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Code	Project Title
1515	RFid Based Highway Toll Tax Collection System

Synopsis for RFid based Toll Collection System

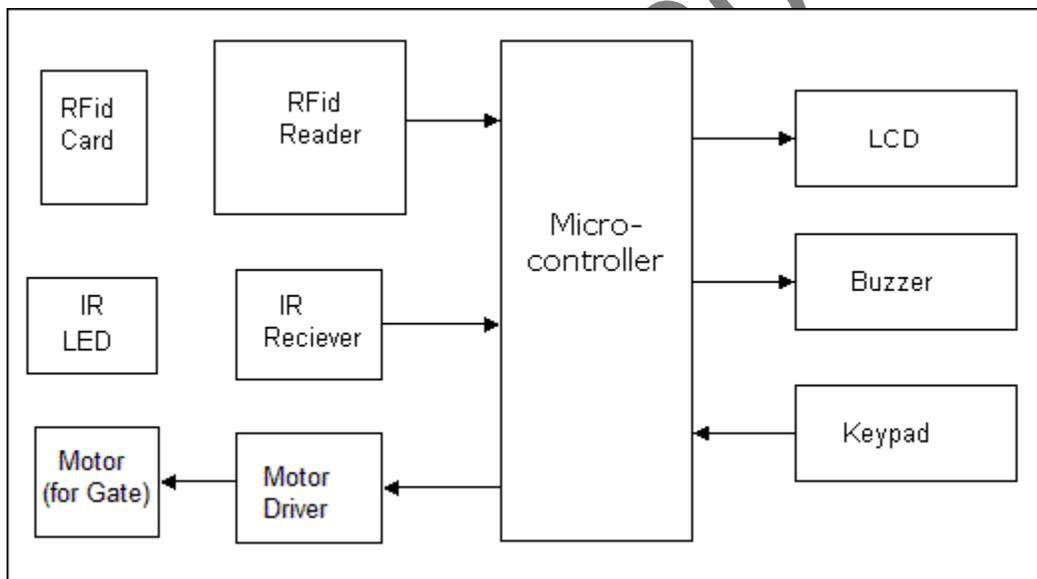
1. Introduction

This project focuses on an electronic toll collection (ETC) system using Radio frequency identification. (RFID) technology. The RFID system uses tags, through which information embedded on the tags are read by RFID readers. The proposed system eliminates the need for motorists and toll authorities to manually perform ticket payments and toll fee collections, respectively. Thus it is a more efficient toll collection by reducing traffic and eliminating possible human errors.

This system allows the vehicle drivers to pass the toll tax booths without stopping at the toll booths. The toll amount is deducted from the RFID card. This RFID card is rechargeable and account is stored on the records.

This system will have two benefits. First benefit is that movement of traffic will be much faster as user will not wait to give the money because, driver has to just show the RFID card in-front of the card reader. Second benefit is that driver doesn't have to carry the money each time. He will just recharge the RFID card by certain amount and will use this card each time he travels. This is little bit similar to using credit cards.

2. Block Diagram



3. Block diagram description

The "RFID based Toll Collection System" basically consists of following main blocks

1. RFID card:

RFID cards has diverse range of functions, while provides convenience, as the cards must simply be waived or tapped in front of a reader rather than swiped. These cards are used for applications as access control in security systems, time and attendance, network login security, biometric verification, cashless payment, and even event management.

2.RFID reader:

An RFID reader is a device that is used to interrogate an RFID tag. The reader has an inbuilt antenna that emits radio waves; the tag responds by sends back its data.

3. Micro controller:

Micro controller senses the signal given from switches and decides the mode of operation i.e. recharge mode or toll collection mode. It fetches data from memory location and send it to output devices like display, motor driver and buzzer. At the same time it can accept data from Keypad for recharging options and from IR receiver to sense that vehicle has passed from toll collection booth.

4. Liquid crystal Display:

It consists of Liquid Crystal display (LCD).The display is various messages like valid card, invalid card, access allowed, manual access etc. We are going to use 16x2 alphanumeric display.

5. IR Receiver:

IR receiver is used to sense that vehicle has passed the toll collection booth. The other alternative for infrared trans-receiver is optical sensor i.e. IR but the disadvantage is that it can be affected easily by the sun light or other lights. So there is possibility of false triggering. Also the disadvantage of using special color sensors like LASER beam is that it is visible to normal human eyes. To overcome all these points we have used infra-red sensor

6. IR Transmitter:

IR LED is used as IR transmitter. Transmitter will be placed at the one side of the booth while receiver is at the other side. When the vehicle passes through the booth, IR rays going to receiver are cut and signal is send to microcontroller.

7. Motor Driver

Microcontroller output is 5 volts and DC motor requires 12 volts supply. Motor driver IC is used to convert 5v to 12v, which is required to drive the motor.

8. DC Motor

DC Motor is used to open the Gate barrier. This will be done when user has successfully performed the Rfid swap operation with sufficient balance.

9. Buzzer

Buzzer will be turned on when invalid card is shown at the RFID reader.

10. Switch

If some user doesn't have the RFID card and he doesn't want to purchase the card then he can pay the cash to the government authority persons at the toll plaza. Authority person will then press the manual switch to open the Gate.

11. Keypad

Keypad is provided for the recharge option. Authority person can recharge the RFID cards using this keypad.

4. Advantages

1. Makes traveling more convenient, reduces travel times especially during festive seasons when traffic tends to be heavier than normal.
2. Saves fuel and thus increases fuel economy
3. Reduces auto emissions
4. Reduces wait time at toll booths
5. Increase highway capacity. Processes 250 – 300% more vehicles per lane, reducing delays and traffic congestion
6. Easy mounting, easy to operate (user friendly).