

Internet of Things Based Automatic Toll Collection with Vehicle and Fuel Theft Detection System

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Abstract - Internet of Things have become an integral part of today's development of the smart city, now in the world where it is possible to have nothing without the Internet especially where they have become corporate organizations to use the Internet for communication purpose. The Internet of things is expanding its impact on each of our daily lives and our use of energy consumption by reducing the use of Internet coding of objects for day-to-day living. Therefore, in this research introduce automatic tollgate collection and vehicle theft detection system using IoT. The automated toll collection system uses RFID technology where they help reduce toll gate traffic and avoid other illegal passage of vehicles through a toll gate. This project consists of two levels. The toll booth displays one of the first to be managed by the concept 'Internet of Things' based entirely on RFID technology. Second level contract for vehicle and fuel theft detection and control using GSM technology. When the vehicle appears to be looted, the customer receives a warning message along with the current location of the vehicle. So, the customer can interact with the system to send a single message with the intention of stopping the transport. Our next goal is to provide an automated toll collection system to achieve simultaneous prevention of long queues at the tolling plaza using time consuming and consumer-specific radio (RFID) technology. There are also obvious, theft, cars using paid online payment concepts. This system has a GSM modem which sends SMS to the owner of the vehicle when there is fuel theft going on.

Index Terms - IoT, RFID, GSM, GPS, Ardiuno, Node MCU

1.INTRODUCTION

The fastest change in our lives and the portion of our day automation into day to day life is expanding at a quick rate. This is the reason behind our venture "Automation". Step by step the quantity of vehicles going across the road is quickly expanding because of

the decay of the state of the roads. Government has been supporting road development and road upkeep costs. Since there is some wellspring of government cash to work, there is a principle cost station on these roads and this source.

Invasion, the goal of our project group, is an automated system of toll collecting. We learned a variety of techniques, such as weight-based systems, and then coding interrupts, etc. We select radio frequency identification, which applies to the tracking and communication of a technology. This is an area of automated identification that RFID (radio frequency identification) has rapidly seen as a radical tool for enhancing processes, complements data handling techniques in many ways with other information capture technologies claiming to be running in recent years. In today's era, where machines are being widely used, we are trying to conceptualize all the fields that are of great use as a public transport system. Today a person has a long way to vast areas unknown for work, business, or tourism. As vehicles are on the rise and roads are deprived, these days we see frequent traffic jams or long lines at toll stations waiting to be paid. Toll by Cash takes time off each time of payment or pass check. And that money is more valuable today. So, our project manual aims to reduce time consuming to business and human endeavor.

1.1.1 Concept of Automatic toll gate collection system
A particular reason PC system intended to play out the devoted capacity of an inserted framework. Expanding innovation in different areas such as fast industrial automation, home appliances, automotive, aeronautics, etc. RFID is a special kind of wireless card embedded in the chip along with this RFID inbuilt loop antenna. The embedded chip represents a 12-digit

card. RFID scanner circuit which generates 125 KHz magnetic signal. The magnetic signal is used to read the RFID card number.

This project focuses on electronic toll collection system using radio frequency recognition (RFID) technology. The proposed, RFID system uses tags attached to the vehicle's airfoils containing vehicle details. This RFID is topped with plenty of cash in advance. When the vehicle crosses the bridge gate, the RF voucher details are provided by the toll gate and the toll fee is detected and the vehicle is allowed to proceed without any delay. This entire process is taken care of by the microcontroller.

1.1.2 Concept of GSM based vehicle theft control

Currently, the crime rate is rising rapidly because of a small amount of evidence that it dominates the sense that theft is routine. These vehicles in particular can incur heavy losses in the area for the money invested in these vehicles. To address this issue, a few technologies are accessible in the market for explicit GPS, GSM and GPRS frameworks. Nowadays, the vast majority of the vehicles are intended for GSM-based vehicle theft control frameworks, which ensure against theft in any event, when they are left in a leaving zone. This article specifies the counter theft arrangement of vehicles. For a superior comprehension of the idea of a vehicle theft control framework, GPS and GSM security plans are examined underneath.

