# Intelligent Vehicle T3-based Internet of Things and Embedded Systems

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**Abstract -** *Every vehicle in the automotive field, the maximum and high quality of the features are given to the luxury vehicle, even the economical vehicle deservers some features and these days there are more cars that sometimes cause traffic The intelligent vehicle T3 system is a system that uses Raspberry Pi3 and ARM 7 microcontroller with RFID TAG, RFID TAG, LCD screen, GSM and GPS modules to collect toll, anti-theft and track the car. We propose an Intelligent Vehicle T3 System which provides two facilities: Automatic Tool Collection and Vehicle Theft Warning for example. The proposed system uses IR sensors and RFID TAG, a specific I d number installed on a vehicle that will be read by RFID reader and automatically subtract the amount that will be displayed on the LCD screen and updated to the database. System often monitors vehicles that recover when stolen and is used as a slid switch to transmit information about the stolen vehicle as it passes through the tool booth so that the user can monitor and track the vehicle. The vehicle can receive information online on the website or via SMS. Intelligent Vehicle T system uses some GPS, GSM, and RFID modules Label to collect, anti-theft and track the tolls. All of these features are accomplished at an economical price that is readily obtained and incorporated. The paper addressed some future work at last section to encourage researchers*

***Key Words**: Raspberry Pi3, RFID TAG, RFID READER, IR sensor, GSM and GPS*

## 1.INTRODUCTION

Any vehicle in an automotive sector, the maximum and high quality of features is given to the luxury vehicle, even the economy vehicle deservers some features and these days cars are more there are plenty of cars that sometimes trigger traffic. Toll gate collection in India is manually operated so it consumes more time, slow operation, traffic jam, and increases vehicle running costs, power loss due to the continuous turning on of the receiver system, so automated toll collection system is required to overcome the problem. The protection provided for the vehicle is not adequate, the overall protection provided to the economy vehicles is the locking system, few sensors and alarm system can bypass all of these and the vehicle can be stolen so there

is a need for a tracking system that can track the vehicle and submit the location. Intelligent Vehicle T3-based Internet of ThingsT( IoT) program proposed in this paper to solve these problems. The system component communicates with the website through IOT, and IOT lets us run and track physical devices. IOT is the computer network through which system communicates and distributes data intelligent Vehicle T3 system is the combination of automatic toll collection, anti-theft and tracking. These are going to be implemented using a Raspberry pi along with other module included in it. Using RFID TAG and Raspberry pi automatically collect toll Using GPS and GSM in micro controller track vehicle Get vehicle location from web application and through SMS. Nowadays most vehicles are being stolen, it is difficult to track and get back the vehicle and there are many problems to deal with the police, to avoid these consequences Intelligent Vehicle T3 system which alerts the user with the SMS when the vehicle is on (or starting). Many advantages like Toll would be paid when moving vehicles so there is no need to stop the vehicle so you can prevent queue at the toll booth and save time. It gives added protection to the current vehicle network. We monitor the vehicle using web app. Location is transmitted via GSM and can be found using GPS, and costs are affordable.

## 2. LITERATURE REVIEW

Studies so far show that automatic tool collection system is important and gaining more attention. **Dr. S. Hussain [1] et al.** proposed an automatic toll ticketing system using for transportation system using MSP430 processor. In this work propose a minimal effort and productive system called electronic toll collection utilizing RFID modules that consequently gathers the toll from moving vehicles when they cross toll boot it's pretty old system and it is slow

**Atif Ali Khan et al. [2]** proposed a RFID based toll collection system using Atmel8051 microcontroller and it uses active tag which consumes more power from vehicle battery and it is difficult to modify or update the system

**V. Sridhar et al. [3]** proposed a smart card based toll gate automated system using 8051 microcontroller. This system describes, the smart card removes handy cash-transaction to eliminate traffic at toll plaza. using smart card even consume time so it's not that efficient in saving time , It's better to use upgraded version like raspberry pi or Arduino

**N. Poornima et al. [4]** proposed an automated toll plaza verification system for an automobile at a check point using visual studio .net .08 software. The proposed system uses active RFID tags, which are placed on the vehicles.

