



AUTOMATIC TOLL E-TICKETING FOR TRANSPORTATION SYSTEM

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Abstract

In this paper presents a automatic toll collecting for a transportation system with an advantage of time saving and minimize the power loss. Nowadays almost all highways toll plazas are manually operated. Since this process can be slow. Automatic process of toll collection will save time, effort and man power. In this work propose a low cost and efficient technique called Automatic toll E-Ticketing system using RFID modules, GSM and IR sensor system. In this system working as automatically collects the toll amount from the registered owner's account and sends the payment details through the SMS by GSM system. There is no need for him to stop the vehicle. If that is a complained vehicle, than the alert SMS is send to the owner's mobile. And the power loss is minimized by the IR sensor. Through this process of toll collection will save time, effort, man power and electrical power.

Keywords: RFID (Radio Frequency IDentification), Automatic E-Toll collection, GSM (Global system for mobile communication), InfraRed sensors.

1. INTRODUCTION

The automatic toll E-Ticketing system is the approach used for the vehicle when it reaches the toll plaza; this is

detected by using Infrared sensor. An IR receiver is used to receive these pulses and sends it to a pic controller. Then the RFID systems are used to read the information about the each vehicle.

We assume that the vehicle was arrived at a sensor part, the sensor system was sends the signal to pic controller. Then the RFID reader reads the signal and information about registered vehicle's owner. These RF signals are received by an RF receiver at the toll plaza, which send data to a computer's parallel port. A software program running on the computer retrieves vehicle details from its vehicle database. Depending on this information, appropriate toll tax is deducted from the pre-paid account of the vehicle's owner. And the owner receives the SMS message on his/her mobile about the details of the payment. If the balance in the owner's account is low or if the vehicle is not equipped with an RF system, the toll gate remains close. And the alert SMS send to the owner. The next method, the owner will have to pay the toll tax in case and collect the receipt.

Existing automatic toll collection techniques incur power loss since the receiver is continuously turned on, even when no vehicle arrived at a toll plaza. In our technique, only the IR sensor is turned on to detect the arrival of vehicles. Only when a vehicle is detected, RFID tag to

RFID reader reads the data. In existing system, A thieved vehicle alert technique is no there.

2. BLOCK DIAGRAM

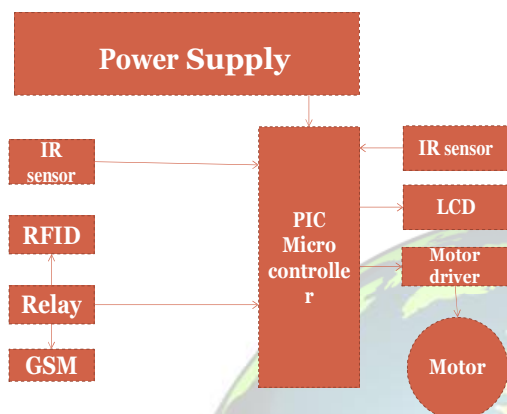
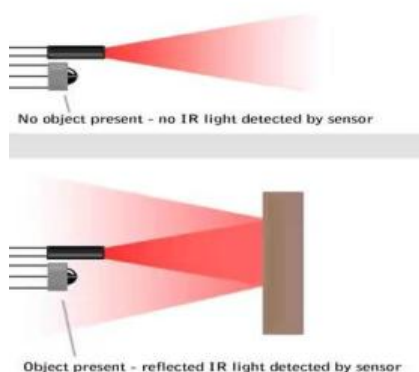


Fig.1. Block diagram of Automatic toll E-Ticketing system

We designed a programming board to program the PIC16F877A microcontroller. It is a middle range system and it has a 33 I/O pins. And it is operated with a 5v power supply and 20 MHz frequency.

