

Automatic Vehicle Identification at Tollgates and Theft Detection of Vehicles

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Abstract— we live in a world where technology is omnipresent. Yet, there are few hurdles which are ought to be overcome. People waiting at toll gates, so as to make their payments is one such time consuming act for which we intend to address a solution through this current project. By designing a simple RFID card holding onto a vehicle with SIM data embedded onto it, whenever a vehicle crosses a toll gate the RFID detector located at the station senses the RF frequency from the vehicle. Through this, we intend to deduct charges for every vehicle that passes by, thereby addressing above mentioned problem of time consumption. Through this project theft detection of vehicles can be achieved with the RFID and thus vehicle security is ensured. Our project will be a real-time implementation of toll pass systems.

from the active reader. A variation of this system could also use a battery-assisted passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal. Also the theft detection of vehicles is also possible which is explained as follows.

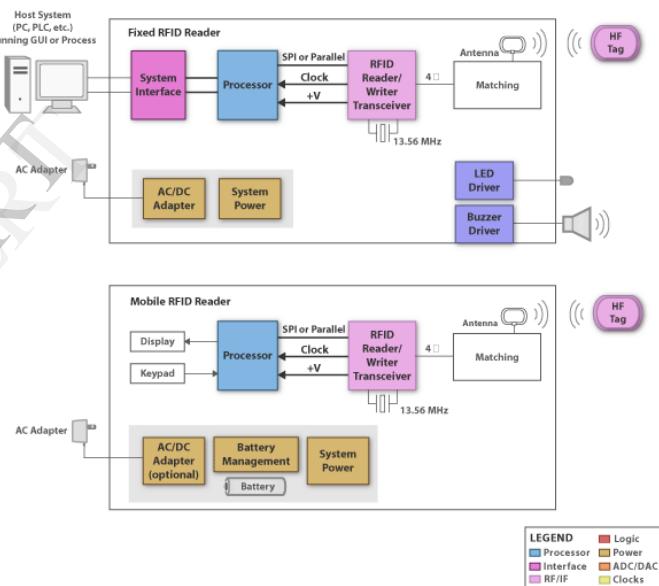


Fig 1 : Basic Block Diagram of Fixed and Mobile RFID Reader

I. INTRODUCTION

RFID is a wireless non-contact use of radio frequency electromagnetic fields to transfer data for the purposes of automatically identifying and tracking tags attached to the object. The tag contains electronically stored information. Some tags are powered by and read at short ranges via magnetic fields. Others use a local power source such as a battery or else have no battery but collect energy from the interrogating EM field and then act as a passive transformer to emit microwaves or UHF (Ultra High Frequency) radio waves. RFID contain at least two parts. An integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, collects DC power from the incident reader signal, and the other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. The RFID tag includes either a chip-wired logic or a programmed or programmable data processor for transmission and sensor data, respectively. RFID systems can be classified by the type of tag and reader. a passive reader active tag(ARPT) system has a passive reader which only receives radio signals from active tags. An active reader passive tag (ARPT) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. An active reader active tag (ARAT) system uses active tags awoken with an interrogator signal

II. EXISTING SYSTEM

In the existing system, toll rate collection is done manually which requires human resources. Also it is a time consuming process. Further in the present scenario, invisible barcode, optical scanner and DSP board are in use. The barcode is made of a material which reflects only the specific light wavelength, 1350 nm which is invisible to human eye. To overcome this disadvantage the following modification has been implemented in our project.

III. PROPOSED SYSTEM

In the proposed system, collection of toll rates is done automatically by the use of RFID technology along with the database management system (DBMS). Through this, theft

detection of vehicles is also achieved by the use of traveler's details which is already stored in the database maintained.

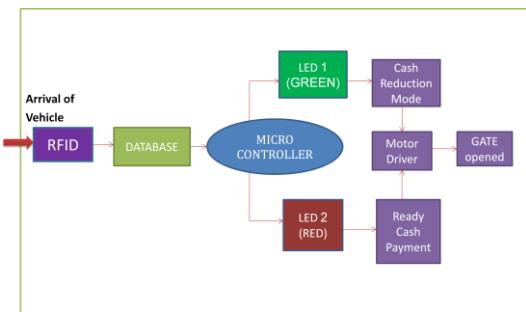


Fig.2 : Basic Block Diagram of Working system

IV. WORKING OF RFID

Initially, vehicle enters the toll gate. The RFID card attached onto the vehicle is detected by the RF reader. Through the MAX-232 cable attached from the RF reader, the customer information is displayed on the database [3] and automatic money deduction is made. The green led glows and the stepper motor which is driven by the motor driver allows the customer to pass through the gate. In case of insufficient money in the RF card ,the traveler is instructed to take the other lane as indicated by the other led (red) and thus pay his/her ready cash at the counter .

