

RTO-VA System: Microcontroller Based Vehicle Alert System Using RFID and GSM Technology

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Abstract: Parking vehicle in proper place is a major problem. One can unknowingly or by mistake park his/her vehicle in no parking area. If RTO officer, an authorized person by RTO, finds your vehicle in no parking area; it is seized by them. To find out where your vehicle is actually bought after the procedure is very difficult and time consuming task. To avoid such inconvenience an alert system is designed. If RTO officer finds a vehicle in no parking area, he will show his identity with the help of RFID card; and the text message being generated by GSM to inform vehicle owner about the actions taken to his/her vehicle against parking a vehicle in no parking area. The text message consists of information about the station where vehicle is to be placed after the whole procedure as well as payment link by RTO is provided to do online transactions. After the message received to owner, if he/she is able to reach the place where he/she parked the vehicle, then owner can reply to the system. So that the officer will wait for owner and no need to take the further actions of seize. Owner will pay fine and get off the vehicle from no parking area. Other than authorized users if someone tries to uplift the vehicle, accelerometer sensor sense the dimensions. Buzzer is provided to system to alert owner as well as people nearby to get attention towards vehicle that something suspicious happening with it. Along with buzzer an alert message, via GSM, is send to owner of the system.

Keywords: Global system for mobile: GSM, RFID tag-reader, Accelerometer sensor, buzzer alert.

I. INTRODUCTION

The microcontroller based vehicle alert system helps to notify the owner of vehicle about the vehicle seize from no parking area. Since vehicles have become one of the essential utility of our daily lives, parking them in the right place has become a major issue as the number of vehicles and its users have seen a rapid increase over the years in densely populated countries like China, India, Indonesia, etc. Resulting in lack of permitted parking areas, also sometimes the “No Parking” board conventions are not noticeable. Due to which the users end up parking their vehicles in the No Parking areas. Vehicles when found parked in No Parking areas are seized by the RTO officers. Such vehicles are then taken to the respective police station until the owner of the vehicle himself rescues his vehicle by paying the belonging fine against parking the vehicle in the No Parking area. The RTO officers only write an alphanumeric code at the place of seize and uplift the vehicle. These alphanumeric codes represent the respective police stations. The user to go through a very hectic process of finding his vehicle only with the reference of the alphanumeric code written by RTO officer resulting a lot of inconvenience. The focus of the system is to reduce the inconvenience by placing a microcontroller kit on the vehicle which will notify the user about the vehicle seize and the location to which the vehicle is being taken to. The system will also be beneficial for the RTO authorities, as they can receive a reply message on a LCD screen on the microcontroller kit, notifying the RTO officer that vehicle owner is nearby and will be present to rescue his vehicle at the place of seize. Hence the officer need not uplift the vehicle and carry it to the particular police station. The system involves RFID tag

and reader for storing and scanning the information and GSM technology for sending the text message to the vehicle owner. This system helps in notifying the information to vehicle owner about his vehicle after the seize reducing the inconvenience associated to it. In addition the system involves a payment link sent through the SMS to pay the belonging fine for parking the vehicle in No Parking area, enabling cashless transactions.

II. REVIEW OF LITERATURE

K. idyasagar et.al.[1] described the safety mechanism of the transportation of the bus and to the children traveling from home to school and resume back to home is a standalone component to the parents and to the school component management. Range and obstacle detection as well as accident detection sensors are implemented on the front surface of the bus for avoidance of collision with another vehicle on the road. Each student is tagged with a special unique code.

Akriti Pawar et.al.[2] described concept about GSM applications in various fields like in medical field for detecting body temperature, heart beat rate as well as the wireless ECG using Bluetooth helps to make the patient monitoring devices to make them more mobile several GSM based microcontrollers are being used for anti-theft security system not only with text message as feedback but also raise alarm. Another advantage is GSM based city area monitoring system.

