IOT BASED TOLL COLLECTION MANAGEMENT SYSTEM

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Abstract: In present days there is a tremendous surge in the toll courts so as to settle the toll regulatory obligation. To reduce the road turned parking lot, to spare time and additional cash deductions, in this paper the automation in toll charge is realized through IoT along with utilization of RFID. The proposed toll collection system consequently distinguishes moving toward vehicles and record vehicle's data. The vehicle with the approved individual gets the toll door naturally open and predefined toll charge is consequently deducted from its record and sends the charge deducted to the registered mobile number. This helps in diminished traffic clog at toll courts and aids in lower fuel utilization.

Keywords: RFID, toll charge, automation, traffic clog.

I. INTRODUCTION

Today, "Transportation" is the real supporter of the nation's economy. Upgrades in the field of transportation empowered us to have a quick pace of life portrayed by outstanding autonomy development, colossal exchanges fabricated merchandise and ventures, high occupations and social developments. The nation's monetary fortune can be said to be straightforwardly corresponds to the beneficial transportation strategies. It is the fact that number of vehicles expands rapidly many issues, like blockage, mishaps, air contamination have turned into a main consideration of concern. Each industry has its diverse strategy for transportation to minimize intemperate costs spent on transportation. In this manner, provision of great quality transportation will fundamentally add to better economy and profitability. Cost decrease in transporting crude material to industrial facilities and moving completed items to shopper showcase is an essential factor in monetary and social development. The confronted difficulties are to diminish blockage and travel time, enhance security and productivity. IoT Toll Collection frameworks are designed for automation of the toll squares in order to keep up decency in the exchanges amid toll accumulations. This paper introduces the possibility of IoT Toll Collection framework

II. Existing Method:

The vehicle with no sufficient card balance entered into toll plaza cannot take alternate way, thus leads to traffic congestion. It takes certain time and hence consumes more fuel. If the vehicle has to take a turn near toll plaza (to an office or school) but not crossing the toll plaza (i.e., not using the road after toll gate) as shown in the figure 1, the RFID tag gets detected and the amount will be automatically deducted even though road is not used.

III. Proposed Method:

Proposed system consists of Vehicle section and Toll gate section as shown in figure 2. In the vehicle section, each vehicle has its own RFID In tollgate section, vehicle id is detected by the RFID reader and transfers the card information to the microcontroller. Then microcontroller checks the details of the vehicle and availability of the amount in the card with the data stored in the computer database using Wi-fi module. If there is sufficient amount in the card, the driver circuit is activated ,turns on the motor and the gate opens automatically. In case of no sufficient amount in the card, gate will not be opened and buzzer rings indicating the vehicle to take alternate route. The amount can be viewed in web page and also message is sent to the mobile .

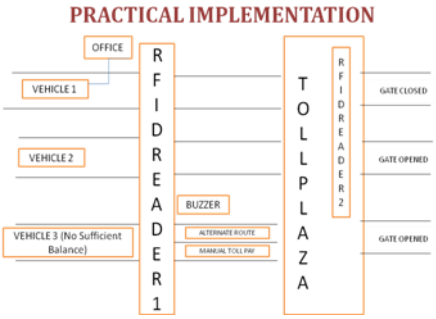

Figure 1: Practical Implementation

IV. Block Diagram

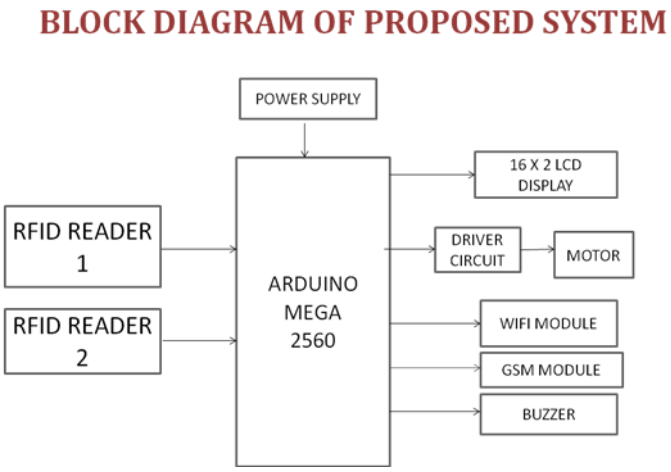

Figure 2: Block Diagram of Proposed System

IV.I Hardware Requirements:

