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A Wireless Intelligent Car Door Locking System

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ABSTRACT

Basically security is most essential factor in software as well as internet environment. In current era software and Hardware security it is most important thing secure your logical as well as physical assets. In many cases tangible entities like service, smart homes, smart car etc. having some IoT base support enhance the drastic supervision, the benefit of such systems to evaluate the current scenario over the internet. In this paper we propose automatic car locking system using IoT. Basically in this work proposed smart locking system to car door, auto motor and GPS sensor has use to get the current state as well as current location respectively. Implementation has done on in web environment as well as user-friendly mobile application. This system is basically beneficial in Real world environment as well as supporting for the smart Security e-asset Management applications. The system having sometime internet dependency to communicate with IoT model with cloud database.

1. INTRODUCTION

The IoT (Internet of Things) means the interconnection of human through a global network of the internet network, processors, sensors, and software. This technology then connects physical objects the data they collect and their operations to an independent user. It is an electronically hybridized infrastructure that has the capability to analyze and capitalize on data in real time maximizing efficiency and productivity.With recent technological advancements, smartphones are becoming an elementary part of our daily life.These are portable and compact size personal computers. They are based on a mobile operating system like Android, Windows Mobile, etc. Smartphones are remotely linked to each other, to the landline phones and to the internet via an integrated broadband mobile network. They can also be linked to the close by devices via wireless or wired interfaces like WiFi, Bluetooth, USB, etc.

The focus of this project is to intelligently employ the IoT with an appropriate combination of smartphone, front-end embedded controller and an array of sensors and actuators. The purpose of this project is to develop an android application to provide a smooth locking/unlocking the car door. It is done by employing a server based car registration and authorization codes generation. The system status is logged on the server in a periodic fashion. it allows authorized owner to globally access this information, via smartphones, whenever required.The purpose of this paper is to study and evaluate a suitable set to develop a smart door lock which is intended to offer high security, easy access, and control. A key challenge that is faced in this project is the security and privacy of the IoT systems. Therefore, the paper will present an extensive investigation for the security and privacy of IoT systems seeking to enhance the lock mechanism by connecting it to the internet, making it more robust, productive and innovative.

2. LITERATURE SURVEY

JamjoomAnet. A. [1] proposed a system is installed on the smartphone and it is linked to the frontend embedded controller based digital car lock via the Bluetooth interface. In this paper we the Authors has combined emerging IoT Technology with Android based smartphone, Bluetooth Wireless interface, Front end Controller and a Server. The system is successfully tested for a range of less than or maximum equal to 20m distance between smartphone and the front end electronics.

Ilkyu Ha et. Al. [2] proposed system alarm information to the mobile device when the door lock is physically damaged. It enables a user to check the access information and remotely operate the door lock to enhance convenience. The Digital Door lock Senses the physical impact of an invalid visitor and notifies the users mobile device by the captured image.

NilamMajgaonkaret. Al. [3] proposed system is to build an integrated security system by using Bluetooth device and microcontroller technology. This paper gives basic idea of how to control home security for smart homes, especially for door key locks. It also provides security and ease for Android phone users.
Ishratet. Al. [4] provided the system that allows the users to monitor and control their homes using the Android device. In this paper, the authors have used GSM technology to ensure security, confidentiality, integrity. They have used encryption technology.

Ruengittinumet. Al. [5] proposed system that alerts the owner when they forget to turn off the car lights or close the windows when the engine is off.The System was tested that helps the driver to notify the bad habits such as forgetting to turn off head or tail light,when the driver forgets to close the windows.
Panduranget. Al. [6] system invented a digital door lock system is an equipment that uses the digital information as smart card as the process for authentication as a substitute of the legacy key system. This paper gives basic idea of how to control security using digital keys.The motion of the user will be captured from camera, user will be detected.

Vivek Gupta et. Al. [7] system came with a novel concept of car automation using raspberry pi with IoT concept. This paper presented a new approach to monitor different parameters such as temperature, humidity, fuel indication speed of a car and also track the location of the car. To control parameter from anywhere an IoT platform called UBIDOT has been used It is code less IoT platform designed to help prototype and scale Iot projects.

