AUTOMATED TOLL COLLECTION AND EMERGENCY TRAFFIC HANDLING SYSTEM

Nithin R[1], Param Jain[2], Prajwal V N[3], PruthviRaj K[4], Dr L.Swarna Jyothi[5]

[1-4]Department of ECE, Rajarajeswari College of Engineering, Bangalore.

[5] Professor & HOD, Department of ECE, Rajarajeswari College of Engineering, Bangalore.

ABSTRACT

ATCETHS is an automated toll collection and emergency traffic handling system used for collecting toll tax and traffic light control to facilitate the movement of emergency vehicles automatically. Proposed system will identify the vehicle using RFID. A vehicle will hold an RFID tag, which is nothing but unique identification number (UIN) assigned by the RTO or traffic governing authority. In accordance with this we will store, all basic information as well as amount to be paid in advance for toll collection. Reader will be strategically placed at all collection centres, whenever the vehicle passes the toll centre, the tax amount will be deducted from user's prepaid balance. Balance will be deducted based on the type of vehicle which is deducted based on its weight and the number of tolls crossed, which is stored chronologically and finally the amount is deducted from the user's prepaid balance. If the user has insufficient balance; updated balance will be negative. When the balance goes negative, the buzzer is activated and beeps continuously, which prompts the driver to recharge and to divert the vehicle to recharge lane. The user is kept updated about prepaid balance whenever vehicle crosses the toll. A message is sent to user using GSM module. The back image of the vehicle is captured and unique identification code stored for further reference in database to locate lost vehicle and vehicle used for crime. As vehicles do not have to stop in the queue, the proposed system assures time saving, fuel conservation and cost. Emergency serving vehicle such as ambulance, fire engine, police vehicle etc. is detected by RFID reader placed near the traffic poles and hence traffic lights can be altered based on the presence of emergency vehicle.

Keywords: *Automated Toll Collection; Emergency Serving Vehicle; RFID technology; MySQL Database.*

1. INTRODUCTION

In the present Indian scenario of toll collection system each vehicle has to stop and pay taxes at toll. Average time for one vehicle to stop and pay taxes in 60 seconds. Suppose 100 vehicles cross the toll plaza, and then the total idle run time is $60 \times 100 = 6000$ seconds per day and $60 \times 100 \times 30 = 180000$ seconds per months. Total time per year again increases cumulatively per year. On an average each vehicle that passes through the toll plaza has to wait 6 hours in engine start condition per year. The figure is staggering if on an average we take on 100 vehicles pass through the toll plaza each day, then nearly 36000 vehicles pass through the toll plaza. And each year 36000 vehicles just stand still for 6 hours in engine start condition thereby aiding pollution and wasting fuel and money. This study is applicable to system which is very efficient. If the vehicle has to wait for 5 minutes in one toll plaza and considering 50 tolls to exist in the system, the effective idle time, fuel consumption and the cost will drastically increase.

The second component of this project is the time management for emergency vehicles (EV), which is an important aspect for safe city. Present situation of traffic control India involves manual interference to allow EV on top priority. EV may not reach the destination within scheduled safe time because of manual interference involved in traffic control, which will result in chaos and accidents on roads as the traffic clearance time is unpredictable. ATECTHS provides the automatic solution for such problems. Automated control of traffic signals during emergencies plays vital role in avoiding damage caused to patient's health status.

2. RELATED WORK

Automated Toll Collection System Using RFID[1]- IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p- ISSN: 2278-8727Volume 9, Issue 2 (Jan. - Feb. 2013), PP 61-66.The author presents reviews on vehicle crossing tolls and price deduction from the recharged RFID tag of the user and storing the data into the database. **Design of an RFID Vehicle Authentication System[3]-** International Journal of Scientific and Technological Research www.iiste.org ISSN 2422-8702 (Online) Vol 1, No.7, 2015. This paper depicts the implementation of the RFID trans-receiver for the authentication of the vehicles entering the college campus to ensure the security of the college campus. **RFID Technology Principles, Advantages, Limitations & Its Applications[4]-**International Journal of Computer and Electrical Engineering, Vol.3, No.1, February, 2011.The author discusses the principle of operation and applications of the RFID technology. **A New Type MySQL Integrated Mutual Authentication Security Model[6]-** 2016 Sixth International Conference on Instrumentation & Measurement, Computer, Communication and Control. The author discusses the database MySQL and the authentication and security using MySQL database. **RFID: Technology and Applications-Sridhar Iyer, IIT Bombay[5]** In this paper author discusses the technologies and various applications of RFID.