Agoston Katalin investigate the use an function of vibration and acceleration sensors. The ADXL202 sensor is a dual axis accelerometer on a single IC chip, with the capability of measuring dynamic and static accelerations, has a faster time than electrolytic or mercury or tilt sensors (thermal). It can be used in computer peripherals, internal navigation, seismic monitoring, vehicle security systems and battery powered motion sensing[3].

Sencun Zhu et.al.[4] have described the design, implementation and evaluation on a Sensor Networked Based Vehicle Anti-theft System named as SVATS to address these limitations. System includes the vehicle with sensors, that are parked within the same parking area of sensor network, monitoring and identification of vehicle theft by detecting unauthorized vehicle.

III. SYSTEM ARCHITECTURE

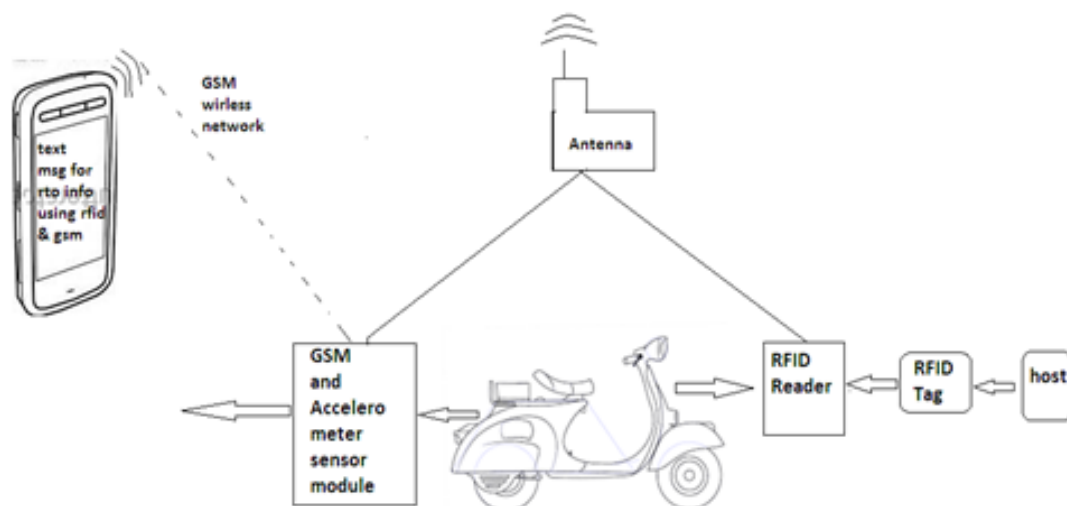


Fig 3.1 : System Overview

The fig 3.1 represents the overall working concept of the proposed system. Here Host will be the RTO officer. He will be provided with a card consisting RFID tag. This tag information is scanned by RFID reader placed on vehicle. The accelerometer sensor is placed to detect vibration/uplift to vehicle and GSM provides respective text message to owner of vehicle. Text message contains RTO officer information, station information as well as payment link.

