

ELECTRONIC TOLL COLLECTION SYSTEM BASED ON RFID WITH GSM

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ABSTRACT

The automated toll gathering system using passive Radio Frequency Identification (RFID) tag show as a evidence solution to the manuscript toll collection method employed at toll gates[3].The object invention sensor which is placed on the side of the road invention the approach of the oncoming vehicle and intimates the stepper motor to raise the strip[2].The concept proposed is of automatic toll tax allotment system and the amount transaction information sends to the cell phone of the driver through the GSM modem technology. It is an innovative technology for expressway network automatic toll collection solution [1] This system makes toll barrier transaction more simple for the public use.

Keyword :- Radio Frequency Identification, Global System for Mobile communication, Prepaid Card(SIM 900).

1. INTRODUCTION:-

The manual toll based systems is need for completely reduced in this method and the tolling system mechanism through RFID. A complete RFID system consists of a RFID tag & RFID reader, antenna. They consist of the tags which can be either active or passive tags. Active tags have inside batteries that allow a longer analysis range. Passive tags are given by the signal from its reader to shorter reading range. Instead of internal power passive RFID uses external power. The given tags are powered by using electromagnetic signal received from a reader. The received electromagnetic indicate charges an internal capacitor on the tags, which acts as a power source and supplies the power to the chip. The obvious benefit of the barrier in our project is that it reads only single tag at a time and that's why it is very useful compared to all the other previously existing system.

The Active RFID technique efficiency is less as the reader uses long read range which can result system crash. Reading several tags at a time cannot functions battery power, restrictive the lifetime of the tag. as a result our project which uses passive RFID technology proves to be very capability having small read range and also avoids harms like indication, cost, lifetime and different transponders need for manual toll based systems is completely reduced in this process and the tolling system works throughout RFID[2].general advantages for the driver consist of fuel savings and reduced mobile emissions in reducing or eliminate deceleration, waiting time and acceleration.

The benefits for the motorists include:

1. Faster and more efficient service (no exchanging toll fees by hand)
2. The ability to make allotment by keeping a balance on the card itself
3. The use of prepaid toll statements (no need to request for receipts)
4. Lowered toll collection costs[3].

2. PROPOSED SYSTEM:-

The RFID tag is used to access vehicle information with unique id mounted on each vehicle contains several information. The tag is read by RFID reader placed at toll gate. when the vehicle pass to toll gate IR sensor will identify which type of vehicle pass to the toll gate and then as per the type of vehicle the specific amount will deducted from user account and transaction message will send on the users register mobile number with the help of GSM. then toll gate open in clockwise direction with the help of motor drive. after the passing of vehicle with in

amount of second toll gate rotate in anticlockwise direction and gate will be close. After crossing vehicle, the counter will be increase by one and result will be display on LCD.

