Ahsanullah University of Science & Technology

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Final Report

Project Title: RFID Based Toll Collection System using Arduino

Course Name: Microcontroller Based System Design Lab

Course Code: CSE 3216

Submitted to: Mr Rayhan Ahmed Simanto
Mr Murad Hassan Anik

Submitted by:

Ashfaq Ali Shafin	14.01.04.111
Irtiza Abir	14.01.04.122
Abid Hasan Prottoy	14.01.04.125

Overview:

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 (or even a hand held reader at manual lane, in case RFID tagged vehicle enters manual toll paying lane) reads the tag attached to 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.

Components:

1. Arduino Mega
2. MFRC-522 RFID Module
3. RFID Tag
4. Servo Motor
5. RGB LED
6. LCD Display
7. Wires
8. Buzzer
9. Bread Board
10. 1k ohm Resistor
11. Connecting Wires

Features:

This project deals with the simplification of procedure followed by passengers to pay toll at toll collection booths, like making it automated, vehicle theft detection etc. All these activities are carried out using single smart card (RFID tag), thus saving the efforts of carrying money and records manually.

1. **Automatic Toll Collection:** The RFID Readers mounted at the booth read the prepaid RFID tags fixed on vehicles' and automatically respective amount will be deducted.

2. **Validation:**

   a. If a user is not valid the invalid user id is shown in the LCD and buzzer is assigned to buzz for 5 kHz of audio frequency. User cannot open the toll gate. User have to do it in the manual process.

   b. If a user does not have enough balance in his account the gate will not open as well as LED will turn red, buzzer will buzz at 5 kHz of audio frequency. LCD display is used to show the message "Insufficient Balance".

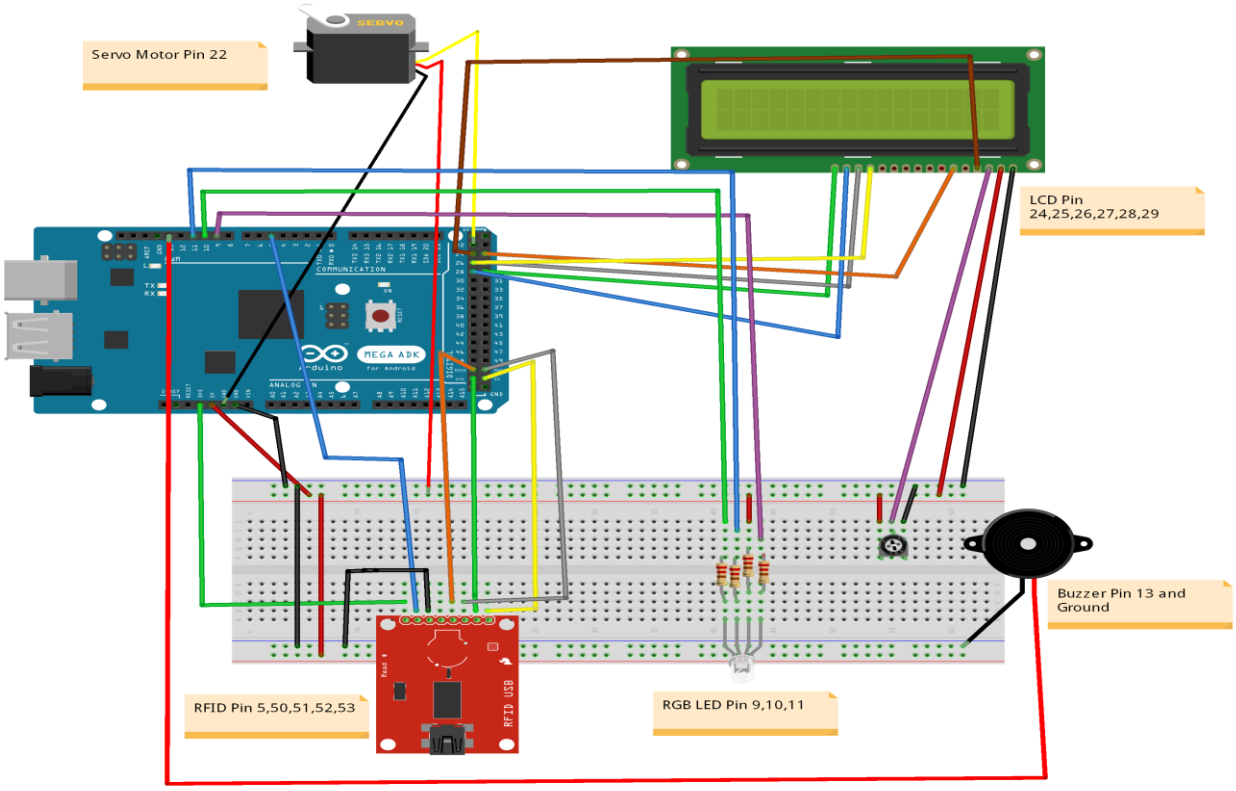
   c. If a user has valid user id and enough balance in his account the LED turns green, LCD display shows the information about the user as USER ID, Name, Current Balance and Balance After Toll and finally the toll gate is opened.

