

An Attempt to Develop an IOT based Vehicle Security System

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Abstract— As the amount of urban vehicle grows rapidly, vehicle theft has become a shared concern for all citizens. Security and safety have always become a necessity for urban population. However, present anti-theft systems lack the tracking and monitoring function. Internet of things(IOT) has been governing the electronics era with cloud services dominating the ever- increasing electronics product segment. Thus, there is a need to develop a system for providing security to the vehicle from problems like theft and towing using IOT for security of automobiles and passengers. Our system proposes a novel security system based on wireless communication and a low-cost Bluetooth module. This paper illustrates a model in which the GSM is used for sending messages. the user can control the engine/ignition and turn it off if needed. The system also employs a password through keypad (with maximum 3 chances) which controls the opening of a safety locker door as well as wearing of a seat belt. If there is a window intruder, the IR module/sensor detects the intruder, or any obstacle and it sends a signal to the micro controller. The controller is connected to a Bluetooth module and to an alarm system. The System transmits an alert signal to the dashboard (which is nothing but a mobile handset) which sends an alert signal to the user's mobile phone. The prototype also provides a solution to the problem like Towing. Thus, the system uses Bluetooth module and controller to control the security system from the user's mobile phone by means of any device with a potential Internet connection.

Keywords: IOT, GPS, Android mobile phone, GSM, Micro-controller.

1. INTRODUCTION:

The Internet of Things (IoT) is the physical network of things or objects—devices, buildings, vehicles, and other items— embedded with electronics, software, sensors, and network connectivity that enables these things or objects to collect and exchange data. An anti -theft system is any device or method used to prevent or deter the unauthorized appropriation of items that is considered valuable.

Internet of Things is expected to produce high degree of human to machine communication along with machine to machine communication. The primary objective of this project is to reduce human work. Automation has always been a prime factor for security system. Our aim in the project is to design and implement a security system. System that offers controllability through a hand-held mobile phone by means of IOT.

1.1 IOT:

The internet of things is the network of physical objects or “things” embedded with electronics software, sensors and connectivity to enable it to achieve greater value and service by exchanging data with the manufacturer, operator and/or other connected services. Each thing is uniquely identifiable through its embedded computing system but can inter operate within the existing internet infrastructure. Typically, IOT is expected to offer advanced connectivity of devices, systems and services that goes beyond machine to machine communication (M2M) and covers a variety of protocols, domains and applications. The

interconnection of these embedded devices is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. [1]

In today's world of comfort and luxury, various high priced costly vehicles are available. Many of these vehicles have been launched with inbuilt security systems. However, even though a huge amount of capital is being invested in areas of vehicle security, the cases of vehicle theft is still rising. [1,2]

This situation gives rise to explore for further security mechanism to avoid vehicle thefts. We have decided to devote our project in areas of vehicle safety and security to stop the vehicle theft. The Vehicle Tracking System allows the user to monitor their vehicle and their routes and arrival. There exists another problem. Recent advancement in the automobile industry has opted many people to use their own vehicle for traveling. This has increased effect on car ownership. But to park all these cars in the major metro cities is quite tedious and difficult task. After wrong parking, problems like towing occurs and hence, there is no solution as of now. Thus, the project also deals with this problem of parking and subsequent towing. To tackle all the problems specified above, the project have features like, Key less unlocking of door of the car and ignition control through both Keypad as well as the wearing of the seat belt. The project also deals with intruder problems from Window of car and can trace the location of the car after being towed. These features should provide better security to the car. [2]

2. LITERATURE REVIEW:

This project provides security to the vehicle using a new technology to unlock the door of the car as well as wearing of seat belt. These two conditions satisfy the user to start the ignition of the car. Similarly securing our valuable things from intruder through the window and the problem of towing. This survey provides an outlook on the various researches that have been made earlier to carry out the project.

The vehicle anti-theft tracking system based on Internet of things is designed in [1,3], which can provide all-round active service for the owners. This system is controlled by an RFID module to switch on and off. In SVATS, A Sensor-network-based Vehicle, an Anti-Theft System is implemented to avoid the vehicle theft in the parking areas by using the Micro-controller, RF transmitter and receiver module. [3] This paper explains the working of GSM and GPS module. After the power supply unit switch on, GPS (Global Positioning System) stores the latitude and longitude information it collects in E2 PROM chip. When thieves get into the car, the vibration sensors mounted in the doors will be triggered. [4] In [5], a comparison of Android JAVA performance with popular Sun embedded JVM running on top of Angstrom Linux was made. Their work shows that Android provides better VM designs but consumes more energy due to lack of dynamic compiler in Dalvik JVM. SeokJu Lee proposed a method the efficient tracking of vehicles using GPS and GSM. [6]. Shang and other proposed a system that uses geographic position and time information from the [7] Global Positioning Satellites. In Vehicle Tracking System by Kumar and Kumar, the GPS plays a major role with wireless communication for extracting the relevant information. [8]. The system presented by Pham, Driberg and others can obtain a vehicle's GPS coordinate and transmit it using the GSM modem to the user's phone. [9]

3. PROBLEM DEFINITION

Develop a system that offers security to the vehicle using Internet of Things (IoT). The system must be able to do user authentication for access control and monitor the vehicle for any suspicious activity. It must keep the vehicle secured by notifying the user via sms in case of any unauthorized access, theft, intrusion, and towing.