Leelavathiet. Al [8] paper provides an overview of method used for image capturing and location tracking followed to trace the missing vehicle and malicious activity in the vehicle. A smart car based application which can secure the car from theft and track the missing vehicles. The android application can initiate the tracking capability which will mail the image of interior/exterior environment of car as well as its GPS location to CIS. The application is capable of generating voice based alert to the user.
Nelson Rai1 et. al. [9] describe work is based on Arduino, motor driver and Bluetooth module. Arduino is an open source prototyping platform Based on easy-to-use hardware and software. Arduino uses an ATmega328 microcontroller. Since robotics has become a major part in our daily life and also in the engineering field and it plays a vital role in the development of new technology. This is a very simple and easy type form of remote control car, where the ordinary micro-controller has been replaced by Arduino and IR sensors has been replaced by a Bluetooth module. The remote can be any android or IOS cell phones. This project can be made in a bigger scale for real time vehicles.

Ujjwal Kumar et. al. [10] purpose of this paper is to give a correct Circuit that lets you operate your home appliances like lights and water pump from your office or any other remote place. So if you forgot to switch off the lights or other appliances while going out, it helps you to turn off the appliance with your cell phone. Your cell phone works as the remote control for your home appliances. You can control the desired appliance by pressing the corresponding key. The system also gives you voice acknowledgement of the appliance status.

According to this literature review study we understand the concept of internet of things and how it communicates with Graphical User Interface (GUI). The various existing systems has implement the such systems, which communicate with different type of graphical user interfaces. In above study we identify the some technical challenges as well as environmental security issues of systems. Many existing systems has used machine learning approach to achieve the accuracy of system. Basically all the systems are generated internal web service dependency as well as cloud database. Sometime hardware dependency should be generated the internal resources dependency to such applications. To implement the future system with some machine learning algorithm as well as effective micro-controller system without environment.

3. SYSTEM DESCRIPTION

The proposed system contains three layer IOT platform, cloud database and GUI of system we have explain each layer with object in below details

- **Motor Lock**: It work with two different function lock and unlock respectively, according to the assumption of proposed system it is a car door lock which having an lock and unlock properties.
- **GPS:** Which will provide the current location of car where it is located.
- **Arduino**:Basically Arduino has used to convert analog values to digital which is generated by both sensors.
- **Raspberry Pi:** It works like CPU of system, which executes the function like middleware architecture between sensors and database. In raspberry we have written python script and it will add those values in database.

- **GUI:** In GUI we measures and validate those values and view the current state of car door, here user having a role base access to lock as well as unlock vice versa.

