

Vehicle Tracking Using RFID

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Abstract— Smart road checking system is proposed to take off the manual road checking by the police. The system works in such a way that, as the vehicle moves through the RF Detector area, the RF Reader module will read the vehicle ID by scanning the RF chip and the associated computing module will validate the vehicle ID with pre-stored records and automatically checking for all certificates validity. If any invalid details found, the system will make alert to the department via email. So the department can take further actions on the system generated report. Some certificates like pollution, insurance etc. are of short term validity, and those certificates will have to be updated in the specific periods. For this purpose, as per the proposed system users have to link with corresponding department.

Keywords— Radio Frequency Identification, RF reader, RF tag, Transponders, RF chip, Barcode, Road Transport Authority.

INTRODUCTION

Radio-frequency identification (RFID) is an automatic identification method, relying on Storing and remotely retrieving data using devices called RFID tags or transponders. The technology requires the cooperation of an RFID reader and an RFID tag. An RFID tag is an object that can be applied in to an object for the purpose of identification and tracking. This can be done by using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. An RFID tag is an object that can be incorporated into a product, here it is vehicles for the purpose of identification and tracking using radio waves.

Smart road checking system is proposed to take off the manual road checking by the police. Now a days there is many road accidents occurs while on road checking. The main reason is the escaping mentality of riders. Sometimes people will have to do unnecessary payments. Tremendous amount of time and power is also wasted due to this type of vehicle checking. Based on the proposed system, the system locks all ways to escape from the checking. As the speed tracking cameras placed near by highways, we implements RF Detectors at each police station limits. Also introducing rule that strictly mentions, each vehicle running on the road should have proper RF chip given while vehicle registration and the vehicles that are registered should get the RF chip from concerned department. The system works in such a way that, as the vehicle moves through the RF Detector area, the RF Reader module will read the vehicle ID by scanning the RF chip and the associated computing module will validate the vehicle ID with pre-stored records and automatically checking for all certificates validity. If any invalid details found, the system will make alert to the department via email. So the department can take further actions on the system generated report. Some certificates like pollution, insurance etc. are of short term validity, and those certificates will have to be updated in the specific periods. For this purpose, as per the proposed system users have to link with corresponding department.

LITERATURE SURVEY

RFID tracking system is also called as Vehicle Tracking application. There is a relative lack of research concerning tracking and monitoring of vehicle movement. This study aims at assessing the feasibility of applying RFID for vehicle tracking purposes. There are different types of tracking devices available in market today.

Radio Frequency Identification (RFID) is an emerging technology that uses wireless radio waves to identify objects from a distance. RFID enables the user to capture real-time information in fast moving and bulky product flows with the aim of achieving a high degree of efficiency and assuring high quality. The components of a typical RFID system include an RFID tag, an RFID reader, an RFID middleware and the backend system. The RFID tag is the identification device attached to the item to be tracked. The RFID reader and antenna are devices that can recognize the presence of RFID tags and read the information stored on them. The aim of

RFID middleware is to process the transmission of information between the reader and other applications after receiving the information. Middleware is software that facilitates communication between the system and the RFID devices. The lower costs and the increasing capabilities of the RFID technique attract attention in keeping track and monitoring the vehicles on the road.

RELATED WORK

Vehicle tracking has increased in use over the past few years and, based on current trends, this rise should continue. Tracking offers benefits to both private and public sector individuals, allowing for real-time visibility of vehicles and the ability to receive advanced information regarding legal existence and security status.

The monitoring system of a vehicle is integration of RFID technology and tracking system. Ben Ammar Hatem and Haman Habib proposed bus management system; integration of RFID and WSN will facilitate the extension of an RFID network eliminating the need of wired installation. The system is suitable for monitor bus traffic inside spacious bus stations and can inform administrators whenever the bus is arriving on time, early or late and information is then displayed on the different wireless displays inside and outside the bus station

COMPONENTS OF RFID

A basic RFID system consist of three components:

- i. An antenna or coil
- ii. A transceiver (with decoder)
- iii. A transponder (RF tag) electronically programmed with unique information

These are described below:

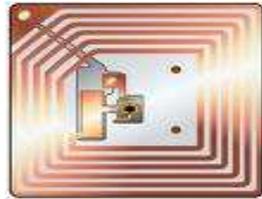
i. ANTENNA

The antenna emits radio signals to activate the tag and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication. Antennas are available in a variety of shapes and sizes; they can be built into a door frame to receive tag data from persons or things passing through the door, or mounted on an interstate tollbooth to monitor traffic passing by on a freeway. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually. If constant interrogation is not required, a sensor device can activate the field. Often the antenna is packaged with the transceiver and decoder to become a reader, which can be configured either as a handheld or a fixed-mount device. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing.

ii. TAGS (Transponders)

An RFID tag is comprised of a microchip containing identifying information and an antenna that transmits this data wirelessly to a reader. At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today. A key difference, however is that RFID tags have a higher data capacity than their bar code counterparts. This increases the options for the type of information that can be encoded on the tag. The amount of data storage on a tag can vary, ranging from 16 bits on the low end to as much as several thousand bits on the high end. Of course, the greater the storage capacity, the higher the price per tag. Like all wireless communications, there are a variety of frequencies or spectra through which RFID tags can communicate with readers. Low-frequency tags are cheaper than ultra-high-frequency (UHF) tags, use less power and are better able to penetrate nonmetallic substances.