4. PROPOSED SYSTEM OVERVIEW:

For ignition to start or for the door to get unlocked, user needs to enter the password through keypad, if password is correct then only car door gets open and the user is given only 3 chances to enter the password, if password is wrong all time then we need to press the reset button to reset the system. After that, if the user wears the Seat belt and the password is correct only then the user can operate the ignition or engine of the car. If we park our car near an unauthorized area and if it gets towed, then a limit switch will get pressed automatically. This sends a command to controller which in turn sends a command to dashboard (dashboard side mobile) through bluetooth module. The dashboard will then send information to user through SMS with GPS location and the user is alerted with the same with continuous beep sound. [10]. If someone is trying to steal valuable things through the window or any

obstacle comes in between the window, it is being sensed by an IR sensor then the sensor sends command

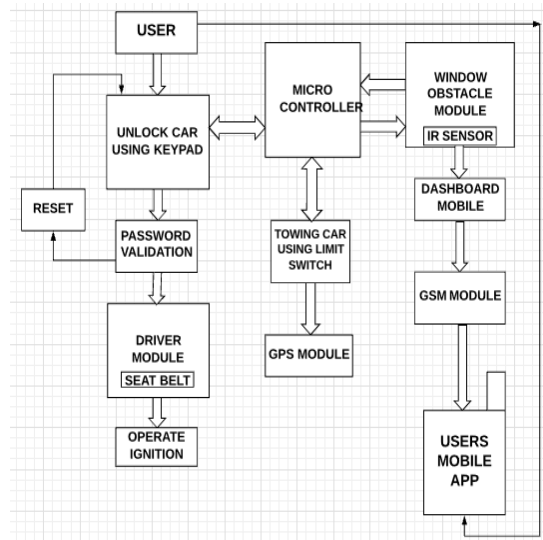


Fig. 1 Block Diagram of the Proposed System

to controller and then controller send command to dashboard (dashboard side mobile) through bluetooth module then dashboard side mobile send information to user through SMS with GPS location and the user is getting closed.

4.1 SENSORS USED:

IR Sensor: IR sensor at the window of car is responsible for sensing theft through window, which will give signal to microcontroller, then microcontroller will send signal to dashboard mobile which will send message to user's mobile. [11]

Limit Switch: When the car gets towed the limit switch at the bottom of the car gets pushed which sends signal to microcontroller from which a signal is send to dashboard mobile then through gprs module present in its location is sent via message by gsm. [11]

Bluetooth module: Used for connection between Microcontroller and dashboard mobile. [4]

Users Mobile: Always have an alert message with continuous beep sound. Also have the location of the car whenever towing is done. [5]

4.2 ALGORITHM:

The algorithm of the proposed system is sub-divided according to the features as follows:

(A) UNLOCKING THE CAR:

