# RFID Based Road Transport Management System

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Abstract: The automated traffic control system on the road for high priority vehicles to pass through the dense traffic conditions in today's scenario is very important in many aspects. In this paper we will discuss on the development of a UHF RFID based traffic control system for high priority vehicles like Ambulance, Fire Brigade and VIP vehicles. Most importantly the people, who need lifesaving medical care, die on the way to the hospital because of heavy traffic on the traffic signals and on the other hand it is also true for Fire Brigade vehicles, which must reach on the spot as early as possible to save many lives. Also some VIPs must reach their destination at the right time. This paper will resolve all such issues. The UHF RFID based traffic control system consists of RFID Reader, Antenna and passive RFID Tags. The vehicle having RFID Tag gets detected by the RFID System before 200 meters of the traffic signal. The controlling unit at the traffic signals receives the information from RFID system and allows the traffic to pass so that approaching high priority vehicle can pass without interruption.

**Keywords:** RFID, Tags, UHF, Reader, traffic, vehicles, ambulance, fire brigade.

# **1. INTRODUCTION**

RFID technology has been invented and applied to various applications. At present RFID technology is applied to many fields such as transportation, security management Lalit Kumar Embedded Systems, CDAC Noida, UP, India lalitkumar@cdac.in

luxury product, patient track and medical treatment. Up to the present time, RFID technology has gradually matured so that it is accessible to anyone. RFID technology is rapidly developing in the access control industries. One area where it can provide the significant advantage is the road transport management.

Traffic control at road crossings is a big challenge in metro cities nowadays. The number of vehicles are increasing very rapidly and road infrastructure has its limitations. Over the decade, many innovative technologies have been developed to control the traffic at road crossings. Several efficient automated systems have been designed to solve this problem. The present day systems use the predefined timing circuits to operate traffic lights. Due to the predefined timing circuits, the high priority vehicles like Ambulance, Fire brigade, police van, have to wait at trafficlights. To solve these problems and to enhance the existing traffic control system, a UHF RFID based Road Transport Management System (RTMS) is proposed. The main idea is based on the principle of RFID tracking of vehicles. This system consists of RFID Reader and Antenna which is deployed at 200 meters before the traffic signal and passive RFID Tag attached to the high priority vehicles. The high priority vehicle bearing RFID Tag gets detected by the RFID System before 200 meters of the traffic signal. The controlling unit at the traffic signals receives the information from RFID system through the local area network (LAN) cable and allows the traffic to pass so that approaching high priority vehicle can pass without interruption.

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In the above Fig.1, a typical road crossing with traffic lights and UHF Readers in four directions is shown. This system consists of a RFID Reader in four directions and a central control unit to control the traffic lights. The Readers are placed almost 200m away from the traffic lights. As soon as the high priority vehicle with RFID tag passes by a UHF reader, it gets detected and Electronic product code (EPC) data of the tag is received. By using a table look-up procedure, the EPC data may be matched with vehicle records and all the details like vehicle number, type of vehicle, and department of vehicle can be generated.

This data is sent to the database processing and control unit. This unit will check the data and if data is matched, the control unit will generate a signal to change the state of traffic light into passing state irrespective of its previous state. If EPC data is unmatched then the control unit will ignore it and the traffic light will work in its normal mode as shown in the flowchart given below in Fig.2.



Fig2. Flowchart of the system

# 3. DIAGRAMMATIC REPRESENTATION AND WORKING

The complete diagram is shown here in Fig.3. When a high priority vehicle with a RFID tag reaches near the RFID reader, which is located almost 200m away from the traffic light, it gets detected by that RFID reader. Now the EPC data will go into the database processing and control unit. Here by using a table look-up procedure the EPC data may be matched with vehicle records and all the details like vehicle number, type of vehicle, and department of vehicle can be retrieved. The decision is also made here whether it is the first time in last 10 min this vehicle is detected. The 10 min time is set here for the re-detection of that particular tag which will be detected by another reader after crossing the red light. If this is the first time, the controlling unit will generate a signal to control the traffic light system.



#### Fig3. Real –Diagram of the System

If the signal is red, the controlling unit will tell the traffic light system unit to change the color of light into green for next 2min so that the particular high priority vehicle, which is at almost 200m away from the crossing, will cross the road even it is at a speed of 10km/hr. After crossing the signal in either direction, this vehicle will be detected by the upcoming second reader present in that direction after the signal. Now the EPC data will again go into the database processing and control unit. The entry of this vehicle, which is already detected in last 10 min, will ignore this and the traffic light system will work in its normal mode.

If two high priority vehicles reach at the same crossing almost at the same time, the vehicle detected first will be served first. It will be on the first come first serve basis.

## 4. FURTHER IMPROVEMENTS

Some additional features can be incorporated into this system. The same system with a few modifications can be extended to find out the direction of the vehicle. The GPS can also be merged with this system to locate the vehicle and surveillance camera can be triggered for monitoring. There are a few limitations of this system with respect to the RFID technology as the tags of old scraped vehicles can be duplicated and used, if it is not disabled in the system. Also RFID tags can be forged if the crypts on the tags are cracked. The tags should be durable, impact resistant and waterproof.

### 5. CONCLUSION

An architecture for passing high priority vehicles stranded at road crossings is proposed. The system provides a simple but a unique solution to the high priority vehicles stranded in the heavy traffic at road crossings. This fully automated system can work in real-time environment. This can save a lot of lives which is the main advantage of this system.

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