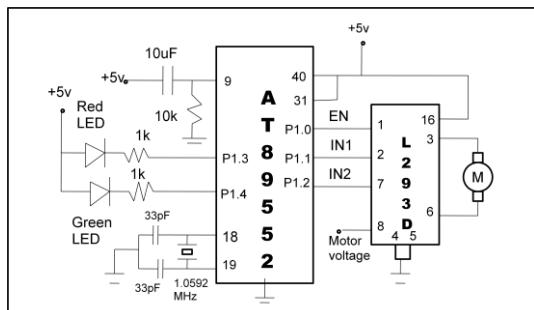


Fig.3 : Overall Circuit Diagram For Implementation

V. COMPONENTS

The main components used are as follows

- RFID Reader
- Microcontroller-8051(AT 89552) [2]
- 12V Geared AC motor
- RFID cards
- MAX 232 Cable
- Motor Driver(L293D)
- LED

A. RFID Reader

An RFID reader's function is to interrogate RFID tags. The means of interrogation is wireless and because the distance is relatively short, the line of sight between the reader and tags is not necessary. The reader contains the RFID module, which

acts as both the transmitter and receiver of radio frequency signals. A microcontroller forms the control unit, which employs an operating system and memory to filter and store the data. The data is now ready to be sent to the network.

B. Microcontroller-8051(AT 89552)

Microcontrollers generally contain numerous general purpose input/output pins (GPIO). GPIO pins are software configurable to either an input or an output state. When GPIO pins are configured to input state, they are often used to read sensors or external signals configured to the output state GPIO pins can drive external devices such as LEDs or motors

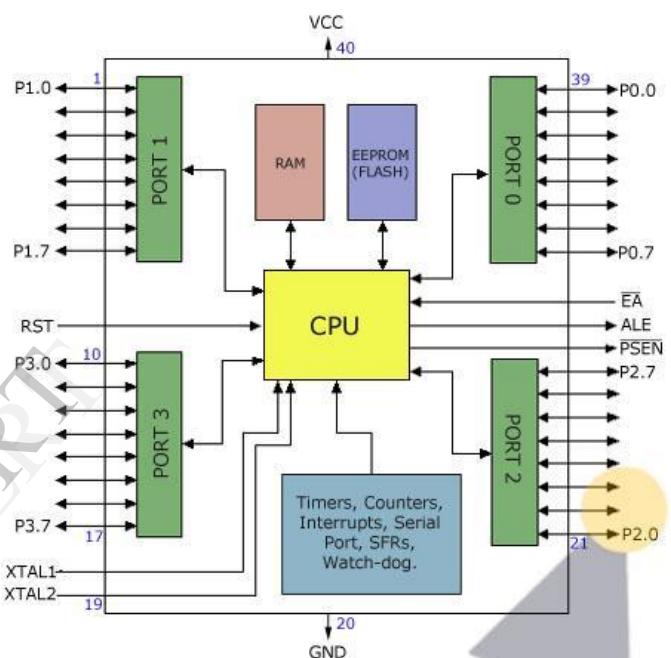


Fig.4: Microcontroller [AT89S52]

C. 12V Geared AC motor

12v ac geared motors are powerful and sturdily constructed motors are applauded and accepted for their consistent performance. They are used in various industrial applications.



Fig.5: Geared AC Motor

D. RFID cards

RFID technology uses radio waves to identify people or objects. There is a device that reads information contained in a wireless device or “tag” from a distance without making physical contact or requiring a line of sight

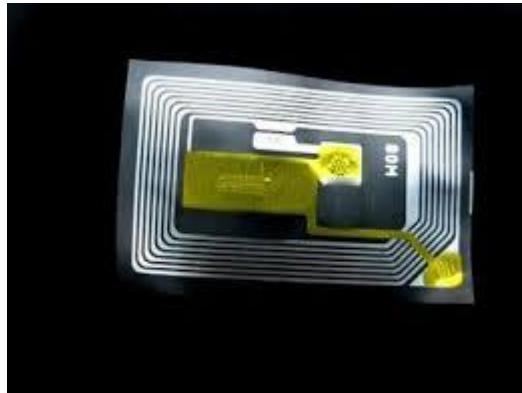


Fig.6: RFID Tag

E. MAX 232 Cable

The MAX232 is an IC that converts signals from an RS232 serial port to signals suitable for use in TTL compatible digital logic circuit.

