RFID Based Traffic Sign Recognition

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Abstract— It is well known that the road signs play's a vital role in road safety its ignorance results in accidents .This Paper proposes an Idea for road safety by using a RFID based traffic sign recognition system. By using it we can prevent the road risk up to a great extend.

Key words: Traffic Sign Recognition, RFID

I. INTRODUCTION

Now a days technology is playing a vital role in almost all field of human life, In automobile field also several advance systems are developed till now. Due to the very busy life, while driving several time we observe that we may not provide the attention on the various signals on plate on the road side which is for Drivers safety and for the safety of other. For example School, Hospital, No Horn Zone, Speed limit 30 etc. But People ignore it and Drive at higher speed. The negligence to such boards on road may become a reason for misshapes and risk for life as shown in fig.1.

Fig. 1: Unseen traffic signs in rain or fog.

Fig. 2: Car accident because of unseen traffic sign.

So considering the same the need of time is to develop a system that automatically receives the traffic signal from the intelligent board and display on the dashboard and also automatically speed control of the vehicle will be carried out. And it is advisable that the RTO department must make it compulsory for all the vehicle which are running on road. Road Traffic Signs are not only important to new car drivers. It is also important at every citizen in the US know the important of traffic signs. Over the years of statistics more and more people both on the road and off-road find these signs very important. This is why the U.S. Department of Transportation–Federal Highway Administration is strictly implementing these rules and regulations to avoid accidents on the road. The main reason why these signs are available on the road is because of SAFETY. Traffic signs make sure that all drivers are aware of the rules and the dangers on the road. Without these signs, accidents may occur more often. These signs also warn the drivers of the potential dangers that can be encountered on the roads. This paper presents a complete traffic sign recognition system based on vision sensor on board a moving vehicle which detect, including circular and triangular signs. A novel solution to the problem of discarding detected signs that do not pertain to the host road is proposed. The basic strategy of a Safe System approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury. This threshold will vary from crash scenario to crash scenario, depending upon the level of protection offered to the road users involved. For example, the chances of survival for an unprotected pedestrian hit by a vehicle diminish rapidly at speeds greater than 30 km/h, whereas for a properly restrained motor vehicle occupant the critical impact speed is 50 km/h (for side impact crashes) and 70 km/h (for head-on crashes). Road traffic crashes are one of the world's largest public health and injury prevention problems. The problem is all the more acute because the victims are overwhelmingly healthy before their crashes. According to the World Health Organization (WHO), more than 1 million people are killed on the world's roads each year. A report published by the WHO in 2004 estimated that some 1.2 million people were killed and 50 million injured in traffic collisions on the roads around the world each year and was the leading cause of death among children 10–19 years of age. The report also noted that the problem was most severe in developing countries and that simple prevention measures could halve the number of deaths.

II. METHODOLOGY

RFID based traffic sign recognition system has been developed by, sequence of operations. To achieve a successful road sign recognition system we use following methodologies:

- Studying literature on different road sign recognition methods.
- Studying the existing method for road sign.
- Analyze and design for the proposed system.
- Implement the proposed design of the road sign recognition.
- Carrying out experiment and evaluate the system.

III. RELATED WORK

There were many researches in the literature with road sign recognition (RSR) problems. In this section we will explain some of those approaches.

A. Road Traffic Signs

Traffic sign recognition can also be used to easy to task of road maintenance. Assuring the visibility and readability of traffic signs is an ongoing task necessary to maintain safety on roads. However, street signs can be covered by obstacles, damaged, soiled or misaligned. Most work in recent years has focused on circular speed signs, which are used in Europe, Asia and Australia. Therefore, Each government imposes some sets of rules and regulations to ensure a safe traffic system. Each person specially the vehicle driver must obey these rules and regulations for a secure travel. Some of those laws are represented as visual language such as different signs and texts that are known as traffic signs. There are various categories of traffic signs that we can see beside the roads. An efficient driver must notice each of the road signs in front of him and need to act accordingly. Otherwise disastrous things can happen. A driver may not notice each of the road signs in front of his car due to lack of care or human perception errors. Therefore, it is desirable of having a automatic road sign recognition system to assist the driver to ensure a safe travel. Numerous research works have been conducted for recognition of road signs in order to assist the driver.

