SPECIAL ZONE DETECTION AND ACTUATION IN AUTOMOBILES

Project Reference No.: 42S_BE_0858

College : K.L.S. Gogte Institute of Technology, Belagavi
Branch : Department of Electronics and Communication Engineering
Guide : Prof. Gajanan P. Kadam
Students : Ms. Shreya A Kale
          Ms. Poonam R. Kamble
          Ms. Shivani R. Mutnal
          Ms. Anupama Hegade

Keywords: RFID, IR technology, Special zones, school zone, hospital zone, red traffic light zone, no parking zone, transmitter, receiver, sign boards, frequency, Anti-collision.

Introduction:
In India, roads are extensively used for both passenger and trade purposes. Various reasons like convenience, cost of travel, speed, time spent and dependability contribute to its popularity and hence transportation by road is considered one of the most popular means of transport. The Indian roads, may it be roads in cities, towns or in rural areas are in a very poor condition making them unfit for travel purposes. As a consequence of poor roads and negligence by the drivers, the rate of accidents on roads in India is one of the highest in the world. The number of deaths in 2017 due to road accidents is 1.47 Lakh, also the number of people who get injured is four times as high as the number of deaths.

Safe driving is necessary to reduce the dangers of accidents. Apart from the condition of roads in India, majority of accidents on roads are caused due to the negligence of the driver. Over speeding, overtaking other vehicles, not using helmet, drink and drive, overloading the vehicle beyond approved limit, fatigue driving, skipping the red traffic signal, sudden lane changing are some mistakes which the driver commits that lead to accidents. Also not adhering to the instructions displayed on the mandatory and warning sign boards on the road side is a major issue. These sign boards are very important as they inform the driver about what action he/she is supposed to take, like to maintain a certain speed of 60 KMPH, no parking in a particular space, to notify about upcoming places like school, hospital and actions related to the particular place. The goal of the project is to overcome the problem of drivers skipping important sign boards, by making use of RFID technology.

Objectives:
The broad objective of the study is to develop a prototype to detect certain special zones in the city like school zone, hospital zone, no parking detection and red traffic signal zone using RFID technology. And also to include a feature of anti-collision which helps in maintain safe distance between two vehicles using IR technology.
1. To establish effective communication between RFID transmitter (which is mounted on the sign board and which operates at a unique frequency of operation for a particular zone) and RFID receiver.
2. To duly inform the driver about the special zones encountered on the travel route and also provide notification about what action the driver is expected to undertake.

Methodology:
Once the vehicle enters any of the special zones, the RFID receiver identifies the zone by detecting the frequency transmitted by the RFID transmitter and generates a signal which is sent to the microcontroller. The microcontroller generates a signal which is given to the LCD to display message about which zone it is and what action is supposed to be undertaken by the driver. Output from the microcontroller is not exactly 5V, so it is given to 16 pin non inverting hex buffer amplifier IC CD 4050, which exactly produces 5V. Output of IC CD4050 is passed on to 4148 signaling diodes. The output of signaling diodes is passed on to ULN 2003 relay driver IC which is characterized by zero voltage and extremely high current gain. Once the zone is detected the 12V relay is energized and N/C connection is switched to N/O which in turn is connected to variable power supply which supplies a reduced voltage of 9V and hence for zones like school/speed limit and hospital zone, the speed of the vehicle is reduced and horn of the vehicle is reduced. In case of red traffic signal zone N/O is connected to ground so that prototypic vehicle stops. In case of no parking detection zone only a message “No parking” is being displayed to the driver. For anti collision application, if any opaque obstacle comes in between the IR transmitter and IR receiver within the specified distance, the signal won’t actually reach the receiver and so the vehicle which is fitted with this circuitry will immediately stop.

**Results and Conclusion:**

1. **Environment:** The prototype consists of a car with the RFID receiver circuitry mounted on it. The RFID transmitter with unique frequency of operation is mounted on the sign board. The range of RFID transmitter is 10-15 Feet. The frequencies chosen for the zones are as follows: School/Speed limit zone: 37MHz, Hospital zone: 32MHz, Parking detection zone: 40MHz, Red traffic signal zone: 27MHz.

2. **School /Speed Limit zone:** To regulate the speed of the car, relay along with motor is used. The transmitter sends a signal with a message to maintain the speed of the car at a particular value. So initially toy car is operated at full speed. The receiver detects the frequency and sends the signal to the microcontroller which generates a signal that is given to the relay. Under normal working condition the motor is given 12V through N/C connection of relay, After relay switches to N/O connection the motor is given 9V through variable power supply and hence reduction in speed objective is accomplished.

3. **Hospital zone:** RF transmitter transmits a signal with No Honking condition. The receiver will obtain this message which is passed on to the microcontroller to operate in the same manner as school zone situation. The load used here is buzzer which is used as a substitute to the horn. The volume of the buzzer is reduced when it is in Hospital zone.

4. **No Parking detection zone:** The RF transmitter will transmit a message indicating No Parking condition, which is received by the receiver and only a display message via LCD is given to the driver.

5. **Red traffic signal zone:** The transmitter sends a signal indicating red traffic signal, the receiver detects the condition and a signal is passed on to the microcontroller to operate the relay. The toy car under normal working conditions is given 12 V through power
supply circuit, this connection is with the N/C of the relay. Once the zone is detected, N/C connection switches to N/O which is given to ground as a result of which the car immediately stops until the signal turns to green.

Anti- collision: Once the vehicle crosses the distance for safe driving the car will stop, the IR transmitter and receiver put on the front side of the vehicle help in doing this.

**Scope for future work:**

The project has achieved the above said objectives such as Reduction of speed of vehicles in school zones, reduction of intensity of horn in hospital zones, reading and indication of no parking zones and following traffic signal there by reducing the traffic and thus avoiding the accidents and collisions.

1. This project can be applied in a large scale like in automobiles.
2. This project is used to secure and avoid road accidents.
3. It can be used as part for automation of public transportation.

This project or concept can be applied in any kind of vehicle.