMS authorization from GPS tracking

C. Traffic Sign Detection System

RF transmitter will be installed in the road signs whereas the RF Receivers will be installed in the vehicles. The data transmitted by these transmitters will be received by the received by the receivers installed in the vehicles as soon as they approach the respective road sign and thereby alerting the driver about them respectively through the integrated display as well as the speakers as shown in figure 5.2 so that they are well known of the approaching zone.
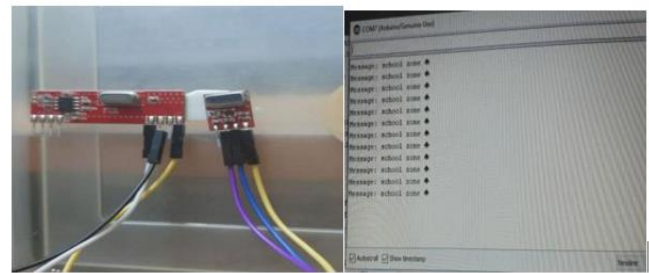
(a)   (b)

Fig.6. (a) RF Transmitter and RF Receiver (b) Output of communicated data

V. APPLICATIONS

- Over Speeding and honking can be supervised by this device in hospital area, school zones, religious places.
- Emergency vehicles can be assisted by clearing the traffic ahead.
- Near the old bridges by automatically limiting the vehicle speed and avoid the road accidents.
- Tracing the carin case of vehicle theft and avoiding the theft by using remote fuel cutoff mechanism.

VI. ADVANTAGES

- Safe: - This product is safe because there are no high voltage devices.
- Secure: - Regular mechanisms and operations of the vehicle will not be affected by the device as it is placed externally.
- Easy to use: - The user interface is not complicated resulting in ease of use.
- Low power consumption: - Usage of radio frequency components reduces the power consumption resulting in high power efficiency.
- High reliability: - Due to the usage of semiconductor devices, the probability of failures decreases thereby increasing the reliability.
- Anti-theft feature: - Since the device is attached externally to the vehicle, it can be placed in secured places of the vehicle resulting in increasing the security of the device and hence cannot be stolen easily.

VII. CONCLUSION

In this paper the reliable approach of the recognition and detection of the road sign has been discussed along with a system to warn the user about the presence of emergency vehicles and a secure anti-theft mechanism.

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