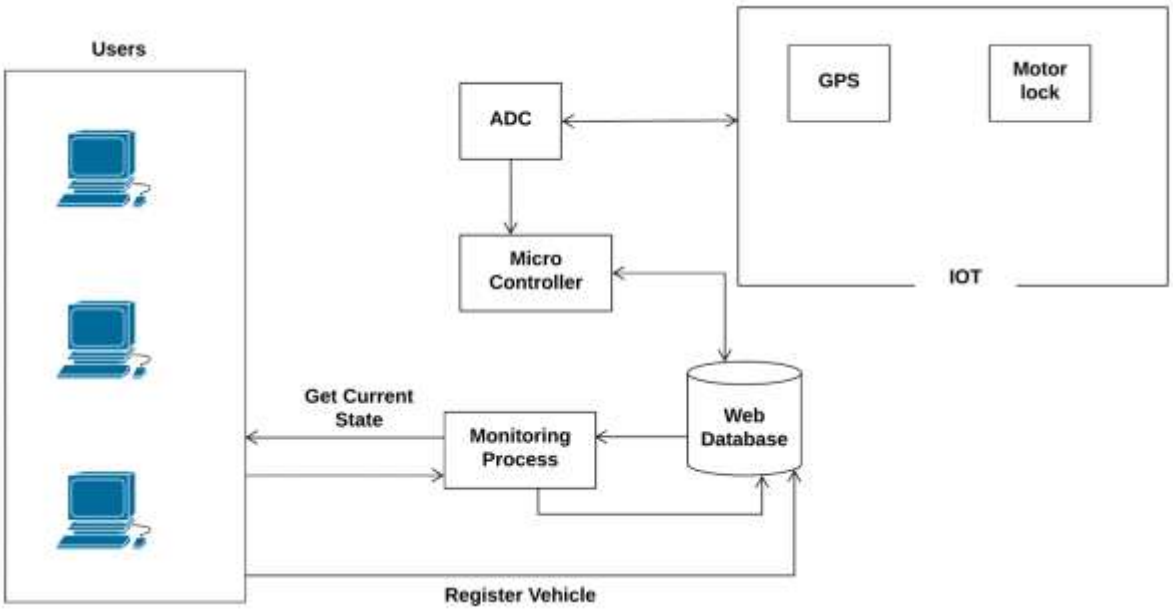

Figure 1: System Architecture

The system has implemented based on IoT. The above figure shows overall execution system, in the first phase car owner registers his own car with system. Once the registration has done the car details will be store into the database. This functionality also carried out more than one referential contact to the car owner, it means car owner can be add more than one contact details to get the current status. In the second phase with actual work on IoT module, auto motor lock as used as a door lock and behalf of the system controller has used of Raspberry Pi. The controller read current state of lock continuously after the particular time interval and according to desired values it will update state into the cloud database. In third section actual work on graphical user interface, here once authentication has done of particular car owner, he can check current Lock status of his car. According to previously updated value by controller system will show the currents car status on GUI. We also provide the functionality to update the current status. E.g. If car owners get current lock is open then he can lock the car as well as vice versa. One another feature we provide in our proposed system to get the current location of car, we used inbuilt GPS sensor technology in the car with current state of lock. The propose system is applicable to implement on global environment which is just required high depth back end servers as well as internet connections. It is definitely overcome the classical car lock system which is inbuilt provided into the new cars.

4. ALGORITHM DESIGN

Linear state validation algorithm
Input: AM_State {0,1}, GPS{Long, Lati}, DbConn
Output: Update DbConn values and lock and unlock Auto Motor (AM) based on 0/1 values
Step 1: Initialized the system withAM_State {0,1}, GPSva {Long, Lati}, DbConn
Step 2: while(true)
AMvalGetAM_State()
GPSValGetCurrentLocation();
Step 3: Update into the Dbconn
Step 4: User request for current state {on/off}
Step 5: State change by user
Step 6: UpdateDbConn with AMvalNewVal
Step 7: Execute command on AM
Step 8: End for

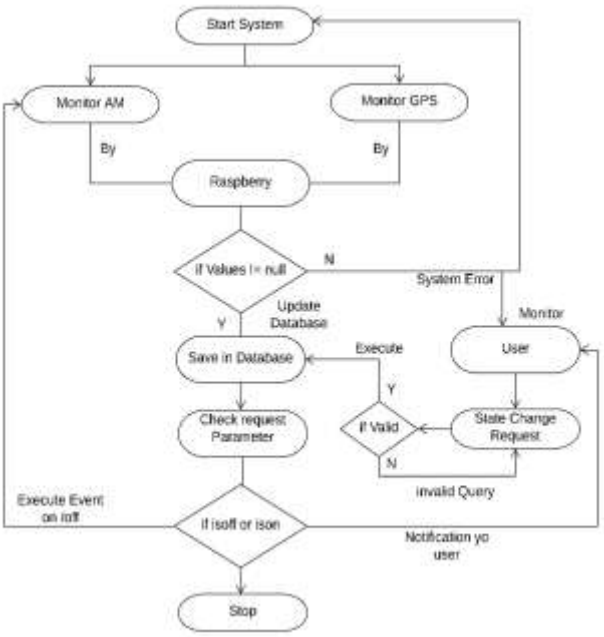

Fig 1.1: Linear state validation algorithm

5. RESULTS AND DISCUSSIONS

The implementation has done IoT with java web environment. The raspberry pi has used for sense the data from hardware sensors. The below figure 2 shows the accuracy of system, below formula has used to calculate the accuracy of system.