Fig. 3: Traffic Signs

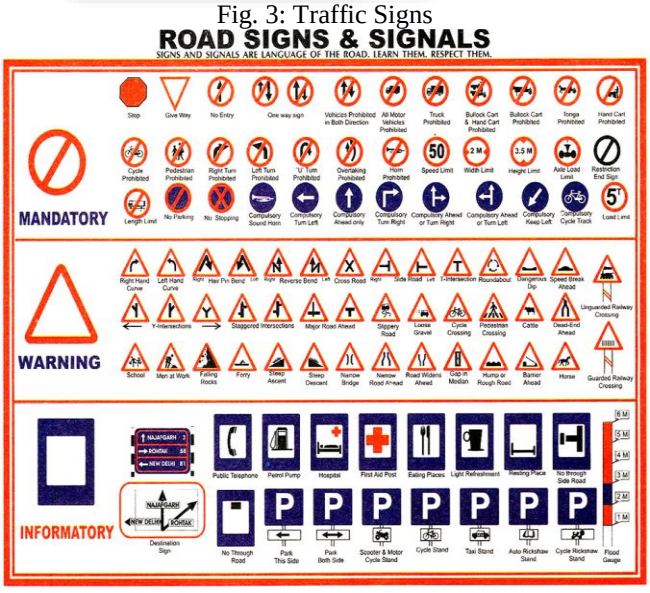


Fig. 4: Classification of Traffic Signs.

B. Classification of Traffic Signs

The sign which is placed at the side of roads to impart information to road users is known as traffic sign. There are four type of traffic signs 1) Warning, 2) Prohibition, 3) Obligation, 4) Informative. Depending on the form and the color, the warning signs are equilateral triangles with one vertex upwards. They have a white background and are surrounded by a red border. Both warning sign prohibition sign have a Yellow background if they are located in an area where there are public works. To indicate obligation, the signs are circles with a blue background.

Fig. 5: Traffic signs of different types and shapes.

From above figure no 5 we can primarily categories the traffic signs in to three categories according to the color. One of them is Red, Black and other is Yellow sign. Red sign are may divided into following categories that are Circular, Rectangular etc. Yellow sign divided in to quadrangle shape and in pentagon shape. Black signs are mostly available in rectangle shape.

IV. BLOCK DIAGRAM

The block diagram of the proposed concept is as shown in fig. 4(a & b) below. It consists of an RFID Tag connected to a traffic sign board in transmitter side which modulates and transmits the reference speed to RFID reader (present in the vehicle). The actual traffic sign get read by using a vehicle RFID reader which placed in car as receiver. The modulated tag code is demodulated in the reader and gives the information of that particular sign board to the driver of that car or vehicle. Now again driver can't see the information of traffic sign in display. Because of that he will get trouble while driving a car. To overcome this problem we also used a buzzer in car at receiver side. When traffic sign will recognize at receiver side the buzzer will beep so the driver will get alert.

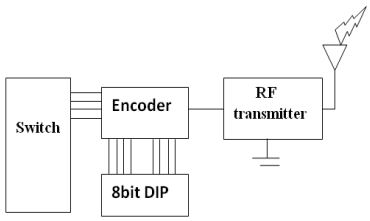


Fig. 6: Transmitter

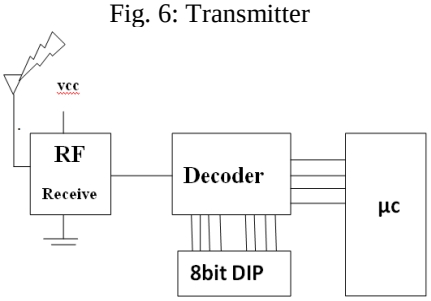


Fig. 7: Receiver

A. Rfid

Radio Frequency Identification (RFID) technology shows a continuous growth in various application fields, like logistics, medical science, security, access control etc. The RFID system is a three component system consisting of: tag,