3. **Time Savings**: As human interaction is very quick so time is saved very efficiently. Long queue in toll gate can be avoided by using this system.

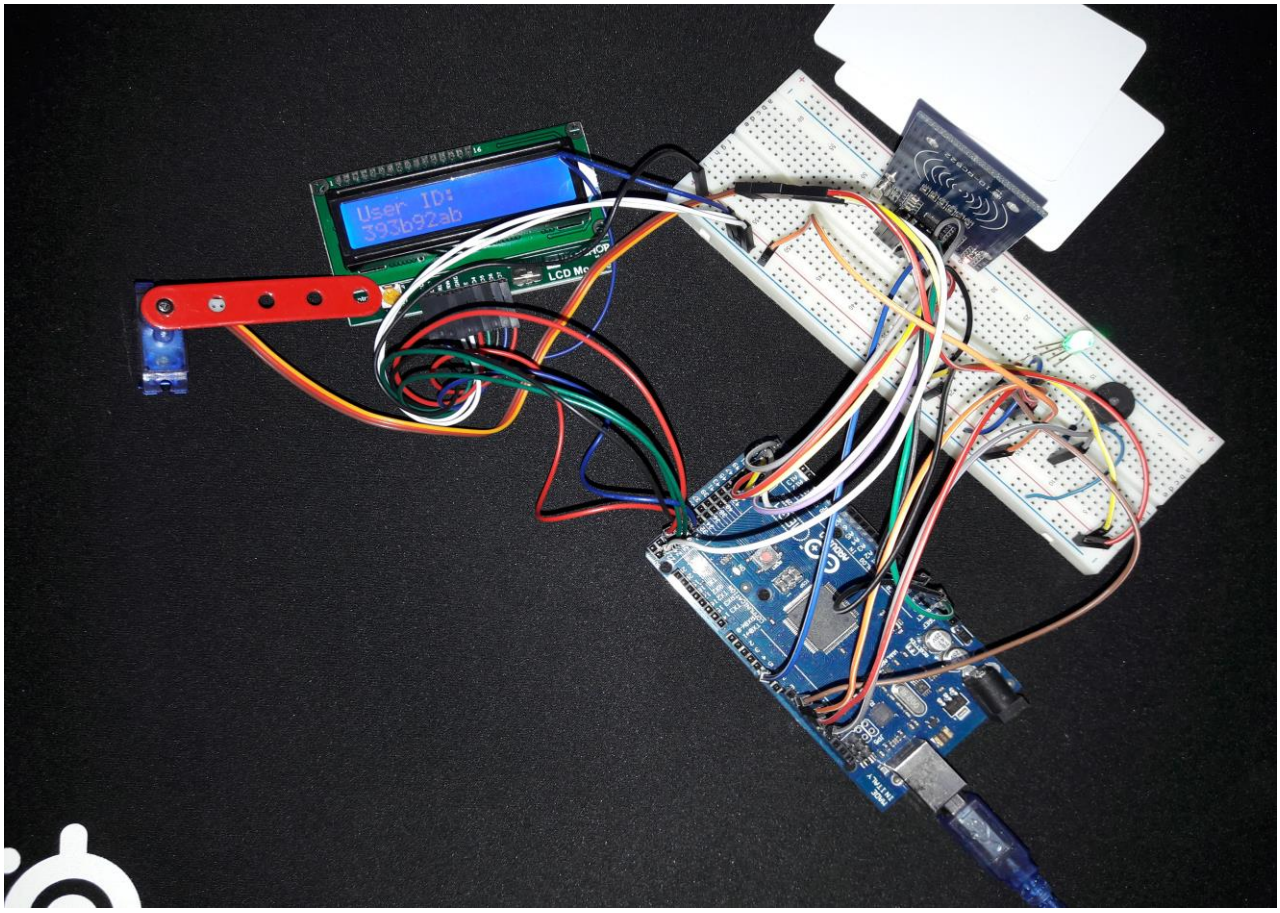
4. **Maintenance:** Maintenance is easy, efficient and cost of maintenance is very low.

5. **Tracking User Information:** RFID card has a 1kB of memory which is used to keep user information and balance of the user.

Circuit Diagram:



Final Project Image:



Future Plan:

1. **Vehicle Theft Detection:** When vehicle is stolen the owner registers complaint on the website with its registration ID and unique RFID tag number. Now when stolen vehicle passes by the toll plaza, the tag fixed on it is matched with the stolen vehicle's tag in the database at the toll booth.

2. **Signal Breaking Avoidance:** The vehicle ignoring the traffic signal will be detected by the RFID readers fixed at signal crossing and will be notified to the traffic police. This can be done efficiently and great accuracy.

3. **Tracking Over speeding Vehicle:** Vehicle travelling above speed limit can be tracked with 100 % accuracy.

4. **Database Connection:** Database will be connected with Ethernet Shield to keep track of the valid user, balance of the user and other important information of the user.