- Power supply
- RFID
- Arduino Mega
- 16x2 LCD
- WIFI
- Driver circuit
- GSM
- Motor

IV.II Software:

- Arduino
- C- language

The following are the components which we used:

Arduino Mega 2560:

The Arduino Mega2560 is a Microcontroller board based on AT Mega 2560 as shown in the figure 3.It has 54 digital input output pins(where 14 can be used as PWM outputs), 16 analog pins, 4 UARTS, 16 MHZ crystal oscillator, a USB connection. Program memory of 128KB.SRAM of 8KB.It is a plug and plug device. The input devices connected to microcontroller are RFID readers, power supply. The output devices connected to microcontroller are 16x2 LCD display, GSM, buzzer, WI-FI module, driver circuit, dc motor.

Figure 3: Arduino Mega 2560

GSM:

GSM framework was produced as a digital framework utilizing time division various access (TDMA) strategy for communication reason. A GSM digitizes and diminishes the information, at that point sends it down through a channel with two distinct floods of customer information, each in its own specific schedule vacancy. The digital framework has a capacity to convey 64 kbps to 120 Mbps of information rates. The GSM modem is appeared in Figure 4

Figure 4:GSM

L293D Motor Driver Module:

An motor driver IC as shownin the figure 5 is a coordinated circuit chip which is typically used to control engines in self-sufficient robots. Engine driver ICs go about as an interface between microchips in robots and the engines in the robot. The most normally utilized engine driver IC's are from the L293 arrangement, for example, L293D, L293NE, and so forth. These ICs are intended to control 2 DC engines all the while.

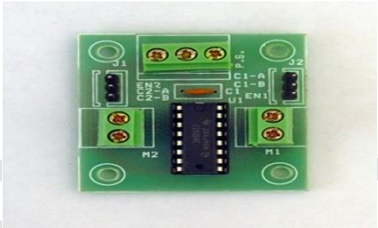

Figure 5:Motor Driver

ESP8266 Module:

ESP-12E Wi-Fi module(as shown in the figure 6) is created by Ai-mastermind Team. Center processor ESP8266 in littler sizes of the module embodies Tensilica L106 incorporates industry-driving ultra low power 32-bit MCU smaller scale, with the 16-bit short mode, Clock speed bolster 80 MHz, 160 MHz, underpins the RTOS, coordinated Wi-Fi MAC/BB/RF/PA/LNA, on-board receiving wire. The module bolsters standard IEEE802.11 b/g/n understanding, total TCP/IP convention stack.

ESP8266EX offers a total and independent Wi-Fi organizing arrangement; it tends to be utilized to have the application or to offload Wi-Fi organizing capacities from another application processor. At the point when ESP8266EX has the application, it boots up legitimately from an outside glimmer.

ESP8266EX is among the most incorporated Wi-Fi contribute the business; it coordinates the receiving wire switches, RF balun, control intensifier, low commotion get enhancer, channels, control the board modules, it requires insignificant outer hardware, and the whole arrangement, including front-end module, is intended to involve negligible PCB region. The Arduino Mega2560 is a Microcontroller board based son AT Mega 2560.It has 54 digital input output pins(where 14 can be used as PWM outputs), 16 analog pins, 4 UARTS, 16 MHZ crystal oscillator, a USB connection. Program memory of 128KB.SRAM of 8KB.It is a plug and plug device. The input devices connected to microcontroller are RFID readers, power supply. The output devices connected to microcontroller are 16x2 LCD display, GSM, buzzer, WI-FI module, driver circuit, dc motor.

Figure 6: Esp8266-12e

RFID

RFID is an abbreviation for Radio Frequency Identification. RFID (radio recurrence recognizable proof) is an innovation that joins the utilization of electromagnetic or electrostatic coupling in the radio recurrence (RF) bit of the electromagnetic range to particularly distinguish an article, creature, or individual. RFID is coming into expanding use in industry as an option in contrast to the standardized identification. The upside of RFID is that it doesn't require direct contact or observable pathway examining. A RFID framework comprises of three segments: a radio wire and handset (frequently joined into one per user) and a transponder (the tag). The receiving wire utilizes radio recurrence waves to transmit a flag that enacts the transponder. Whenever enacted, the tag transmits information back to the receiving wire. The information is utilized to tell a programmable rationale controller that an activity ought to happen. The activity could be as straightforward as raising an entrance entryway or as confounded as interfacing with a database to do a money related exchange.

