International Journal of Technical Research and Applications e-ISSN: 2320-8163,
www.ijtra.com Special Issue 40 (KCCEMSR) (March 2016), PP. 65-68

RFID BASED TOLL PLAZA SYSTEM USING PIC MICRCONTROLLER

Saurabh Narkar, Ankit Hendre, Sunil Redekar, Pranay Targe
Students: Department of Electronics Engineering
K C college of Enginnering & Management Studies & Research, Mith bunder
RD.,Kopri Thane (E)- 400 603
narkar.saurabh@gmail.com
ankit.hendre94@gmail.com
sunilredekar9@gmail.com
pranaytarge19@gmail.com

Abstract— **The automated toll collection system using passive Radio Frequency Identification (RFID) tag emerges as a convincing solution to the manual toll collection method employed at tollgates. Time and efficiency are a matter of priority of present day. In order to overcome the major issues of vehicle congestion and time consumption RFID technology is used. RFID reader fixed at tollgate frame (or even a hand held reader at manual lane, in case RFID tagged vehicle enters manual toll paying lane) reads the tag attached to windshield of vehicle. The object detection sensor in the reader detects the approach of the incoming vehicle's tag and toll deduction takes place through a prepaid card assigned to the concerned RFID tag that belongs to the owners' account. This makes tollgate transaction more convenient for the public use.**

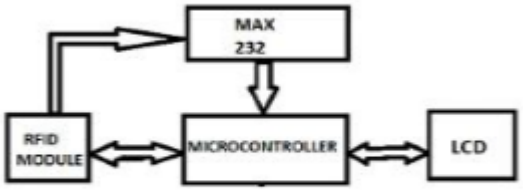
I. INTRODUCTION

Design and develop a Automatic toll plaza which is based On microcontroller, RFID technology and load cell to save the time at toll plaza and having cash free operation" As the name suggests "Automatic Toll Plaza" the key theme of our project is the automation.

So here we will just take the over look of what is mean by Automation. So in very simple language the Automation means to replace the human being from the process with the machines .Means what presently the human is doing on the process now onwards the machines are going to do. Before moving further we will just take the overlook of history of the toll plazas.

So before the 90's decade the toll plazas were fully manual controlled. Means there are two people for opening & closing of the gate & another two are for reception of the money & data keeping etc. But in 1995 when the Express ways had been developed the semi automatic toll plazas were launched in which data is stored in computers & gate operation is automatic, only two personals are required for single booth. But here we are going to see the human less toll plaza. So, according to serve of Maharashtra Government carried out in Sept.2010,they have proposed to get the annual toll collection of 1500 corers/year .But in the present situation only 1200 corers of the toll value is collected. Means there is loss of 300 cores due to some human errors. So, we have to control this leakage. Now the present system we have with us on the highways takes 1minute to complete the toll collection process for one vehicle. With this automatic process, it will take just 40 to 42 sec. to complete the whole process. As there is reduction in time for completion of the process so indirectly there will be no traffic as such & as there is no traffic so no fuel wastage takes place & the purpose of designing the highways is achieved i.e. reduction in journey time & also the money loss will be reduced.

II. SYSTEM BLOCK DIAGRAM



.

III. DESCRIPTION

[A] RFID

A Radio-Frequency Identification system has three parts:

A scanning antenna

A transceiver with a decoder to interpret the data A transponder -the RFID tag -that has been programmed with information.

The scanning antenna puts out radio-frequency signals in a relatively short range.

The RF radiation does two things:

It provides a means of communicating with the transponder (the RFID tag) AND

It provides the RFID tag with the energy to communicate (in the case of passive RFID tags).

The scanning antennas can be permanently affixed to a surface; handheld antennas are also available. They can take whatever shape you need; for example, you could build them into a door frame to accept data from persons or objects passing through.

When an RFID tag passes through the field of the scanning antenna, it detects the activation signal from the antenna. That "wakes up" the RFID chip, and it transmits the information on its microchip to be picked up by the scanning antenna.

In addition, the RFID tag may be of one of two types. Active RFID tags have their own power source; the advantage of these tags is that the reader can be much farther away and still get the signal. Even though some of these devices are built to have up to a 10 year life span, they have limited life spans. Passive RFID tags, however, do not require batteries, and can be much smaller and have a virtually unlimited life span.

RFID tags can be read in a wide variety of circumstances, where barcodes or other optically read technologies are useless.

The tag need not be on the surface of the object (and is therefore not subject to wear)

The read time is typically less than 100 milliseconds Large numbers of tags can be read at once rather than item by them.