Accuracy weight = F(x) / Sum F(x)

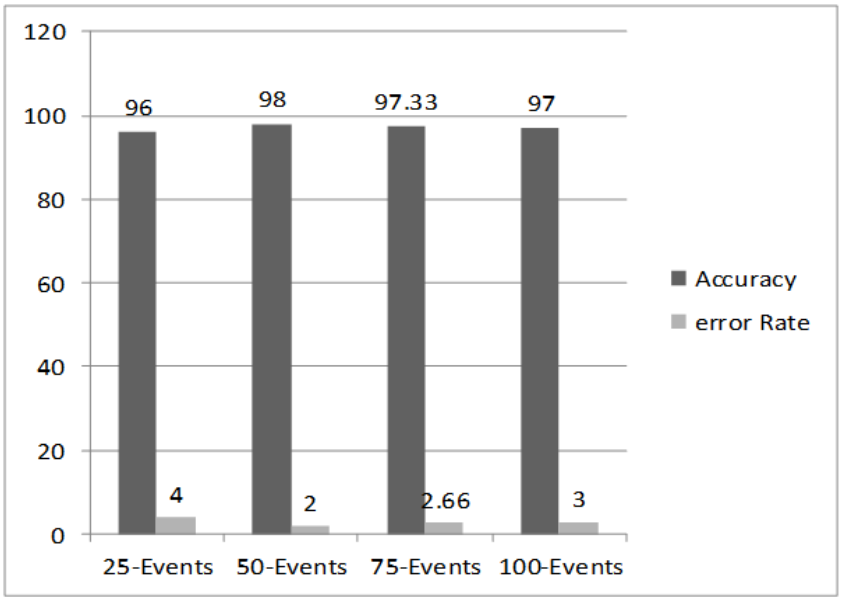

Figure 2: Accuracy of system

Here F(x) shows the correctly classified instances from total events and Sum F(x) is the length of all events, this experiment shows our system having accuracy around 98% it is much higher than classical approaches.

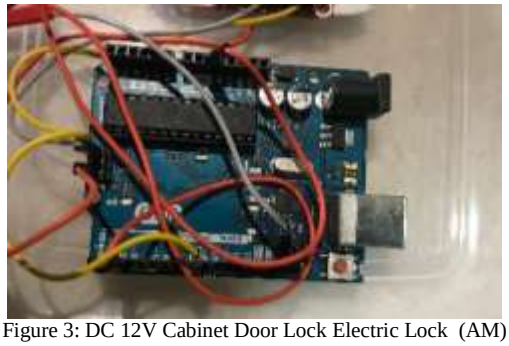

Figure 3: DC 12V Cabinet Door Lock Electric Lock (AM)

This DC 12V Cabinet Door Lock Electric Lock Assembly Solenoid can be used for locking sell-machine, storage shelf, file cabinet and etc. The hidden way of unlocking can be used for an emergency. The lock works as the circuits disconnects, and it will unlock as the instant power-on. It is steady, durable and energy-saving and had a long lifespan. In the anti-theft and shockproof design, the lock is better than other kinds of locks. After connecting the wires and when the current is available, the electric lock can control the door's opening and closing.

Features:

- Iron Body Material
- High quality ultra-compact electric lock.
- Rustproof, durable, safe, convenient to use.
- Suction which tightly sucks the iron, thus locking the door.
- Applicable for being installed in the escape door or fire door electronic controlled system.
- Adopts the principle of electric magnetism, when the current through the silicon, the electromagnetic lock will achieve a strong.

Figure 4 : Arduino used for ADC

Basically Arduini has used for ADC of sensor generated values. An Analog to Digital Converter (ADC) is a very useful feature that converts an analog voltage on a pin to a digital number. By converting from the analog world to the digital values, and same values has been passes to Raspberry pi.

Features

- Works like microcontroller.

