Intelligent Traffic Violation Detection & Emergency vehicle Clearance System

K Shreshta Subodh Shetty
Asst Prof. Dept of ECE
Nitte Meenakshi Institute Of Technology
Bengaluru, IndiaBengaluru, India

Athul S D
Student, Dept of ECE
Nitte Meenakshi Institute Of Technology

Nagashree K S
Student, Dept of ECE
Nitte Meenakshi Institute Of Technology
Bengaluru, India

Madhushree M
Student, Dept of ECE
Nitte Meenakshi Institute Of Technology
Bengaluru, India

Nandini M
Student, Dept of ECE
Nitte Meenakshi Institute Of Technology
Bengaluru, India

Abstract

Controlling Traffic Violation is a tedious task especially in Metropolitan cities. A little negligence on roads may even lead to death. In this paper we present two applications for effective traffic management.

1. A system to monitor Traffic violation intelligently and efficiently. The system is based on Radio Frequency Identification (RFID) which is read by a RFID reader when Traffic signal is violation happens.
2. A system to automatically turn RED signal to GREEN whenever a emergency vehicle approaches. A RF transmitter receiver pair is used to implement this

Introduction

Transportation is a essential part of today's fast paced life as everyone has to move around for their day to day work. Roadways is commonly chosen mode of transport due to its ease, low cost & availability to each and every common man in the country. The ease of roadways transportation is widely affected by various factors like quality of roads, congestion, accidents etc. Accidents have become a major concern in metropolitan cities due to the increasing density of vehicles on road, accidents not only cause loss of lives but also result in economic loss to the country.

Thousands of people lose their lives on Indian roads due to lack of Discipline and knowledge, having safe and free flow traffic has become a major challenge to the Government and Traffic Departments. Traffic enforcement Departments can make use of modern technologies like RFID for intelligent traffic violation detection, it is a common sight in India to see one vehicle violating rules thus blocking way of multiple vehicles. Traffic enforcement authorities are responsible for controlling traffic violations and imposing fine on violations. The existing system in India employs cameras in traffic junctions, these cameras are

Monitored live and violators are fined, this process is done manually at a police control room, our project is capable of automating this process that is , traffic signal violations can be detected automatically by the RFID receiver. The present system also has many disadvantages:

1. Cameras have to be installed in every traffic junction which would result in high costs
2. Maintenance cost of these cameras are high and they are also prone to bad weather conditions.
3. A vehicle with dirty of damaged number plate cannot be fined.
4. Size of the Font on the number plate may cause lack of precision.
5. Manpower is required to monitor the cameras and impose fine.

On the other hand RFID based traffic violation detection system is much more effective as RFID tags store all information about the vehicle and owner. Today's world is technologically developing rapidly, RFID systems are employed in various application to make our lives easier and better. The RFID reader continuously emits radio waves, when the RFID tag comes within the range of the RFID reader it responds

to the reader with the unique identification number of the tag. RFID tags are of two types: active tag and passive tag . A passive tag contains no internal power source where as an active tag contains its own power source which runs the microchip circuitry and helps in broadcasting the signal. In this system passive tags are employed.

Low frequency tags have frequency between 3-30Mhz and that of ultra-high frequency varies between 300-3000 Mhz.

RFID reader uses radio waves to read the tag and hence does not require line of sight communication. Every vehicle is installed with the RFID tag and the RFID reader is installed in the traffic junction.

Second application of this project: Emergency vehicle clearance system, RF transmitter -receiver pair is employed to implement this. Every year thousands of lives are lost due to unavailability of timely medical care, primary reason for this is, ambulances may not get way due to traffic congestion. In order to solve this problem, we have developed a system which automatically gives Green signal to the ambulance.

RF transmitter is installed in the emergency vehicle which can be operated by the vehicle driver, when the emergency vehicle is approaching the traffic junction driver has to manually send a signal to the RF receiver installed at the traffic junction which in turn sends signal to the ARM controller thus turning RED lights to GREEN. RF transmitter has to be operated with the help of a switch.

RF transmitter receiver pair work on the principle of Radio Frequency which is efficient and advantageous.