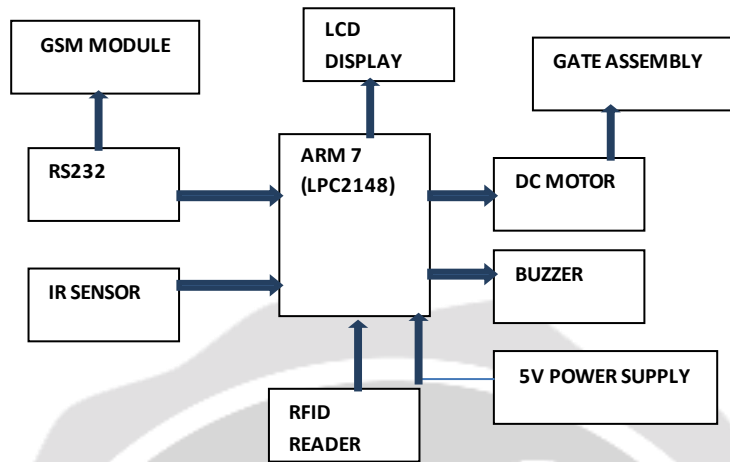


Figure 1. Block Diagram

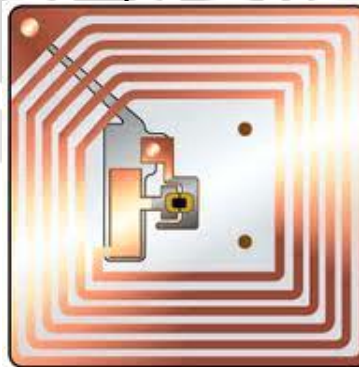
3.1 RFID Technology

3.1.1 RFID (Radio Frequency Identification)

1. RFID is an automatic identification method, relying on storing and slightly retrieving data using procedure called RFID tags or transponders.
2. The technology requires some extent of co-operation of an RFID reader and an RFID tag.
3. An RFID tag is an object that can be applied to a product, animal, or person for the tracking and identification using radio waves. Some tags have reading capacity to few meters away from the line of sight of the reader.

3.1.2 RFID TAG

An RFID tag is a microchip collective by means of an antenna inside a compressed package; the packaging is structured to agree to the RFID tag chosen attached to an object to be tracked. "RFID" stands for Radio Frequency Identification. The tag's antenna picks up signals since an RFID reader or scanner and after that returns the signal, usually with some additional data (like a single serial number or other customized information). RFID tags can be very small - the size of a big rice particle. Others may be the size of a small paper back book.



3.1.3 PASSIVE RFID TAG

Passive tags i.e. RFID tag does not include a battery, the power is supplied via the reader. While radio waves since the reader be encountered by a passive RFID tag, the coiled antenna inside the tag form a magnetic field. The tag draws power from system to stimulate the given circuit. The tag then sends the information determined in the tag's memory.

3.1.4 ANTENNA (RFID TAG ANTENNA)

The antenna in an RFID tag permits the tag to replace data by using the reader. Passive RFID tags use coiled antenna that can create a magnetic field provided through the reader's carrier indication energy generation.

3.2. IR Sensor

The IR Transmitter Receiver gate is used our project to identify the accurate location & place of the vehicle on the weight cell laminate. Because one problem with weight cell plate is that it is unable to weight the affecting object. The IR transmitter emits the IR rays towards the IR receiver. As the vehicle arrives diagonally the gate the rays are deflected since the vehicle & IR receiver doesn't get several signals. The IR Receiver self-control give the replying signal to the control device to actuate the load cell laminate as the vehicle is at accurate position on the weight cell plate. At this time for IR transmitter we are using IR LED's. The IR transmitter we can design in our home by immediately connecting desired rate of resistance in POSITIVE ARM & additional is grounded. The IR receiver have three pins i.e. 5V supply, GND. Line, signal line.

3.3. DC Motors

A DC motor is an electrical motor that runs on electrical energy (DC) electricity. In any motor, operation is predicated on easy electromagnetism. A current-carrying conductor generates a force field; once this can be then placed in associate degree external magnetic field, it'll expertise a force proportional to this within the conductor, and to the strength of the external force field. As you're cognizant of from wiggling with magnets as a child, opposite (North and South) polarities attract, whereas like polarities (North and North, South and South) repel. the interior configuration of a DC motors designed to harness the magnetic interaction between a current-carrying conductor associate degree an external force field to come up with movement motion. Speed dominant of DC motors DC motor speed controllers ar very- helpful for dominant the motion of robotic and industrial automation systems.

3.4. GSM MODEM

Global System for Mobile communication is a digital mobile telecom system. With the assistance of GSM module interfaced, we will send short text messages to the specified authorities as per the applying. GSM module is provided by SIM uses the mobile service supplier and send SMS to the several authorities as per programmed. This technology changes the system a wireless system with no specific vary limits.

GSM uses a variation of your time division multiple access from the given 3 digital wireless telecom technologies (TDMA, GSM, and CDMA). GSM compresses and digitizes the given information and then sends it down a channel with 2 alternative streams of user knowledge, every in its own slot. It can operate at either 900 or 1800 megacycle per second waveband.