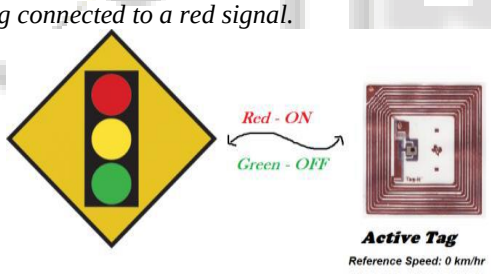
reader and database. The access control, specifically, is detection of IDs entry to or exit from the range area of the RFID reader. Transponders (Tags) must have the circuitry needed to harvest power from the electromagnetic fields generated by the interrogator, the necessary memory elements, as well as the different control circuits. This RFID system consists in a set of emitters or tags which, periodically or upon interrogation, transmit a short digital radiofrequency message containing an identification code (unique to each tag) as well as some data stored in the tag's memory. These data can be obtained remotely by a computer equipped with an RFID reader. Besides the tag ID, which confirms the presence of the tag within the detecting range of the reader, the RFID reader measures the received signal strength (RSSI) of the RF signal, which is an indicator of the range from tag to reader.

The main advantage of RFID systems—with respect to other RF technologies, which could be used for infrastructure-to-vehicle (I2V) communications—is its low cost and minimum infrastructure maintenance, which results in a high scalability and easy deployment of the infrastructure. The kind of active RFID tags used in this research are cheap (10–20 euros each), can be easily attached to the traffic signals and last for at least five years.

In our discussion we consider active tags only. The advantage of RFID is its low cost for tags and can be attached to the traffic signals easily. Apart from this the tags have an ID code generator which is modulated and sent to the reader. This improves security, transmission & detection of data. RFID reader is placed in the car which detects the tag within a particular range. The tags placed here contain specific information. The tags which we use here are active tags (turns on only with the power supply).

In this case we consider two possibilities:

1) Tag connected to a red signal.



Whenever there is a red light traffic signal situation, that is, if the traffic signal turns red, because it is an active tag it powers ON when the red light is active. The tag remains inactive as long as there is a green traffic signal. The reference speed in this case is taken to be 0 Km/hr. This information of red light is modulated and sent to the reader.

2) Tag connected to speed limit boards on the side of the road.

These are tags which contain a particular unique code corresponding to the speed on the speed-limit sign boards. This particular reference speed to which the vehicle's speed has to be reduced to is transmitted by this tag to the RFID reader.

V. FLOWCHART

In fig.5 explained that, Camouflaged and Disoriented signs, sudden illumination variations in driving conditions, weather conditions like raining, night, sunny etc, speed of image sensor, variations in road signs, real time performance, these are the challenges we face while developing this TSR system. Considering these challenges and real time implementation, we try to use simple and efficient methods in the algorithm.

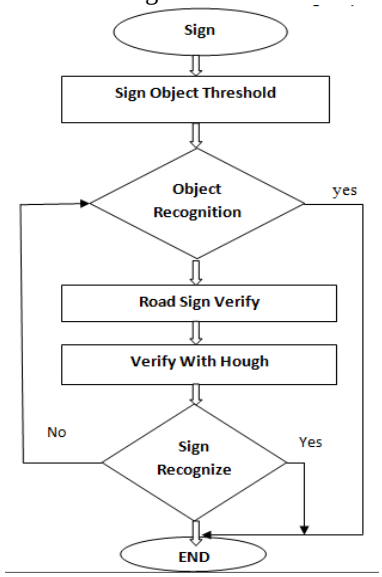


Fig. 8: Flowchart for proposed system

VI. CONCLUSION

This paper proposed TSR which is successfully able to recognize almost all type of signs at different day timing and weather conditions. Improving system performance in night time and with high speed and also large number of traffic signs used for training the neural network, are few works which need further advancement of the system. We will conduct our research further to improve the robustness of this new approach so that it can perform better in all kinds of atmospheres and luminance conditions. In future, we will use machine learning approach so that our system can learn from the current environment and become dynamic.

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