1. RF signals can transmit easily even if there are obstacles between sender and receiver
2. RF transmitter Receiver need not be in line of sight with each other
3. RF signals are capable of penetrating through certain obstacles

Thus, the entire system is controlled and coordinated
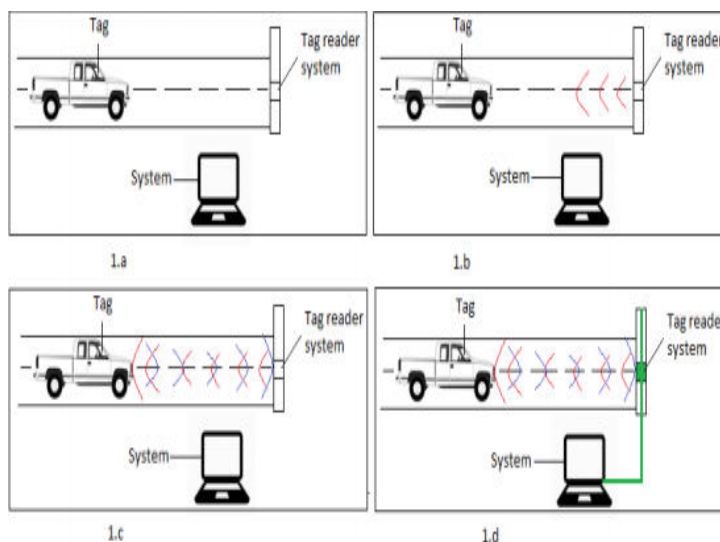
by ARM LPC2148 controller.

The figure 1a shows the system setup, figure 1b shows scanning of RFID tag by reader   figure 1c shows reading of information from RFID tag figure 1d shows extracting information from tag reader and analysis

Methodology

Application 1 : The RFID reader continuously emits RF signals, distance up to which these signals travel depend upon the range of the RFID reader. The RFID reader kept at the traffic junction is activated only when the traffic light goes RED. If any vehicle comes in the range of the RFID receiver during this time, the information in the RFID tag is captured and sent to the police control room via the GSM module

Application 2 : When an emergency vehicle is approaching a traffic junction and the Traffic signal is RED the driver of the vehicle sends signal to RF receiver via RF transmitter. RF receiver in turn sends signal to the ARM controller and the ARM controller automatically turns RED signal to GREEN

Thus, these applications if implemented practically can solve the problem of traffic congestion as every person violating traffic signal will be fined, this can help in bringing road discipline among citizens thus reducing accidents. Emergency vehicle clearance system can be effectively implemented such that patients in ambulances can get timely treatment

Hardware & Software Components used

Hardware:

ARM lPC2148 controller: 16-bit ARM controller is used in this project. The ARM controller is programmed using keil u vision 5 & USB flash programmer software. ARM is founded on the *Reduced Instruction Set* (RISC) principle. In simple words, this means that each instruction is designed to complete in one clock cycle, keeping the instructions simple. In other words, this takes away the complexity from the CPU and instead puts it onto the compiler. The other aspect of ARM is that is is based on a *Load Store Architecture*. To *load* a value from memory, you copy the data from memory into a register. Similarly, to *store* a value to memory, you copy the data

1.a   1.b

1.c   1.d

from a register to memory. All operations take place on data held in registers.

RFID :A RFID tag operates on radio frequency waves . RFID receiver continuously transmits RF waves and responds when RFID tag comes within its range

RF TRANSMITTER & RECIEVER: RF transmitter receiver pair can easily communicate with each other as they work on radio frequency waves. They work on the principle of Amplitude Shift Keying (ASK), which is also advantageous over other modulation techniques. RF signals can transmit irrespective of obstacles between transmitter & receiver.