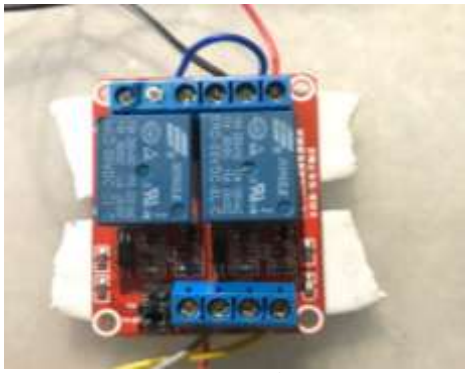

Figure 5: Relay which is used for control the power

This is a 2 Channel isolated 5V 10A relay module Optocoupler for Arduino PIC ARM. It can be used to control various appliances and other types of equipment with a large current. It can be controlled directly with 3.3V or 5V logic signals from a microcontroller (Arduino, 8051, AVR, PIC, DSP, ARM, ARM, MSP430, TTL logic).

Features :

- 2 LEDs to indicate when relays are ON.
- Works with logic level signals from 3.3V or 5V devices
- Opto isolation circuitry
- Module with diode current protection, short response time
- Around the board with 4 mounting holes, hole diameter 3. 1 mm, easy installation and fixing

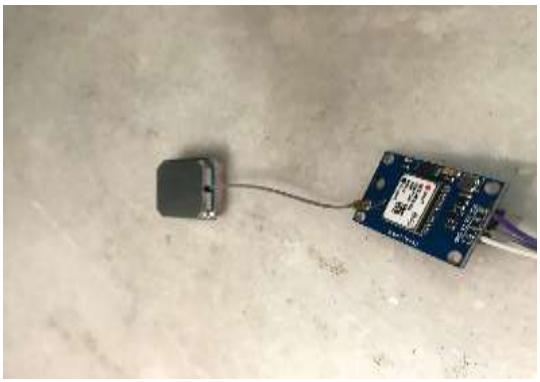

Figure 6 : GSM Module sensor

Basically this sensor has used for access the GPS details of system, this device basically returns the longitude as well as latitude of current location.

Feature

- Remove location monitoring can be possible over the internet.
- Update the location details and it moves itself