1. Start.
2. Enter a 5-digit password with chances =3.
3. If password is correct.i.e.
 if (pass [0] =='1' && pass [1] =='3' && pass [2] =='5' && pass [3] =='2' && pass [4] =='4')
 LCD string("Success");
 Else
 {

```

        chance++; LCD string ("Chance:");
    }
    LCD string ("Error Reset");
4. Stop.

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(B) DRIVER MODULE (SEAT BELT):

1. Start.
2. If seat belt is worn go to step 4.
3. Else seat belt error.i.e. 1
4. (a) if (left switch is pressed)
 - move==left;
- (b) elseif (right switch is pressed)
 - move==right;
- (c) elseif (reverse switch is pressed)
 - move==reverse;
- (d) elseif (forward switch is pressed)
 - move==forward;
5. Stop.

(C) WINDOW INTRUSION MODULE:

1. Start.
2. if IR Sensor is interrupted, an ALERT MSG ("Intrusion Detected") is send on the users mobile and the Buzzer starts.
3. Else window is closed.
4. Stop.

(D). TOWING OF CAR:

1. Start.
2. If the Limit Switch gets pressed, then
 - (a) A Voice message on the Dashboard.
 - (b) An Alert message is sent on the users mobile.
3. GPS Location is detected and send via Dashboard.
4. Stop.

4.3 GUI:

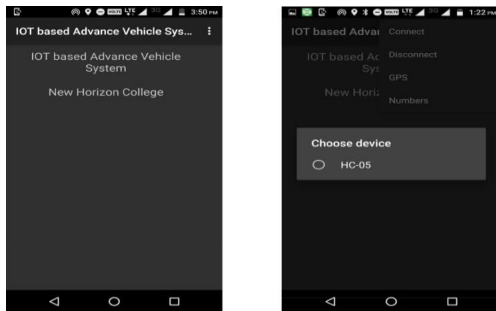


Fig. 2 Dashboard side GUI and Connection to HC-05

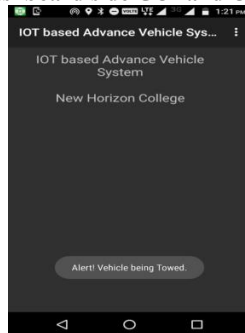


Fig. 3 Towing Alert Voice MSG on Dashboard APP

5. RESULTS AND DISCUSSIONS:

In this project, we have implemented a prototype which represents a Car.

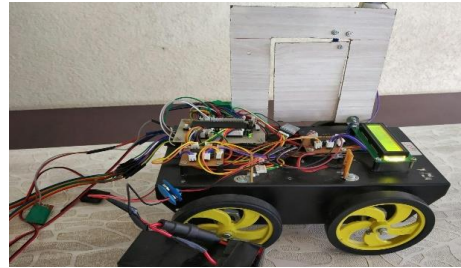


Fig. 4 Car Prototype

For ignition to start, the user needs to enter the password through keypad.



Fig. 5 Display Enter password for unlocking car

If password is correct, then only the user can have access to car as given only 3 chances for the same. After that, if the user wears the seatbelt and the password is correct then only the user can move the car. If intrusion is detected, then through IR sensor a command is send to the controller and then controller sends command to Dashboard (dashboard side mobile) through Bluetooth module then dashboard side mobile sends information to user through SMS along with GPS location. At the time of towing, when the limit switch gets pressed a command is send to the controller and then controller send command to Dashboard (dashboard side



Fig. 6 Three Chances given after wrong password input



Fig. 7 Reset option after putting wrong password three times

mobile) through Bluetooth module. Then dashboard side mobile will send information to user through SMS and with GPS location. If password is wrong all the time, then we need to press the reset button to reset the system.

The screen displays success for the correct password. The system displays seat belt error on the screen if the user is not wearing seatbelt. If the user wears the seatbelt and the password is correct, then only the user can access the car.

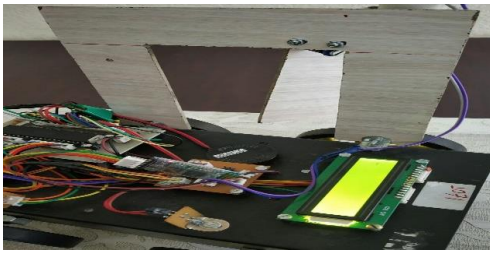


Fig. 8 Access the car after correct password Input

If intrusion is detected, then through IR sensor a command is send to the controller and then controller send command to Dashboard (dashboard side mobile) through Bluetooth module then dashboard side mobile send information to user through SMS along with GPS location. At the time of towing, when the limit switch gets pressed a command is send to the controller and then controller send command to Dashboard (dashboard side mobile) through Bluetooth module. Then dashboard side mobile will send information to user through SMS and with GPS location.

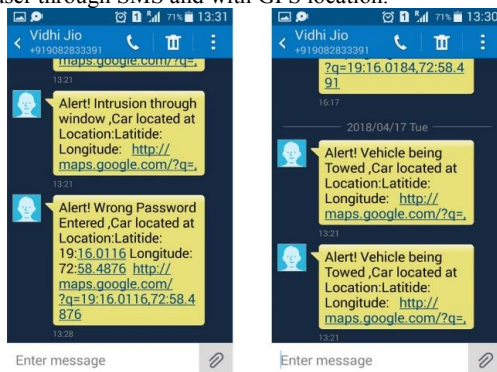


Fig. 9 Alert Message on user's mobile for window intrusion and wrong password input and towing along with location.

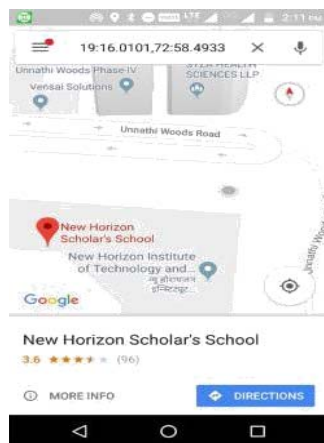


Fig. 10 Location on User's mobile on Google maps.

6. CONCLUSION:

The ongoing research in the field of IoT and its implementation in full or partial manner will improve the quality of life. Thus, the proposed project "IoT Based Advanced Vehicle System" would take the security level a step forward and try to cover many of the loopholes which are in existing technology. The verification shows that the IOT based advanced vehicle System is realistic and can control the theft automatically. The response time delay is also less. This IOT based advance vehicle system enables user safety by seat belt compulsion, key less locking /unlocking system to operate the car. In addition to the above, it gives security from towing of car and theft through the car window. The system is ideal for cars, further it can be used for other vehicles too by using these components and modules used in this project. IOT based advance vehicle system offers utmost efficiency, convenience, safety & reliability. It is an ideal solution for car users.

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