A.IR SENSOR

When a vehicle arrives at a toll plaza,



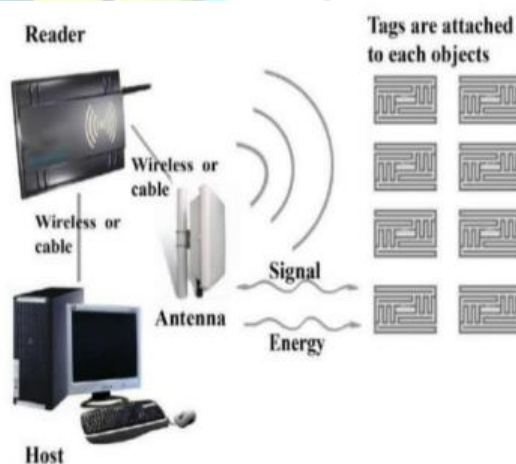
the IR transmitter sends the signal to pic controller. The IR light was reflecting from the object, and then the reflected IR light was sense by the sensor. Output of the sensor is high. After this process the RFID

system will ON and read the data from RFID tag.

B.RFID SYSTEM

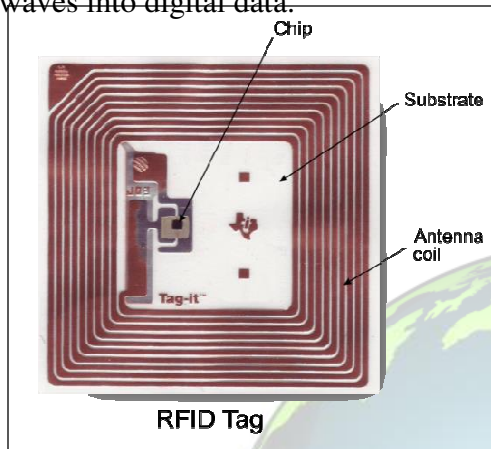
Radio Frequency Identification (RFID) is a technology that uses radio waves to transfer data from an RFID tag, attached to identifying the object.

Radio frequency identification, or RFID, is a generic term for technologies that use radio waves to automatically identify people or objects. There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag).



The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it. An RFID system consists of a tag, which is made up of a microchip with an antenna, and an interrogator or reader with an antenna. The reader sends out electromagnetic waves. The tag antenna is tuned to receive these waves.

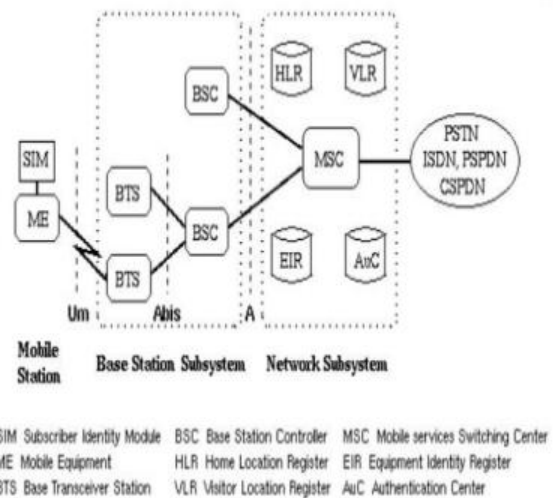
A passive RFID tag draws power from field created by the reader and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data.



The chip is used to store the information. Antenna coil is used to transmit the radio signal and the substrate is used to encase the chips and antenna.

C.GSM

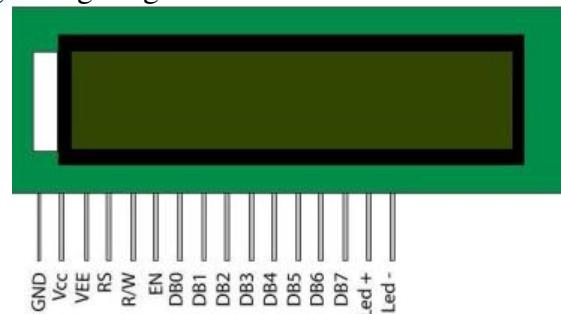
Global System for Mobile communication (GSM) is used to send the SMS to the user. GSM has the 3 services. There are 1.Tele services, 2.Data services and 3.Supplementary services. The Tele service is used to a voice call system, the Data service is used to SMS sending system and the Supplementary service is used to a call waiting and call forwarding system. In our project we can use only the data services.



A mobile phone comprises of mobile termination, terminal equipment and terminal adapter. Mobile termination is interfaced with the GSM mobile network and is controlled by a baseband processor. It handles access to the SIM, speech encoding and decoding, signaling and other network related tasks.