5.1Implementation Details

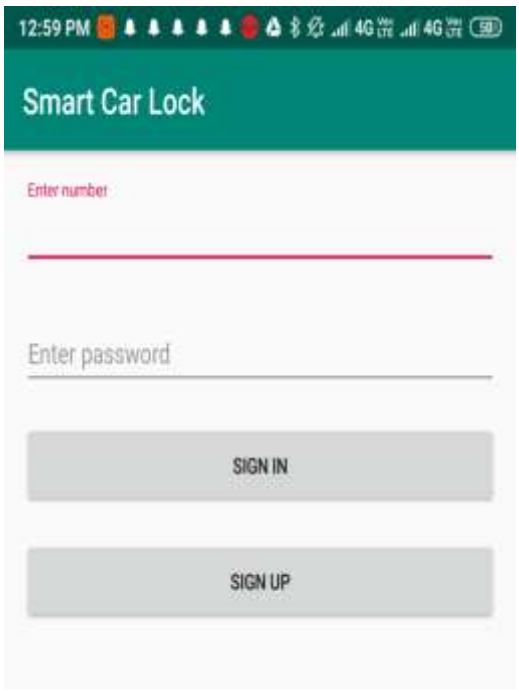

Figure 7 : Login screen

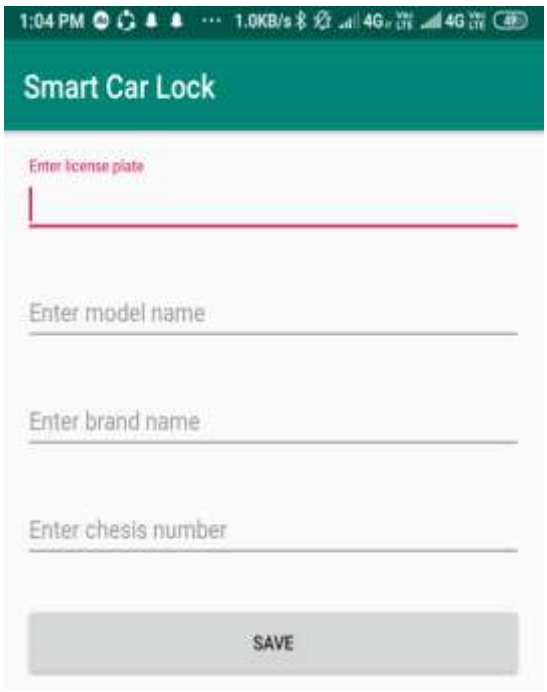

Figure 8 : vehicle registration

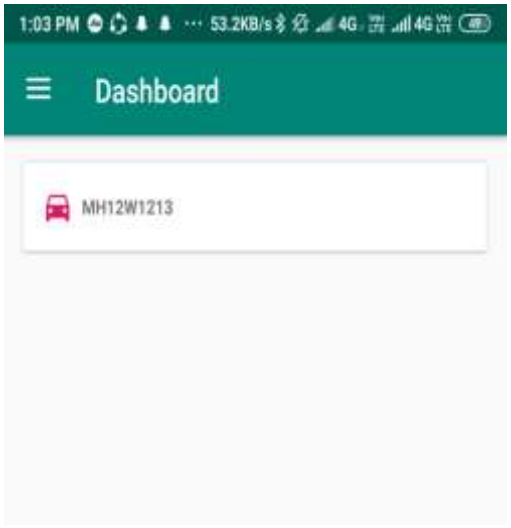

Figure 9 : Registered vehicle

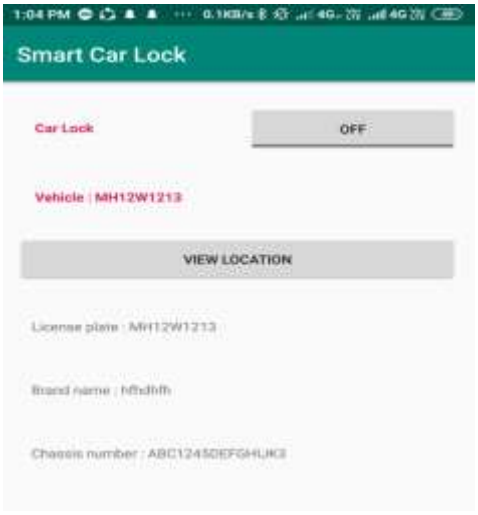

Figure 11 : View status

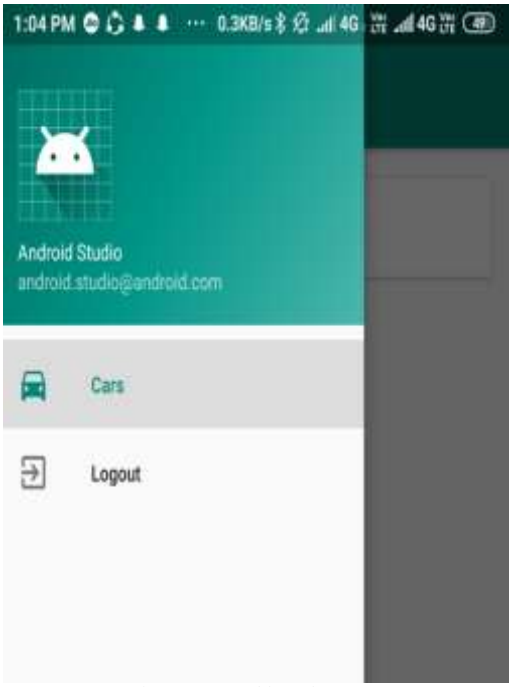

Figure 10: Dashboard menu's

Figure 12 : Updated status

6. CONCLUSION

In this paper, a smart door lock and location monitor system is presented which is a car automation system using IOT which includes the car security along. The smart door lock and GPS system provide a convenient way to remotely control the door lock get current location with the help of GPS sensor. Making use of recent and advanced technologies has given a new dimension to the stated purpose. The most trending Smartphone technology is been brought in use for one more purpose apart from the one always being used. Besides entertainment and information utility aspect of Smartphone devices, they can also serve the purpose of unlocking the door. Internet technology will be adding an additional feature to the proposed module. The price of chipsets for internet continues to drop, making it an economical option included in even more devices. Computers and many other devices, including smart phones, can be connected to the internet. Having least limitations and more superior level of safety attribute makes it more reliable. It provides an overall satisfaction to the user.

7. REFERENCES

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