These GSM and GPS global positioning frameworks for vehicles are altogether under human-controlled and humanoid obstruction work. In the modern world, there are numerous new innovations, for example, GPS, GSM RFID, and biometric distinguishing proof. Mobile communication is composed into vehicles for security purposes. In these activities, GPS innovation is utilized to look through the vehicle's accurate area and make an impression on the proprietor of the GSM vehicle. On the off chance that the vehicle is by all accounts taken, the proprietor just needs to send a SMS to the vehicle once the vehicle is left.

2. PROPOSED SYSTEM AND WORKING PRINCIPLE

2.1 Overview of proposed system

This project comprises of two levels. The toll corner shows one of the first to be overseen by the idea 'Internet of Things depends totally on RFID innovation. Second level agreement for vehicle theft recognition and control utilizing GSM innovation. At the point when the vehicle seems, by all accounts, to be burglarized, the client gets an alarm message alongside the vehicle's present location. So, the client can cooperate with the framework by sending a stop message with the goal of halting the vehicle. Our next target is to give a computerized toll assortment framework to accomplish concurrent anticipation of long line on the toll plaza utilizing tedious and Radio Frequency Identification (RFID) purchaser innovation. Likewise identify there are taking vehicles utilizing on the web toll installment ideas.

2.2 Iot Based Smart Toll gate system

Normally the toll booth is an extremely convoluted task. From this project, we propose a smart card-based toll booth framework that is checked over IoT. We have an Internet worker to keep up all information of client accounts and furthermore their balance. Every vehicle proprietor ought to be had a RFID based card that stores their record number. At the point when the vehicle shows up at the toll booth the vehicle will screen via cards checked. This framework is currently associated with the online worker to check if the card is legitimate and if substantial what is the balance. In the event that client balance is adequate balance implies the framework charged by online and web framework imparts a sign back to the card scanner framework that the client has been charged. In the wake of getting the billing signal the framework works a motor to open the toll gate for that car.

This system is controlled by a NODEMCU ESP8266 microcontroller to accomplish this reason. The microcontroller utilizes the WIFI association with interface with the internet through which the system collaborates with the webserver to play out the online check measure. Additionally, the system permits storing data of the apparent multitude of vehicles relaxed spans for later reference and observation. This system consequently robotizes the whole toll booth assortment and observing cycle easily utilizing RFID in addition to IOT based system. The block diagram of IoT based Toll entryway system is appeared in Figure 1

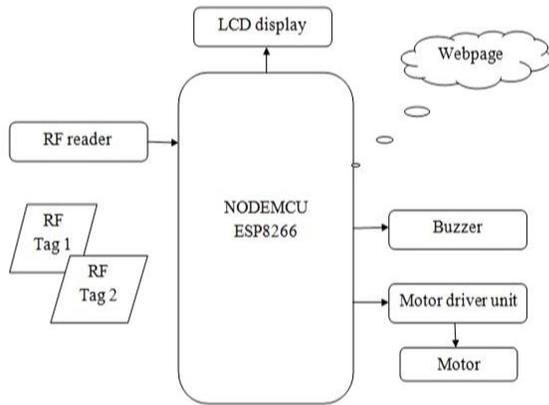


Figure 1 Block Diagram of Proposed Toll Gate System

2.2.1 Block Diagram of Proposed Toll Gate System

This IoT toll framework works with respect to the standard of a RFID reader. Exactly when anyone vehicle goes through the toll variety booth then the vehicle owner just separated his RFID card on RFID reader then this RFID reader will allow the vehicle to go through toll collection booth. Truly, the behind of this whole cycle, every vehicle owner must have his own toll booth account and this account would be charged from the toll arrangement booth division. Likewise, when the vehicle would be gone through a toll variety booth then the owner would be separated his RFID card on RFID reader then RFID reader will give the logic signal to the microcontroller. By then microcontroller would give the logic signal to WIFI modem which is interfaced with an online web affiliation. This framework is related on the web, this framework will check the equality of that specific vehicle owner. If the balance is adequate as per the toll booth charge, by then the microcontroller will give the logic signal to the engine drive circuit the engine will make the best approach to pass the vehicle.