3. PROPOSED SYSTEM

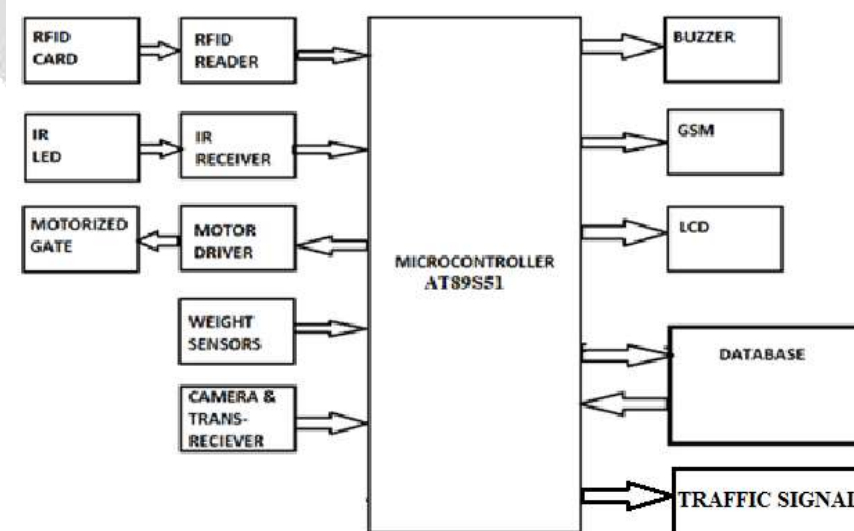### 3.1 Automated toll collection system

Fig- 1 : Block Diagram of Automated toll collection system and emergency surveying system

In ATCETHS system the RFID tag of the vehicle passing through the toll is sensed by the reader and information of the card holder is verified with reference to database. If the information is found it allows car to pass

and the message is sent to the card holder otherwise they are sent to different lane for the manual toll collection, depending upon the type of vehicle and at which toll the vehicle is passing.

The second part of the project deals with the handling of the emergency vehicles. The RFID tag is made universal so has to avoid the problem of multiple RFID card reads, whenever the vehicle approaches the traffic signal at the time of emergency situations the tag is been read. The traffic signal is changed accordingly for the smooth flow of vehicles. The buzzer makes the noise and used as indicator for the crowd.