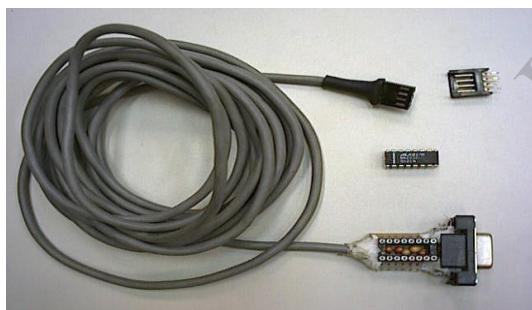


Fig.7: MAX 232 Cable

F. Motor Driver (L293D)

L293D is a typical motor driver which allows DC motor to drive on either direction. L293D is an 16 pin IC which can control a set of two DC motors simultaneously in either directions.

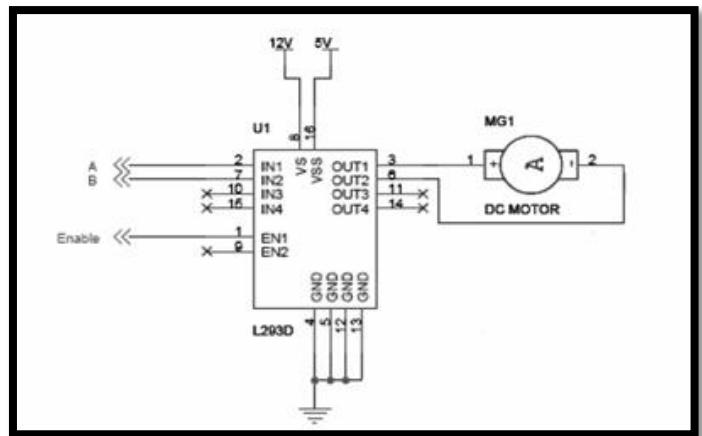


Fig.8 : Circuit Diagram of Motor Driver(L293D)

VI. THEFT DETECTION

Theft detection of vehicles is also achieved through the RFID reader and database maintained and theft intimation is also made. A database is maintained in which the traveler's complete details are stored and can be retrieved whenever required.

The following block explains the theft detection held at various cases.

a) Case 1: when the number plate is not changed

Once the complaint is registered the account of the particular vehicle in the database freezes. Eventually when the vehicle is passed, the complaint arises.

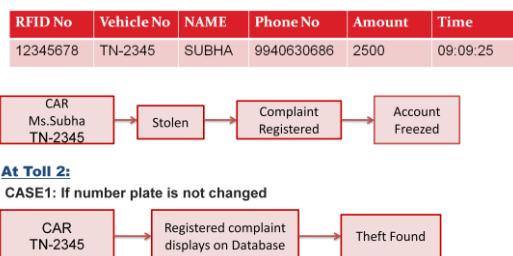


Fig.9 : Block diagram of theft detection of vehicles

b) Case II: when the RF card does not have sufficient amount in the card

In this case, when the traveler crosses the toll gate, the red led glows and the traveler is instructed to take the alternative path and pay the ready cash at the other gate.

VII. SOFTWARE TOOLBOX

The Major Software used is Arduino and MySQL Server. MySQL Server database maintains the complete details of the vehicle's owner.

The advantage of using this software is

1. Easy accessible.
2. Large number of database can be stored and retrieved easily.

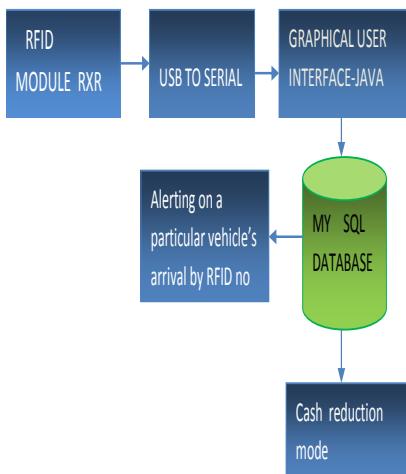


Fig.10: Block diagram of software toolbox

VIII. FUTURE ENHANCEMENT

This project can be further enhanced by the use of RFID technology employed at various traffic signals, petrol bunks and malls.

IX. ADVANTAGES

- Although RFID is more costly than barcode, it proves to be indispensable for a variety of automated applications involving data acquisitions and object identification.

- The reading/writing capability of an active RFID system id's also significant advantage in interactive applications. E.g. when tracking products in process or maintenance jobs.
- RFID transponders can be read at remarkable speed even in difficult conditions, and in most cases respond in less than 100 milliseconds.

X. DISADVANTAGES

- The financial investment and human resources required from the outset.
- RFID tags are larger than barcode cables.

XI. CONCLUSION

Thus this paper emphasizes on less time consumption .also less man power is sufficient .the vehicle theft can be prevented up to 99.9% .With the implementation of such an efficient security system we can put a curb on the increasing crime rate.

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