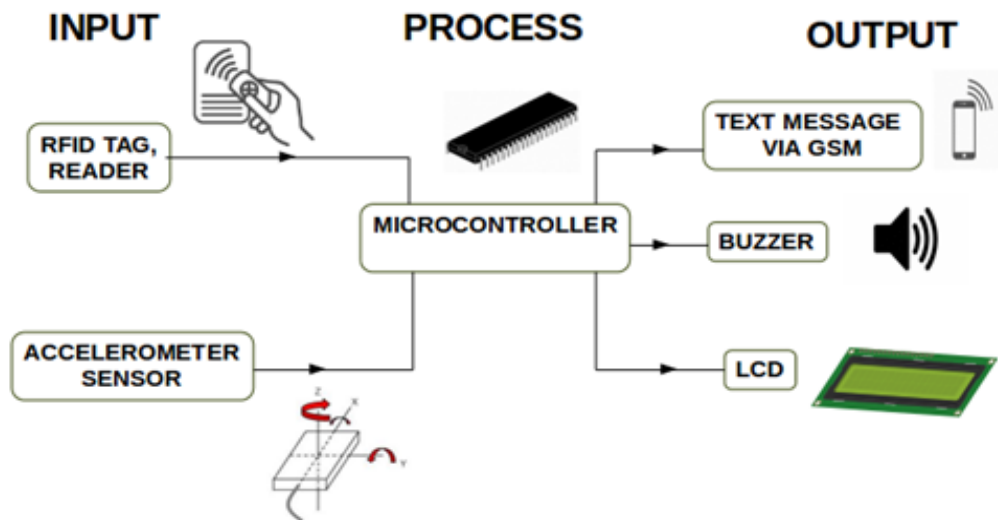


Fig 3.2 : Component Diagram.

Different hardware components used are shown with the help of component diagram. Fig 3.2 shows components which will help to build up the system. Inputs can be of two types of input that is authorized input as RFID tag and unauthorized as vibration to vehicle. Microcontroller process the input and generated particular output accordingly. Output generated is shown with the help of text message via GSM, buzzer and LCD.

ADVANTAGES:

1. Reduction of inconvenience after seize:

The RTO-VA system reduces inconvenience of finding the vehicle after the seize as system provides information about seize via text message.

2. Message reply:

If in case user is nearby and able to come quickly at the place of seize he can send reply to the system. The message will display on LCD screen placed on vehicle so that officer can wait for owner.

3. Go cashless:

RTO alert message consist of payment link so that owner can pay fine by online transaction.

4. Unauthenticated user alert notification :

Other than authorized users, someone who tries to uplift the vehicle, text message notification is provided to owner.

5. Buzzer Alert:

Buzzer is provided to system to alert owner as well as people nearby to getting attention towards something suspicious happening to the particular vehicle.

6. Compact hardware kit:

Vehicle alert system comprises of a small hardware kit. It is easy to install.

7. Low manufacturing cost:

The system having low cost and can be affordable for vehicle owners.

8. Authorized seize:

The legal proof is available with the owner as text message with the information of seize.

IV. SYSTEM RESULT AND ANALYSIS

The result of the system consists of text message provided to the owner to notify him/her about the actions taken to the vehicle. In the first case when RTO officer shows card to the system, system shows text on LCD which displays name and station which is given as input to assure that input is accepted by the system. The information gained from input is then send to the vehicle owner in the form of text message. If the owner is able to reach the place then he can reply to the system. System answers the RTO officer with the help of text on LCD screen. To attract attention of RTO officer to the reply of owner, buzzer gets activated. In the second case if an unauthorized person tries to uplift the vehicle alert message is generate to notify owner as well as buzzer is activated to notify nearby people that something wrong is going on with this vehicle. Fig 4.1 shows the position of tag in front of reader so that reader can detect the information in the tag. Fig 4.2 shows the LCD display showing the input is accepted from the RFID card. Fig 4.3 shows text message to owner to notify about the seize also owner replied to the system. Fig 4.4 shows the LCD screen text to inform RTO officer that owner is nearby and coming to the place. Fig 4.5 shows payment link to pay fine. Fig 4.6 shows the alert notification in the form of text message as someone has tried to uplift the vehicle.