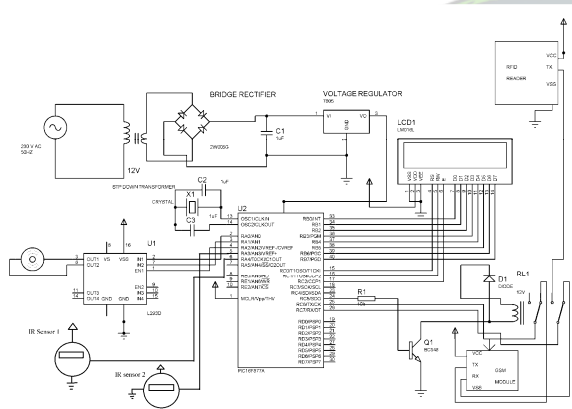
D.LCD DISPLAY

Liquid crystal display have materials, which combine the properties of both liquids and crystals. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizes, which would result in activating high lighting the desired characters.



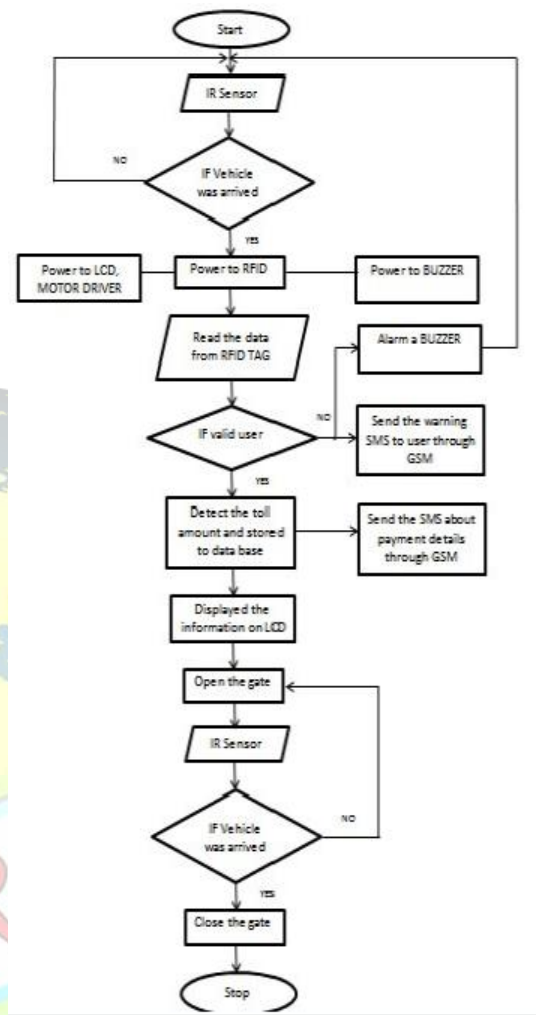
The main principle behind liquid crystal molecules is that when an electric current is applied to them, they tend to untwist. This causes a change in the light angle passing through them. This causes a change in the angle of the top polarizing filter with respect to it. So little light is allowed to pass through that particular area of LCD. Thus that area becomes darker comparing to others.

3. CIRCUIT DIAGRAM



In our project, we used the PIC micro controller. It has the 33 I/O pins. The 5v power supply is given to the picontroller. Crystal oscillator was connected to the 13 and 14th pin of controller. And its makes the sufficient frequency to controler. LCD was connected to the port B at the micro controller. IR sensors are connected to the 6 and 7th pin of the controller. And its sends the analog signal to the pic. RFID and GSM were connected with relay to the pic controller. And the motor driver were connected to the port A.

4. FLOW CHART



5.CONCLUSION AND FUTURE WORKS

It is a completely automated toll collection system and semi automatic lanes. Various traffic and payment data are collected and stored by the system as vehicles pass through. RFID systems have a secure place in the automatic identification sector. By application of Automatic toll E-ticketing system into real time we can avoid malfunctions and time maintenance system



and long wait at toll gates can be improved. In future, it can comprise an image sensing for vehicle identification. It can also comprise a postpaid payment system.

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