GSM MODULE: GSM module works with the help of a subscriber identity module (SIM) card similar to that of a mobile SIM. GSM module is programmed to send SMS to a particular mobile number (Police Control Room in this case). In this project whenever a traffic violation is detected ARM controller instructs the GSM module to send SMS of the vehicle details to the programmed mobile number , carrier charges will apply to send the SMS (similar to a mobile phone)

Power Supply: In this project a 5v DC input power supply is used to power up the entire circuitry. The original input to the power supply may be AC this is further converted to DC and brought down to 5 volts.
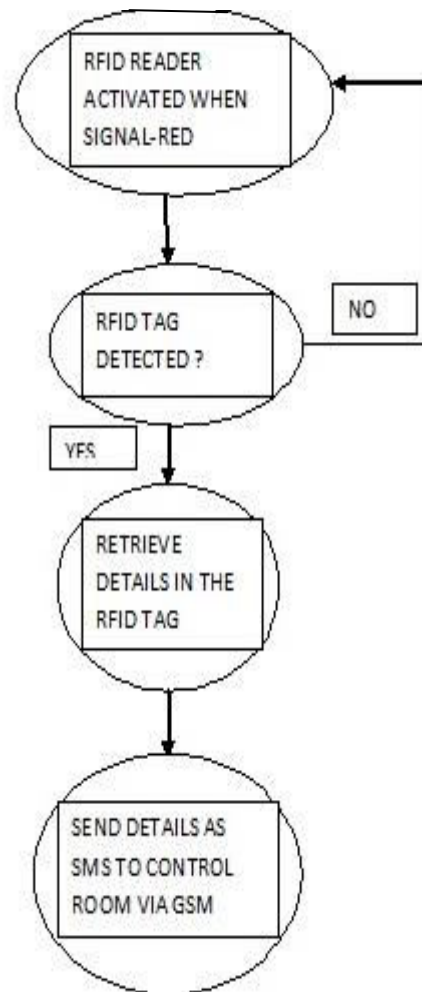
LED: LED lights of three colors: RED, GREEN & YELLOW are used in this project to simulate the working of the traffic lights

Software

- **Keil u vision 5**
- **USB flash programmed**

Embedded C programming language is used to program the ARM LPC2148 controller

FLOW CHART

Flowchart shows the flow diagram of application 1. The RFID reader remains in idle condition when the traffic light is green immediately after the traffic lights turn RED the RFID reader is activated and the violation detection begins, once the signal turns GREEN again the RFID reader is deactivated and the cycle continues , this way traffic violation is detected effectively without any manual efforts.

Conclusion

In order to implement effective and efficient traffic violation detection system this project can be implemented practically; it overcomes the disadvantages of the present system in India

The system shows promising results on automatic detection since the RFID technology is more precise, efficient and reliable, the frequency of RFID reader used in our project is 125 Khz and the range of the RFID reader is 1 meter

In real time implementation the width of the roads may be much larger than the range we have used in such case a higher range RFID reader can be used or multiple RFID readers can be used on either sides of the road, the project can give promising results in real time implementation too if high range RFID readers are used

The present system used in India requires huge manpower to manually check the cameras at different locations for violation, which further has many disadvantages, thus this system can give much promising results than the present system.

References

- Perez J seco F ,Milanzvejameniz "An RFID based vehicle speed controller using active traffic signals" pp 5872-87
- Cheng an-ZT " RFID based traffic information acquisition system " journal of electronics and information technology 2010
- 3. Pandit AA, Mundra AK, Talreja J, "RFID tracking system for vehicles (RTSV)", In Computational Intelligence, Communication Systems and Networks(IEEE), 2009, CICSYN'09, First International Conference on 2009 Jul 23, pp. 160-165
- Min Z, Wenfeng L, Zhongyun W, Bin L, Xia R, "A RFID-based material tracking information system", In Automation and Logistics, 2007 IEEE International Conference on 2007 Aug 18, pp. 2922-2926
- Khali H, Araar A, Abdulla EZ, "Suitability of passive RFID technology for fast moving vehicle identification" 5(1), Journal of Emerging Trends in Computing and Information Sciences, January 2014
- Li C, "Automatic vehicle identification (AVI) system based on RFID", In Anti-Counterfeiting Security and Identification in Communication (ASID), 2010 IEEE International Conference, 2010 Jul 18, pp. 281-284.