Also, in the event that the vehicle owner equality isn't adequate as per toll both cost, at that point the microcontroller won't give the logic signal to the engine drive circuit won't drive the engine to clear a path to pass the vehicle. Constantly this condition, the NODEMCU ESP8266 microcontroller will confer the logic sign to electronic chime then the ringer will turn on and will give the suggestion message to the toll the two divisions.

2.3 GSM based vehicle and Fuel theft detection and automatic ignition cutoff system

A beneficial automotive security framework is executed for hostile to robbery using an inserted framework composed with Global Positioning System (GPS) and Global System for Mobile Communication (GSM). Framework presented has Two sorts of following, one is internet following GPS framework can simply get the vehicle territory information from satellites and other is disconnected following. GSM framework is presented in the vehicle for sending the information to the owner of the vehicle. The preventive evaluations like engine turn over cutoff is presented in the vehicle which is controlled using customer or owner GSM flexible. The owner can jolt or open his/her vehicle with the help of SMS. The framework is realized on extensively helpful printed circuit board (PCB) Using Arduino. The square chart of GSM based vehicle burglary area and modified beginning cutoff framework is showed up in Figure 2

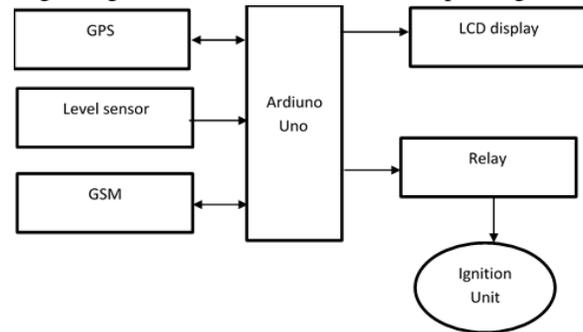


Figure 2 block diagram of GSM based vehicle theft detection and automatic ignition cutoff system

The work includes the design and construction of a remote fuel-level sensor followed by remote monitoring of the fuel level. Monitoring is done by sending messages from a compatible mobile phone. Messages are sent to the owner at regular interval of time. One more distinguishing feature of this research is the locking of vehicle using remote password. Siren can also be enabled during intrusion. This fuel-level monitoring system will ensure efficient use of fuel, minimize operating cost, and help realize maximum profit. This system is user friendly, easily to install and low cost

3. RESULTS AND ANALYSIS

In this research introduce automatic tollgate collection and vehicle theft detection system using IoT. The automated toll collection system uses RFID technology where they help reduce toll gate traffic and avoid other illegal passage of vehicles through a toll

gate. This project consists of two levels. The toll booth displays one of the first to be managed by the concept 'Internet of Things' based entirely on RFID technology. Second level contract for vehicle theft detection and control using GSM technology. When the vehicle appears to be looted, the customer receives a warning message along with the current location of the vehicle. So, the customer can interact with the system to send a single message with the intention of stopping the transport. Our next goal is to provide an automated toll collection system to achieve simultaneous prevention of long queues at the tolling plaza using time consuming and consumer-specific radio (RFID) technology. There are also obvious, theft, cars using paid online payment concepts. The beneath demonstrated figures are the results of the proposed work. Which incorporates anti-theft and RFID based programmed cost assortment framework

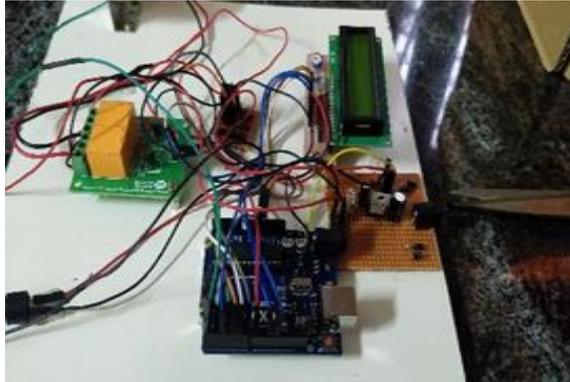


Figure 3 Toll unit- Hardware model

The hardware model of RFID based toll unit system is shown in Figure 3, it consists of Arduino uno, RFID Reader and Bridge driver