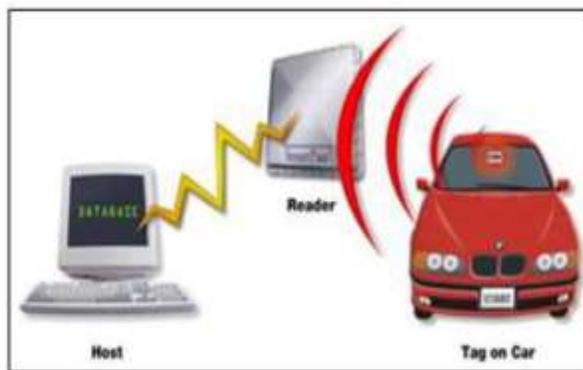
Figure 1: *RFID Tags*



i. RFID Reader

A device used to communicate with RFID Tag. The reader has one or more antennas, which emits radio waves and receive signals back, from the RFID Tag. Also called Interrogator because it interrogates the RFID Tag. Data retrieval - RFID Reader – Device - Emits radio waves - Received by the RFID Tag - Activates the microchip data get transmitted.

Figure 2: A reader is reading RFID tag.



SOLUTION

Current Options

- **Papers (License, Pollution Certificate etc.):**

Traffic police department have been using the traditional techniques of issuing original papers since the start checking.

- **Sticker:**

Police now attaching stickers on Wheelers after checking papers. They paste stickers on every vehicle. Both Road Transport Authority and police officials' informed that the vehicles having no stickers would be considered faulty and illegal and that action would be taken against them.

- **Barcode:**

We may think of Barcode as in some countries departments are using this. But all the above options have modern challenges that may not be overcome easily. Recently huge improvement has been evolved in printing industry and we have found even false money has become impossible to identify. Therefore papers are not enough to overcome the critical situation and very hard to implement in speedy and busy roads. Special stickers may take some time to copy but when it would become older then the fraud owners would take the same chances. About bar code the most important thing is the reader requires to bring very close to the tags (and in line of sight). And paper tags are easily become useless if they are wet and torn.

- **Camera**

Opponents of traffic cameras believe traffic cameras violate privacy and a citizen's right to face his/her accuser. Because this camera photograph people without their knowledge. Another disadvantages of traffic cameras is that they often do not work correctly. The camera and recording system may not be maintained properly. And sometimes the picture is not clear.

New Solution

The main objective of the proposed system is to automate the on road vehicle checking by the police department. For which we are introducing a new concept that every vehicle should have RF Device fitted with the vehicle. By replacing the on road checking and camera placed near by road for checking vehicle, the RF Reading device placed near by the road will read the card details, and automatically validates the owner details and corresponding certificate details. If any mismatch found the system will automatically send alerts to the specific department. Another facility provided by the system is lost vehicle detection and/or vehicle robbery tracking. The owner and police department can see the vehicle position that is the vehicle is under which station limit. So it will be much easier to find out the vehicle. Therefore, the best solution is using Radio Frequency Identification (RFID) Technology.

RFID Advantages

- I. Not requiring line of sight access to be read.
- II. Automatic scanning and data logging is possible without Operator intervention.
- III. Each tag can hold more than just a unique vehicle code.
- IV. Each item can be individually 'labeled'.
- V. With the right technology a plurality of tags can be concurrently read.
- VI. Provides a high degree of security and product authentication – a tag is more difficult to counterfeit than a barcode.
- VII. The supporting data infrastructure can allow data retrieval and vehicle tracking anywhere provided the scanner/reader is close enough to the tag.
- VIII. Since each tag can be unique they can act as a security feature if lost or stolen.

RFID disadvantages

- I. Some common problems with RFID are reader collision. Reader collision occurs when the signals from two or more readers overlap.
- II. Another problem is Tag collision. Tag collision occurs when many tags are present in a small area

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CONCLUSION

Designed as a system is to automate the on road vehicle checking by the police department. For which we are introducing a new concept that every vehicle should have RF Device fitted with the vehicle. By replacing the on road checking the RF Reading device placed near by the road will read the card details, and automatically validates the owner details and corresponding certificate details. If any mismatch found the system will automatically send alerts to the specific department. Another facility provided by the system is

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