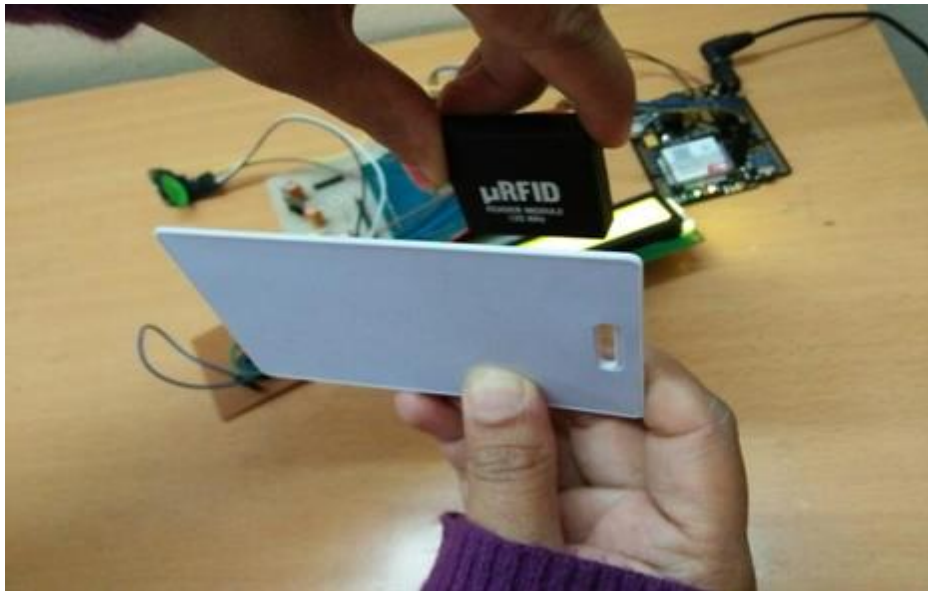


Fig 4.1 : RFID tag and reader usage



Fig 4.2 ; LCD screen display – input accepted

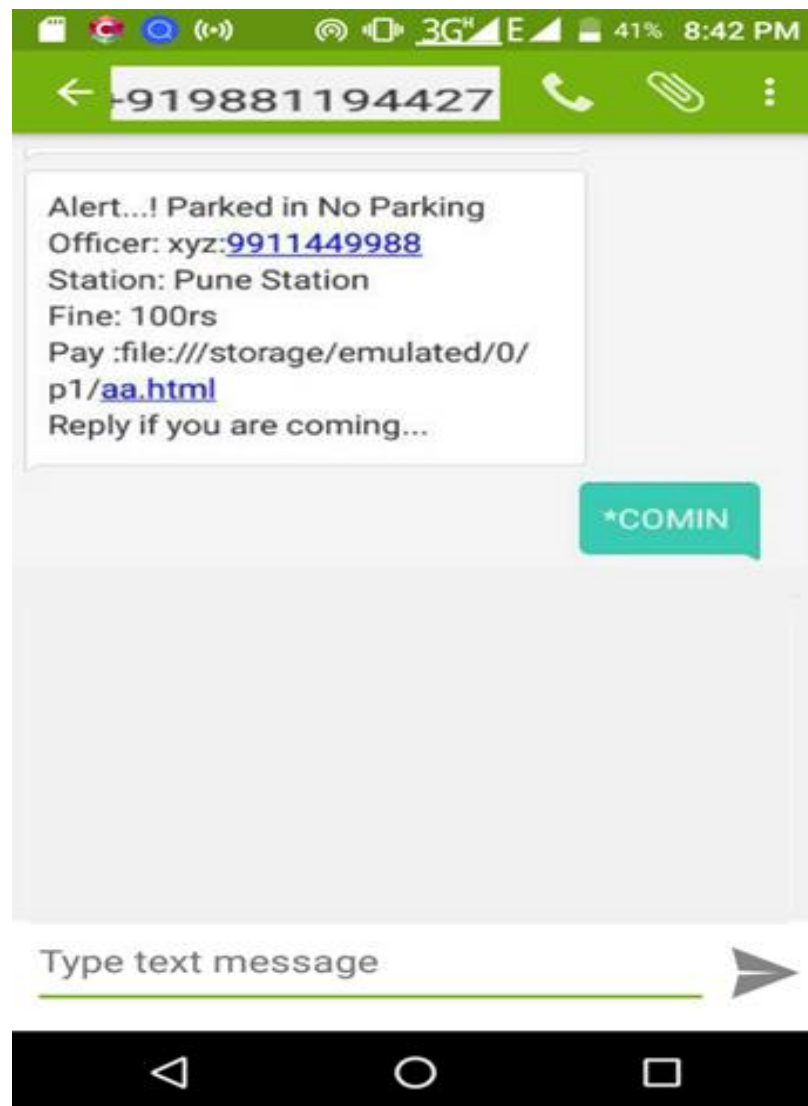


Fig 4.3 : Seize information message and reply by owner



Fig 4.4 : LCD Screen display – reply of owner to system



47% 9:42 PM
ONLINE FINE PAYMENT PORTAL

ONLINE FINE PAYMENT

Pay by Credit Card

Card Number

Expiry Date
January 2016

Enter CVV

submit

Fig 4.5 : Payment Link

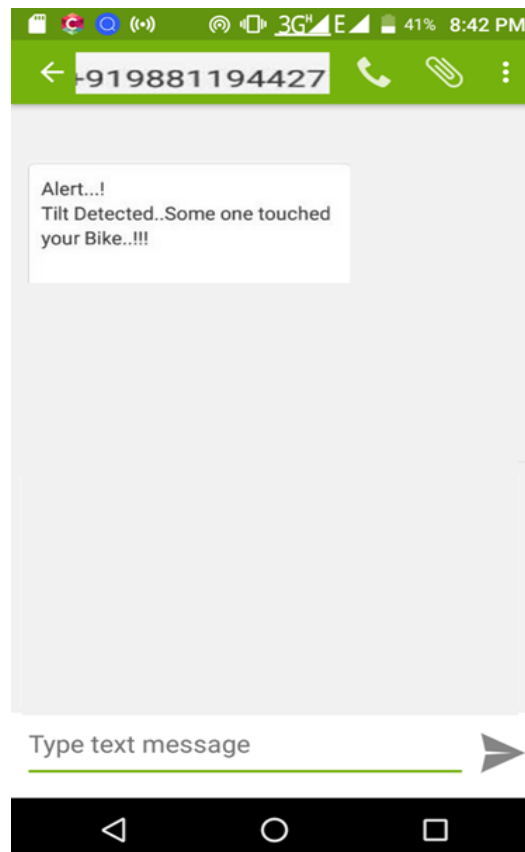


Fig 4.6 : Text message notification for unauthorized uplift

V. CONCLUSION

The vehicle alert system reduces inconvenience of finding particular police station after the seizure by providing information via text message. If in case user nearby and able to come to place he can reply to system indicating to wait. Payment link is provided along with the SMS for online payment of fine. Other than authorized users if someone tries to uplift the vehicle, along with the buzzer SMS notifying alert is send to owner.

REFERENCES