Figure 4 Vehicle unit- Hardware model

The hardware model of RFID based toll unit system is shown in Figure 4, it consists of Arduino uno, RFID tag, GPS and GSM

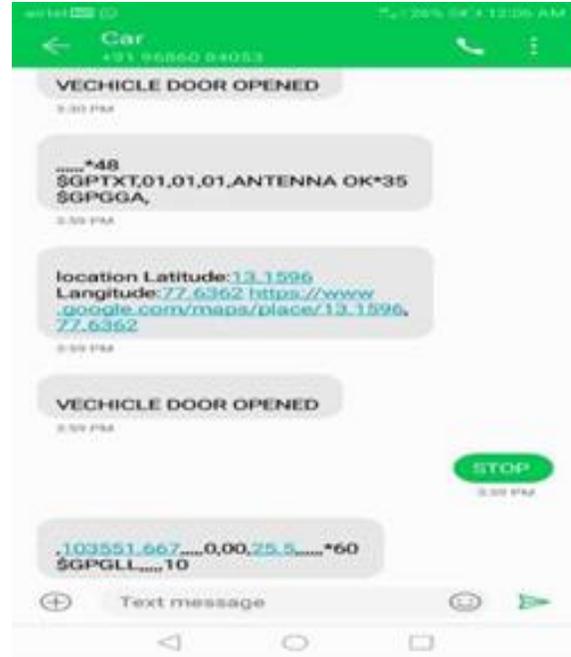


Figure 5 SM alert message

The SMS alert message about vehicle' location and vehicle ON and OFF stage is shown in Figure 5. In this location is obtained from GPS and GSM used to send the message to clients

Advantages

1. The working cost is less
2. The vehicles have the Steady protection.
3. The theft vehicle is identified perfectly
4. The extract location of the vehicle is tracked perfectly
5. With manual free operation in tollgate, the loss of time and traffic can be forestalled.
6. Battery life can be improved by using a self-monitoring range

5.1 CONCLUSION AND FUTURE WORK

Today the theft rate of vehicles is very high, which is very popular due to the tracking of the order system. Vehicle theft and violent crime do more damage to the confused country, however. Thus, the system offers vehicle safety and effectively and efficiently steals the patient. In this research introduce automatic tollgate collection and vehicle theft detection system using IoT. The automated toll collection system uses RFID technology where they help reduce toll gate traffic and avoid other illegal passage of vehicles through a toll gate. This project consists of two levels. The toll booth displays one of the first to be managed by the concept 'Internet of Things' based entirely on RFID

technology. Second level contract for vehicle theft detection and control using GSM technology. When the vehicle appears to be looted, the customer receives a warning message along with the current location of the vehicle. So, the customer can interact with the system to send a single message with the intention of stopping the transport. This system assures the security vehicle fuel whenever the vehicle is at rest and the monitors the fuel level in the fuel tank. If the fuel level decreases when the bike is at rest the system detects that fuel theft is going on. And it will raise the alarm and send the message to the owner of the vehicle that "Fuel Theft Detected". To send this message we used GSM module. This GSM module has a unique IMEI number. By using this IMEI number we can track its location in case the vehicle is theft.

Our next goal is to provide an automated toll collection system to achieve simultaneous prevention of long queues at the tolling plaza using time consuming and consumer-specific radio (RFID) technology. There are also obvious, theft, cars using paid online payment concepts.

1. It can also be used to track traffic violations by giving the speed of the minicomputer to RFID readers. In fact, the police can definitely get a car that is as smart as possible.
2. This framework can likewise be utilized for children which is additionally a significant concern these days
- 3.

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