**SeokJu Lee et al. [5]** proposed a vehicle tracking system using GPS/GSM/GPRS technology and smart phone application. An in-vehicle gadget, a server and a cell phone application are utilized for the vehicle tracking framework. In this work in-vehicle gadget is made out of a microcontroller Atmega328 and GPS/GSM/GPRS module. It uses google map which most of the time it is inefficient and we don't three module only two module is enough (GSM and GPS) to show a vehicle area on google maps.

**Pradeep V Mistary et al. [6]** proposed a real time vehicle tracking system based on ARM7 GPS and GSM technology. This system shows a vehicle tracking system to track the correct area of moving or stationary vehicle in real time. This system is a combination of hardware module and programming module.

**Sanchit Bhargava et al. [7]** proposed a Vehicle Tracking System Using "GPS" And "Google Maps". It only track the vehicle doesn't give any alert when a vehicle is stolen or some try to breach .Google maps are not always accurate

## 3. METHODOLOGY

That embedded system requires operating software. It has to monitor the system, whether we call it firmware or embedded software, and provide the user experience and decision-making for the product to do its job. Embedded software design differs from conventional software creation, because engineers have to deal with custom hardware and very tight power , memory, storage and other constraints.

**Figure 1.1:** System Architecture
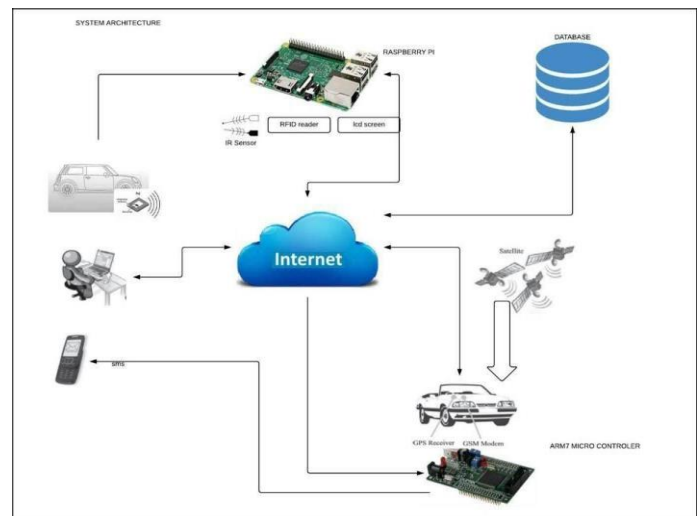


## 3.1 System description

System architecture shown in figure consists of:

**Raspberry pi:** Raspberry pi using RFID identifies and verifies the vehicle and interact with the database to deduct amount and update. It stores the information that is used to trace the vehicle

**IR SENSOR module**: IR SENSOR emits IR rays and receiver which receives the IR rays that falls on object and reflects back.it is used to detect vehicle and led light switch to yellow

**RFID module:** RFID TAG holds a unique id and can store information from 64bits to 1kb. System uses a passive tag which is efficient in power saving. Active tag needs a power supply to be but passive tag uses the power from the RFID tag reader (when the tag comes in the range of reader it gets activated) RFID reader reads the RFID tag and interacts with database where its going to verify and deduct amount and update the database.

**LCD screen:** It is used to display information such has deduction of amount and vehicle detail .it displays two column

**ARM7 microcontroller:** With InSystem programming (ISP) and inapplication program 2.0 usb device controller CPU clock up to 60mghz. The GPS and GPS is integrated ,when a user request for vehicle location through website ,it interact with the microcontroller in which GPS gives the location and send it through GSM to website and to the number of the user through SMS

**GPS module:** Gets the location from satellite and pass this location (longitude and latitude) to GSM

**GSM module**: GSM is used to send the location via through SMS to user phone number (that would be registered) and send the location to the website

## 3.2 System Scenario

### 3.2.1 Automatic toll collection.

 -Track vehicle: trace and track vehicle to get location through website or through SMS andstore the information in the website database.

 -Anti-theft the microcontroller will send message when vehicle is switched on.

- Automatic toll collection is done using raspberry pi including with modules IR SENSOR, RFID TAG, RFID READER and LCD screen. Led lights are used to indicate vehicle detection and amount deduction

- When a vehicle pass through toll booth IR sensor detect the vehicle and the RFID reader reads the RFID tag.

