

An Intelligent Toll Gate Security System with Speed Control

M.D.S. Nandini

Assistant Professor

Department of ECE

SNS College of Engineering

Coimbatore, India

C.Abirami

UG Scholar

Department of ECE

SNS College of Engineering

Coimbatore, India

R.Maheswari

UG Scholar

Department of ECE

SNS College of Engineering

Coimbatore, India

Abstract - An intelligent toll gate opener using zigbee technology is to overcome the major issue of collision. The zigbee module is placed in both the transmitter and receiver side, the module in the receiver side receives the signal from the transmitter side, which is placed in the vehicle. It maintains the user details of user name, account number, vehicle number and address to verify the user details in the data base. Simultaneously the transaction details of the users is sent to the micro controller and the amount will be reduced from the user's account, it will intimate the gate control which is supported by a stepper motor to open the strip of the gate, if it is valid. If not, the vehicle will be automatically stopped.

Key words: Zigbee, Embedded system

I. INTRODUCTION

The information about the user is stored in the vehicle's module, which is stored in the toll gate module also. When the vehicle arrives near to the toll gate path, the IR sensor attached at the road side send the signal to the toll gate. Then the zigbee module sends the signal to the vehicle module. The toll gate name will be displayed at the receiver side, after that the user has to enter the password. If it is correct the details will send to the toll gate, if the password not matched the buzzer sound will be produced. At the other side the central data base system receives this information compares the data base for the sufficient details and the amount. If the details are matched then the amount will be reduced from the user's account and the toll gate will be opened. If the users have no in the account means then the speed of the vehicle is automatically reduced, then vehicle will be stopped. After paying the money, the toll gate will be opened for the particular vehicle, otherwise the vehicle is not allowed to pass through the toll gate. By this method the collision in the toll gate is avoided and the time consumption also reduced.

II. RELATED METHODS

A. Automated Toll gate

Automated toll gate system is considered the most sophisticated entrance roads in the world. Cameras are equipped with Optical Character Recognition (OCR). The OCR cameras are used to capture license plate numbers of vehicles without transponders. The entrance bill is then sent directly to the registered address of the vehicle owners. There are two

laser beam scanners in the system which is placed above the road way to detect the types of vehicles passing through the toll gate. The toll gate system is considered to bear a very high infrastructure cost, and the users are the ones who help recover the cost through increments in their entrance bills. ATG is said to use a combination of telecommunication technology (GSM) with satellite based Global Positioning System (GPS). Using GPS technology, the distance driven in kilometers can be estimated and use to calculate the entrance fees and rates, and then transmit the information to the NATCS computer centre. Each vehicle is charged from the highway entrance up until the end of the highway. In order to identify the plate numbers of trucks, the system has control gates equipped with digital short range communication (DSRC) detection equipment and high resolution cameras. The system is considered expensive due to the technical specifications which incur high cost for motorist [5,4].

B. Smartcard Based Toll Gate Automised System

It is observed that the use of contact type smart cards cannot be under estimated in the world of technology because it is being utilized for different purposes. The latest technology trends introduced contactless smartcards. They work on the RF frequencies. With the help of these smartcards there is no need to insert the smartcard in the reader, the reader reads the smartcard from the distance, and both the smartcard and the smartcard reader will transmit and receives signal which led to mutual transfer of information to other devices. It is considered faster than the contact based smartcards. The smartcard based toll gate automated system is considered effective and efficient since the card is recharged with some amount and whenever a person wants to pay the toll gate tax, just needs to insert the smartcard and deduct amount using keypad, the system is security conscious since there is no need to carry cash. But it is considered expensive to install and maintain [7].