[B] LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments) animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

[C] PIC MICROCONTROLLER

PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developedby General Instrument's Microelectronics Division. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use Flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit and in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 8-pin DIP chips up to 100-pin SMD chips, withdiscrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types.

Features of PIC Microcontroller:

Separate code and data spaces (Harvard architecture).

A small number of fixed-length instructions

Most instructions are single-cycle (2 clock cycles, or 4 clock cycles in 8-bit models), with one delay cycle on branches and skips

One accumulator (W0), the use of which (as source operand) is implied (i.e. is not encoded in the opcode)

All RAM locations function as registers as both source and/or destination of math and other functions.[7]

A hardware stack for storing return addresses

A small amount of addressable data space (32, 128, or 256 bytes, depending on the family), extended through banking.

[D] MAX RS232

The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it difficult to establish a direct link between them to communicate with each other.

The intermediate link is provided through MAX232. It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply. Each receiver converts RS232 inputs to 5V TTL/CMOS levels. These receivers (R1& R2) can accept ±30V inputs. The drivers (T1& T2), also called transmitters, convert the TTL/CMOS input level into RS232 level.

The transmitters take input from controller's serial transmission pin and send the output to RS232's receiver. The receivers, on the other hand, take input from transmission pin

of RS232 serial port and give serial output to microcontroller's receiver pin.

MAX232 needs four external capacitors whose value ranges from 1µF to 22µF.

IV. OPERATION

The RFID system interfaced with AT89C51 requires the controller to continuously scan the input from the RFID reader. Timer1 is configured for serial communication. The baud rate is set to 9600bps for data transmission. The LCD is initialized to display the code. When a card/tag comes in the proximity of RFID reader, the microcontroller reads the code and sends it to the LCD module. The serial interrupt is triggered on every reception of one byte of data. Since the identification code of transponder consists of 12 bytes, the flag is also generated 12 times to indicate the byte wise transfer of data. Whenever the serial code is generated by the reader, the interrupt is activated and the data is sent to the receiver pin of microcontroller. A serial level converter is required for AT89C51 to receive these serial signals. IC MAX232 has been used for this purpose to interface the RFID reader with microcontroller. The receiver pin of RFID reader is connected to R1IN (pin13) of MAX232. R1OUT (pin 12) of MAX232 is connected to RxD (P3.0) of microcontroller. Pins 1-3 of port P1 (P1.0, P1.1 & P1.2 respectively) of AT89C51 are connected to the control pins 4-6 LCD. The unique identification code of RFID tag is displayed on the LCD.

V. IMPLEMENTATION & RESULT

VI. ADVANTAGES

1. Automatic collection of Toll tax.
2. Reduced man power.
3. Cash free operation.
4. Avoid the fuel loss.
5. Saving of times in collection of toll.
6. To monitor the traffic.

VII. LIMITATIONS

- The proposed system will take care of only single toll dept.
- It is not the centralized system.
- The RFID tag is typically more expensive.

VIII. APPLICATIONS

[1] We can send this data to remote location using mobile or Internet.
[2] RFID technology can be used in shopping using RFID tag.

IX. FUTURE SCOPE

For greater distances microwave, RF can be used. Implementation of image processing for centralize data recording.

The system may use any existing local GSM/CDMA network for collection of Toll payment . This can be done using SMS or any other VAS (Value Added Services) related features.

The same idea can also be used to improve car parking, traffic control and security systems. Centralised system for toll tax collection among all the toll tax depots.

X. CONCLUSION

By the realization of the above proposed system we can make the Toll Tax collection system more efficient and can reduce the traffic logging on the highways. Lot of time will be saved.

We also learnt the software development strategies and various programming techniques for PC based applications.

REFERENCES

[1] RFID based toll collection system,2011 IEEE third international Conference.

[2] A Novel Chipless RFID System Based on Planar Multiresonators for Barcode Replacement Stevan Preradovic, Isaac Balbin, Nemai C.
Karmakar and Gerry Swiegers200

[3] Raj Bridgelall, Senior Member, IEEE, " Introducing a Micro-wireless Architecture for Business Activity Sensing ", IEEE International Conference RFID, April 16-17,2008

[4] The Times Of India paper April 20,2012 "Now road toll can be paid without stoping at Toll

Plaza"

[5] P. Blythe, "RFID for road tolling, road-use pricing and vehicle access control," in RFID Technology (Ref. No. 1999/123), IEE Colloquium on, 1999, pp. 8/1-816.

[6] https://en.wikipedia.org/wiki

[7] The 8051 Microcontroller and Embedded System using assembly and C 2nd edition

[8] Electrical Motors By M.S. Rao

[9] www.electronicsforu.com