- raspberry pi interact with database and LCD screen display the vehicle details and the amount deducted. If vehicle is not detected the LED light remains red else if vehicle is detected the led switch to yellow and after amount deduction it switch to green.
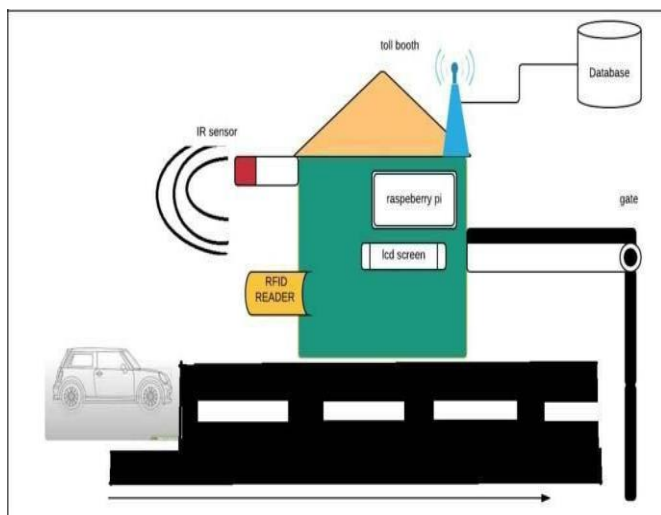


**Figure 1.2:** Toll Collection

## 3.2.2 Vehicle tracking and Anti-theft

Vehicle tracking is done using microcontroller with GSM and GPS component .user can send a request locate their vehicle by logging in to website and send request the website interacts with the microcontroller, GPS receive location from satellite sends the longitude and latitude to GSM.

The GSM will send the location (latitude and longitude) through SMS and to website .user can locate on the website or use the longitude and latitude received through SMS to locate in different map tool online(or offline) it is best to use with online

Proposed system uses a sliding switch is used which going to send information to authorities (police) about the stolen vehicle, if it pass through toll booth.

## 4. Conclusion and Future Enhancement

The proposed program effectively collects the toll, anti-theft and tracks the vehicle and the price to implement is economically feasible. System uses a necessary and sufficient module, not more or less of a system module. Intelligent framework for t3 vehicles is powerful and works well. Future enhancement is a component for accident detection and operation of vehicles such as switching on light, indicators, and horn via your mobile. Another Promising work is to analyze the data that will be generated from the system in terms of big data and to use the appropriate machine learning techniques to make these data useful.

## ACKNOWLEDGEMENT

## REFERENCES

[1] Al-Ghawi, S. S., Hussain, S. A., Al Rahbi, M. A., & Hussain, S. Z. (2016, March). Automatic toll e-ticketing system for transportation systems. In 2016 3rd MEC International Conference on Big Data and Smart City (ICBDSC) (pp. 1-5). IEEE.

[2] Khan, A. A., Yakzan, A. I. E., & Ali, M. (2011, July). Radio frequency identification (RFID) based toll collection system. In 2011 Third International Conference on Computational Intelligence,

Communication Systems and Networks (pp. 103-107). IEEE.

[3] Sridhar, V., & Nagendra, M. (2012). Smart card based toll gate automated system. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 1(5), 203-212.

[4] Poornima, N., Arvindhan, M. P., Karthikeyan, R., & Raj, S. G. (2015). Automated Toll Plaza Verification System for an Automobile at a Check Point. International Journal of Engineering Development and Research.

[5] Lee, S., Tewolde, G., & Kwon, J. (2014, March). Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application. In 2014 IEEE world forum on internet of things (WF-IoT) (pp. 353-358). IEEE.

[6] Mistary, P. V., & Chile, R. H. (2015, December). Real time Vehicle tracking system based on ARM7 GPS and GSM technology. In 2015 Annual IEEE India Conference (INDICON) (pp. 1-6). IEEE.

[7] Sanchit Bhargava, Vishal Varshney and Vipin .VEHICLE TRACKING SYSTEM USING "GPS" And "GOOGLE MAPS" slideshare.com

## BIOGRAPHIES

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