C. RFID Based Toll Gate Automised System

Radio frequency identification (RFID) is an automated identification technology which uses radio frequencies between 30 KHz and 2.5 GHz to identify objects remotely. The RFID automatic toll gate system is designed to automatically detect the identities of the vehicles and perform the billing in accordance with the identify of each vehicle as pre-recorded in the data base. The system could automatically emails the owners of the vehicles. These were the major achievements of the system. Other features are the ability to track vehicles and

connect data base remotely. In spite of these, the system has failed in some of the required criteria because it did not yield the required result due to lack of resources and high cost of implementation for instance, remote database connection needed a pre-set virtual private network and automatic synchronizing software which will be readily available[6].

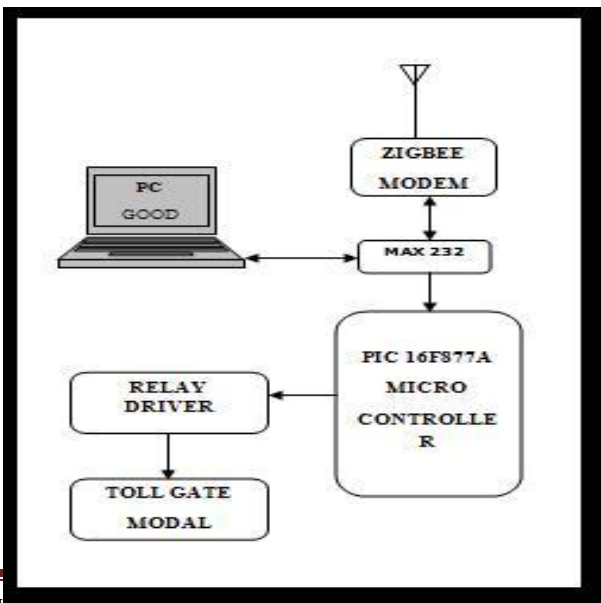
D. License Plate Detection

The development of a reliable and accurate license plate recognition system cannot be underestimated in view of its potential application in traffic monitoring systems and highway entrance collection. LPR systems have recently attracted considerable interest as part of an intelligent transport system. While much commercial work has been done for Iron, Korean, Chinese, European and US license plates, little work has been done in LPR systems for developing country such as Nigeria. The central idea of the license plate extraction is to detect vehicle plate number from video existing systems are based on four modules. In the first module, the camera captures video of the vehicle. In the second module, the video is converted into frames by using MATLAB operations. The third module converts frames into images. Finally, in the last module by using canny edge detection and morphological operator's vehicle number plate is extracted. This serves as a major disadvantages because the system may need more computations [8,4].

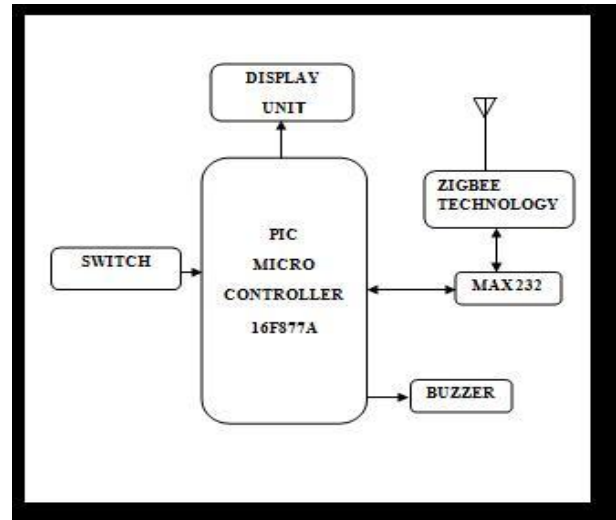
III. SYSTEM DESIGN

We are implementing an intelligent toll gate security system using PIC 16F877A and Zigbee technology. In this system three sub systems are present, those are central data base system, tollgate unit, Pic microcontroller, RS 232 and Zigbee module. Similarly another side consist of a Pic microcontroller and Zigbee module