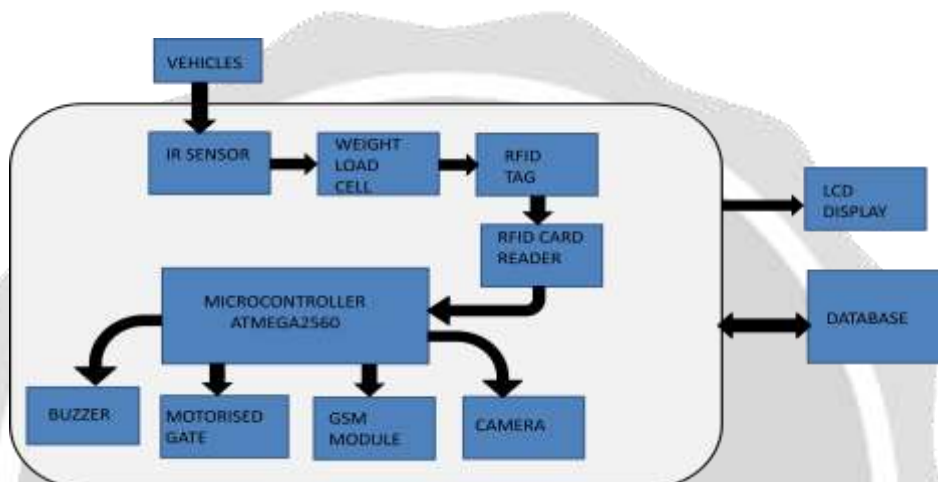### 3.2 Automated toll collection system

Fig-2 : Functional Diagram of Automated toll collection system

The block diagram consists of RFID tags and readers, IR sensors, GSM Module, LCD display, Buzzer, DC motor, and MySQL Database. The microcontroller used to interface all these devices to ATMEGA2560. The information is first sent to microcontroller and processed. The IR Sensor indicates the presence of vehicle coming towards toll gate, whenever the vehicle passes through the toll gate the RFID assigned to the respective vehicle is read and the data is verified with database. Based on the type of vehicle segregated by load weighing cells the amount is deducted from the card. The acknowledgment is sent to the card holder with respect to deduction and updates are given about the balance in the card to card holder.
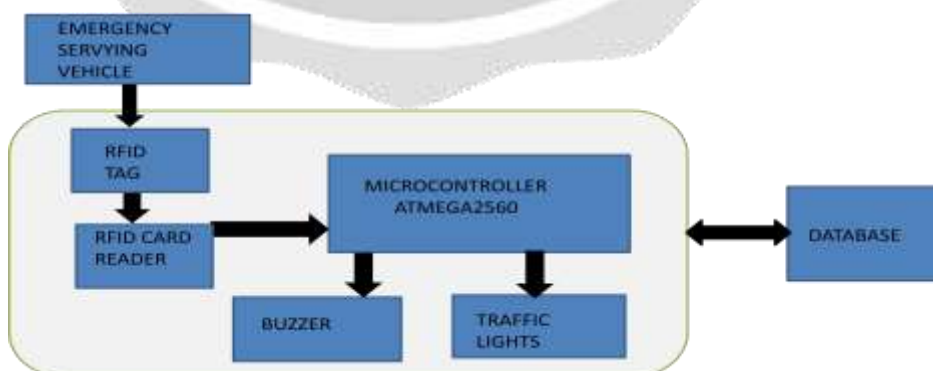
3.3 EMV handling system

Fig-3: Functional Diagram of EMV handling system

The EV handling system consists of RFID tag and reader, microcontroller ATMEGA2560, Buzzer and MySQL database. The RFID tag is made universal for the each category emergency serving vehicle. When EV approaches towards traffic light the RFID reader reads the tag and the traffic signal is changed accordingly for the smooth flow of vehicles. The buzzer makes the noise and used as indicator for the crowd.

4. CONCLUSION

The authors have discussed the design of automated toll collection system and emergency surveying vehicle handling system. The first part deals with the concept of automated toll collection using an innovative approach where in a traveler can pay the toll while in motion using RFID communication technology. The number of vehicles passing through the toll gate will be stored in the database. We can also find out the repeated movement of a vehicle through the toll gate in a day. This process of toll collection will save time, effort, cost of travel and man power. The second part deals with the handling of emergency serving vehicle by changing the traffic lights accordingly using RFID technology. Using this technology the precious time to reach the hospital is reduced for medical assistance without manual interference is achieved at low cost.

5. REFERENCES

[1] A New Type MySQL Integrated Mutual Authentication Security Model-2016 Sixth International Conference on Instrumentation & Measurement, Computer, Communication and Control.

[2] Design of an RFID Vehicle Authentication System-International Journal of Scientific and Technological Research www.iiste.org ISSN 2422-8702 (Online) Vol 1, No.7, 2015.

[3] Automated Toll Collection System Using RFID- IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p- ISSN: 2278-8727Volume 9, Issue 2 (Jan. - Feb. 2013), PP 61-66.

[4] RFID Technology Principles, Advantages, Limitations & Its Applications-International Journal of Computer and electrical Engineering, Vol.3, No.1, February, 2011.

[5] H. Vogt. Efficient Object identification with passive RFID tags. In F.Mattern and M. Naghsinesh, editors,-International Conference on Pervasive Computing. Volume 2414 of Lecture Notes in Computer Science, Zurich, August 2002. Springer-Verleg.

[6] Klaus Finkenzeller, "RFID Handbook: Radio-Frequency Identification Fundamentals and Applications"-John Wiley & Sons, 2000.

[7] RFID (Radio Frequency Identification): Principles and Applications-Stephen A. Weis,MIT CSAIL.

[8] RFID: Technology and Applications-Sridhar Iyer, IIT Bombay.

[9] The Time's of India paper April 20, 2012 "Now Road toll can be paid without stoppingate Toll Plazas".

[10] The Time's of India paper May 28, 2012 "High-Tech number plates for 20 lakh vehicles soon".