Liquid Crystal Display (LCD):

It is an virtual display module as shown in the figure7. Here 16x2 LCD has been used. Operating Voltage is 4.7V to 5.3V.Consists of two rows and each row can print 16 characters. Each character is build by a 5×8 pixel box. LCD display indicates the amount existing in the card

Figure 7: LCD display

IV.II Software Requirements:

Here we are using Embedded C for programming microcontroller. As we are using Arduino as microcontroller, we use ARDUINO IDE platform for coding the Arduino. Arduino is an open source platform. We will write the code for interfacing all the hardware components and dump the code into the microcontroller. After writing the code connect the microcontroller to the computer using USB cable and then dump the code.

V.RESULTS: The proposed IoT based toll booth management system is shown in the figure 8. Then microcontroller checks the details of the vehicle and availability of the amount in the card with the data stored in the computer database using Wi-fi module as shown in the figures 9 and 10. If there is sufficient amount in the card as shown in figures 11 to 13, the driver circuit is activated ,turns on the motor. The toll charges are deducted as shown in the figure 14 and the card balance is sent as message (figure 15) and then the gate opens automatically. In case of no sufficient amount in the card as shown in figure 16, gate will not be opened and buzzer rings indicating the vehicle to take an alternate route. The amount can be viewed in web page and also message is sent to the mobile .