3.5. Liquid Crystal Display

i) The foremost unremarkably used alphanumerical displays area unit 1x16 (Single Line & sixteen characters), 2x16 (Double Line & sixteen character per line) & 4x20 (four lines & Twenty characters per line).

ii) The liquid crystal display needs three management lines (RS, R/W & EN) & eight (or 4) knowledge lines. the amount on knowledge lines depends on the mode of operation. If operated in eight-bit mode then 8 knowledge lines + three management lines i.e. total eleven lines area unit needed. And if operated in four-bit mode then 4 knowledge lines + three management lines i.e. seven lines area unit needed. However will we decide that mode to use? It's easy if you've got spare knowledge lines you'll be able to choose eight bit mode &. If there's a time constrain i.e. show ought to be quicker than we've got to use 8-bit mode as a result of primarily 4-bit mode takes double as longer as compared to 8-bit mode.

iii) Once RS is low (0), the info is to be treated as a command. once RS is high (1), {the knowledge information} being sent is taken into account as text data that ought to be displayed on the screen.

iv). Once R/W is low i.e. 0, the data on the info bus is being written to the liquid crystal display. R/W is high i.e. 1, the program is effectively reading from the liquid crystal display. Most of the days there's no ought to browse from the liquid crystal display thus this line will directly be connected to Ground so saving one controller line.

v). The change pin is employed to latch the info gift on the info pins. A HIGH - LOW signal is needed to latch the info. The liquid crystal display interprets and executes our command at the moment the nut line is brought low. If you ne'er bring nut low, your instruction can ne'er be dead

4. SOFTWARE DESIGN: -

In this system small 'C complete is employed to develop the program for ARM7 processor. The programming is completed by victimization in Embedded C language. The compiler used here is ANSI C as a results of it's best resolution for developing code for PIC devices conjointly these area unit user friendly and a price effective tool for all embedded C comes. This selections is a spontaneous IDE powerful compiler with advance version. It having voluminous package and hardware libraries with further tools can assist you in your work

4.1 ALGORITHM:-

1. Start.
2. Initialize GSM , RFID,IR Sensor.
3. Check for presence of car.
4. If affirmative then deduct certain quantity from user account via RFID.
5. Open gate via motor assemble.
6. Count are increase by one and show on liquid crystal display.
7. Send SMS to the user of the group action..
8. Closed gate .
9. If NO gate won't open.
10. End.

4.2 RESULT

The given below figure a shows the final output on LCD display . Whereas the figure b shows the message on mobile screen of owners vehicle.

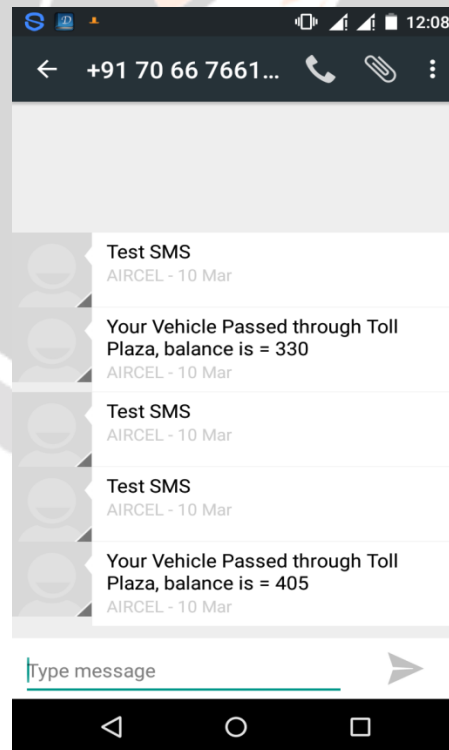


Fig A. Transmitter And Receiver And GSM Switching Systems.



Fig B. Transmitter And Receiver And GSM Switching Systems

4.3 APPLICATION

1. Machine-drive vehicle identification.
2. Machine-driven
- 3.
- 4.
5. vehicle classification.
6. Group action processing (Toll calculation).
7. Is accustomed trace the vehicle if this technique is centralized.
8. Parking system.

CONCLUSION

Reducing the personnel needed for assortment of cash at the tract. scale back the traffic indirectly leading to reduction of your time at the tract..RFID tag & reader, that in coordination with one another may be wont to sight the vehicle identity. Trans receiver is employed for sleuthing the presence of the vehicle at totally different locations which is able to act because the gate pass to the toll plaza[1].

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