A. Toll gate side



B. Vehicle side



C. Zigbee technology

Zigbee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400-2.484GHz, 902-928MHz and 868.0-868.6MHz. The 802.15.4 specification was developed at the Institute of Electrical and Electronics Engineers (IEEE). The specification is a packet-based radio protocol that meets the needs of low-cost, battery-operated devices. The protocol allows devices to intercommunicate and be powered by batteries that last years instead of hours. The Zigbee protocol carries all the benefits of the 802.15.4 protocol with added networking functionality. The Zigbee protocol was engineered by the Zigbee Alliance, a non-profit consortium of leading semiconductor manufacturers, technology providers, OEMs and end-users worldwide. The protocol was designed to provide OEMs and integrators with an easy-to-use wireless data solution characterised by low-power consumption, support for multiple network structures and secure connections. The Zigbee protocol was designed to carry data through the hostile RF environments that routinely exist in commercial and industrial applications.

D. PIC 16F877A

PIC Microcontroller has a very basic advantage of having Parallel Slave Port. The Master Synchronous Serial Port (MSSP) module is serial interface, useful for communicating with other peripheral or microcontroller devices. PIC16F877A has host of features intended to maximize system reliability, minimize cost through elimination of external components, provide power saving operating modes and offer code protection. It has 33 pins and this makes it easier to decide what external devices to attach without worrying too much if there enough pins to do the job. One of the main advantages is that each pin is only shared between two or three functions so

it's easier to decide what the pin function [1].

E. MP LAB

MP LAB Integrated Development Environment (IDE) is a free, integrated toolset for the development of embedded applications. MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. Moving between tools is a snap, and upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools [1].

F. RS 232

RS232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data terminal equipment) and a DCE (Data Circuit terminating Equipment). The RS-232 standard defines the voltage levels that correspond to logical one and logical zero levels. Valid signals are plus or minus 3 to 25 volts. The range near zero volts is not a valid RS-232 level; logic one is defined as a negative voltage, the signal condition is called marking, and has the functional significance of OFF. Logic zero is positive, the signal condition is spacing, and has the function ON. So a Logic Zero represented as +3V to +25V and Logic One represented as -3V to -25V.

IV. CONCLUSION

In this we have discussed various types of ETC systems applied in some countries. The proposed automatic method of collecting toll applies using Zigbee technology with a difference in idea of implementation which will avoid collision and various other existing problems too. With the elimination

of human interaction in the entire toll collection process. It can also significantly improve the efficiency of toll stations and avoid the traffic congestions on roadways.

V. FUTURE PLANS

We are focused to avoid the man power. When the user have no balance in his account, the GSM technique is used to send the message about the insufficient to the user's phone number and the vehicle is allowed to pass through the toll gate. So there is no need for speed control technique and man power.

REFERENCES

- [1]. Janani S.P and Meena S "Automatised Toll Gate System Using Passive RFID and GSM Technology".
- [2]. V.Sandhya and A.Pravin "Automatic Toll Gate Management and Vehicle Access Intelligent Control System Based on ARM7 Microcontroller".
- [3]. Chonghua Li , "Automatic Vehicle Identification System Based On RFID". Anti-Counterfeiting Security and Identification In Communication, 2010.
- [4]. Vincent O. R, Olayiwola O. E. And Kosemani O. O., "Estimating Traffic Intensity at Toll Gates Using Queueing Networks", 2014.
- [5]. Khali, P., Michael, C.W. and Shahriyar, H., "Entrance Collection Technology and Best Practices", Project 0-5217: Vehicle/License Plate Identification for Entrance Collection Application, 2007.
- [6]. Gunda, L., Lee M., Reginald G., Mhlanga, S. and Nyanga L., "Vehicle License Plate ", CIE42 Proceedings, Cape Town, South Africa 2012
- [7]. Raadhikaa, L. "The Universal Journal of applied Computer Science and Technology, UNIASCIT, 1, 1, 2011, 05-08.
- [8]. Jameel, A., "License Plate Recognition System, Thesis Presented to the Deanship of Graduate Studies", King Fahd University of Petroleum and Minerals, 2003: 2-5