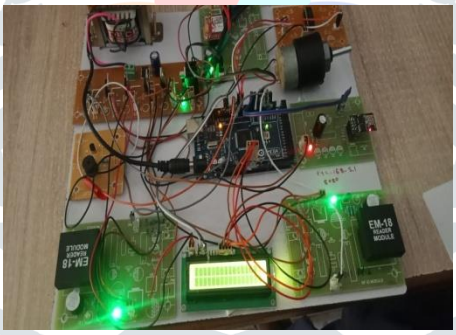

Fig: 8: IoT Based Toll Booth Management System

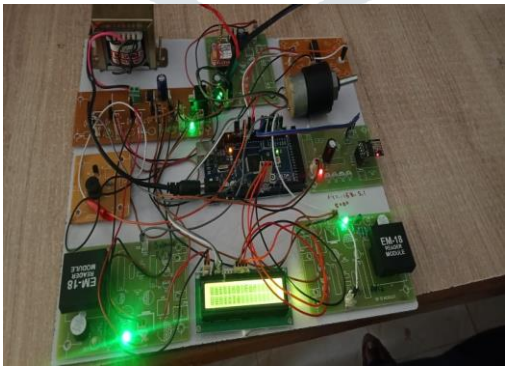

Fig:9: Balance Check

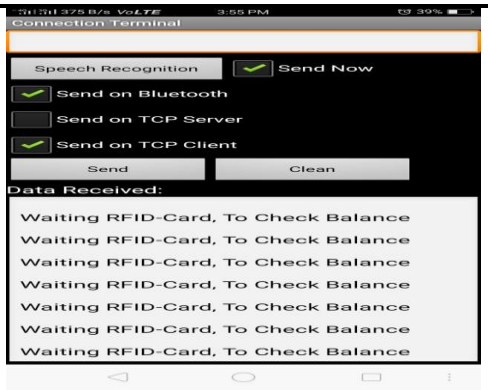

Fig:10: Balance Check in webpage

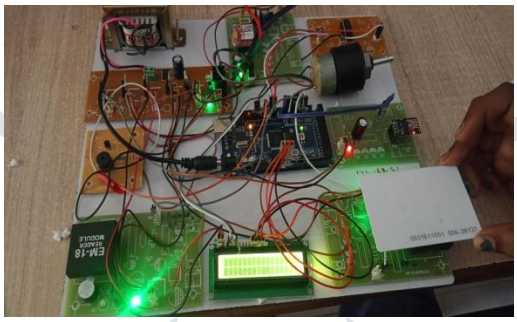

Fig:11: Vehicle With Sufficient Card Balance

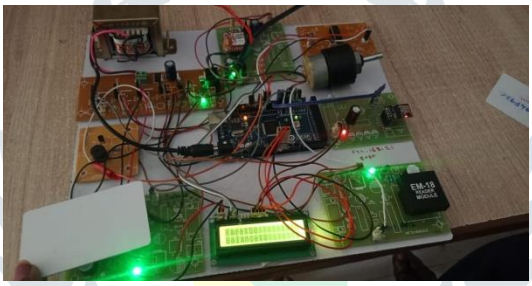

Fig:12: Balance Ok

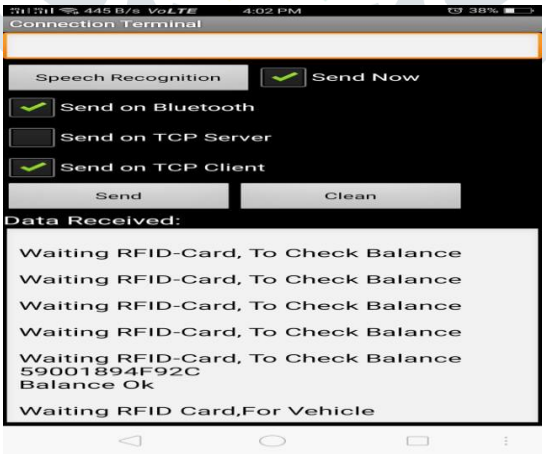

Fig:13: Display of Balance ok in webpage

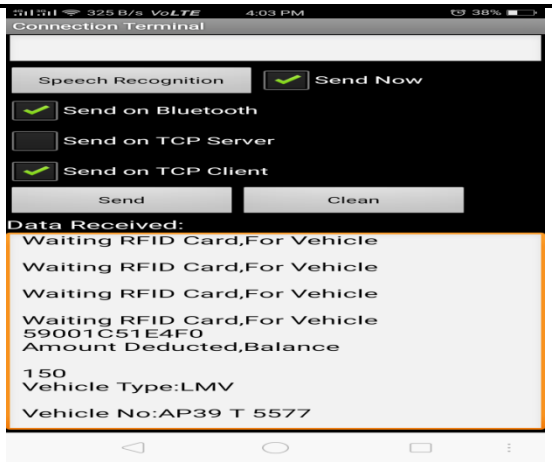

Fig:14: Toll Deduction

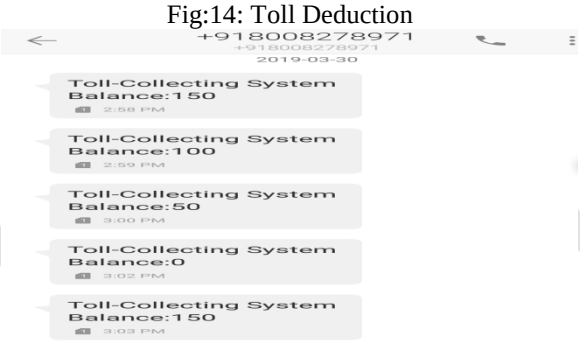

Fig:15: Message Received By User By Using GSM

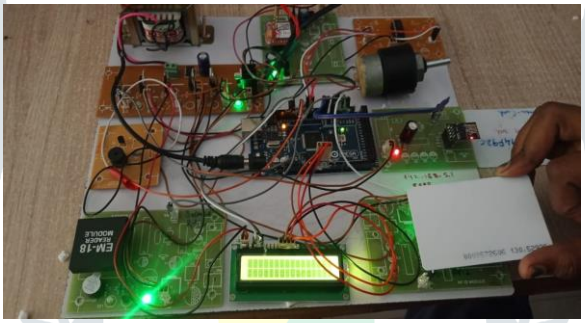

Fig:16: Vehichle With Insufficient Card Balance

VI.CONCLUSION:

Hence the proposed system could prevent traffic congestion, thus reduces longer waiting time in a toll queue. Also it provides ease toll payment experience to the traveler through reduced illegal toll gate entry and fuel loss. Based on RFID frequency ranage we can reduce the traffic congestion effectively.

VII. References:

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