- [1] K. Vidyasagar, G. Balaji, K. Narendra Reddy, “ RFID-GSM Imparted School Children Security System “ Volume No.2,pp. 17-21,June 2015
- [2] Anjali Rathore, Akriti Panwar, Deepika kumari, Upendra Kumar, “ A Review on application of GSM for monitoring system “, Volume No.6,Issue 5,pp. 3778-3780, May 2015.
- [3] Agoston Katalin, “ Microcontroller based system for vibration analysis “ 1-4244-2577-8/08/\$20.00,2008 IEEE.
- [4] Hue Song, Swncun Zhu and Guohong Cao, “ SVATS : A Snsor-network-based the Anti-Theft System “, 978-1-4244-2026-1/08/\$25.00,2008 IEEE,pp. 171-175, IEEE INFOCOM 2008.
- [5] Akshay Punjabi, Siddharth G V, Sidhant Singhal, K.V.N.Kavitha, “ RFID Scurity Systm for the domestic applications “, volume 104, Article 11062,pp.318-321,December 2013.
- [6] Visa M. Ibrahim, Asogwa A. Victor,“Microcontroller based anti-theft Security System usingGSM network with Text message as feedback”, volume 2, issue 10, pp. 18-22, August 2012.
- [7] *Minghul Wang, Junhua Pan, “Authentication test based the RFID authentication Protocol with security analysis”, pp. 196-202, 31 August 2014.*