

Vehicle Validation and Driver Authentication System

¹Abhishek Kale, ²Adarsh Roy, ³Akshat Sharma, ⁴Rajeev Sinha, ⁵Dr.Arvind Jagtap

¹²³⁴Student, Dept Of Information Technology, MIT School Of Engineering, Pune, India

⁵Assistant Professor, Dept Of Information Technology, MIT School Of Engineering, Pune, India

Abstract: Vehicle Validation and Driver Authentication System predominantly focuses on the safety and security of the Vehicle as well as of the Driver. It provides safety measures against larceny, subadult driving, accident prevention, etc. In this most important and very well founded human identification method fingerprint identification is used for the identification. It is intelligent and has features loaded that would be performed sequentially. Nowadays, the furtherance made in technology has reduced the efforts made by humans. Here, we describe the Vehicle affirmation, endorsement, and driver authentication which could be used by the Government as well as common people in daily frenetic life easily and efficiently. In this context, we have proposed a Vehicle Validation and Driver Authentication System which will definitely help citizens.

Keywords —*Authentication, Automation, documents, Identification, IOT, Validation.*

I. INTRODUCTION

The Internet of Things (IOT) plays a vital role in the smart world. Deploying enormous connected smart devices and analyzing the gathered data, the IOT enables evolutionary changes in every aspect of people's daily life, including the emerging smart automobiles. One of the important and interesting aspects of smart automobiles is Vehicle validation and Driver Authentication which enables many safety and security features of the automobile which could be operated by Mobile Phones. According to the survey, road accidents in India assassinate almost 1.5 lakh people annually. In India 44,158 cases of motor vehicle larceny were register in 2018. Smart cars that can authenticate their drivers could be a solution to mitigate this. So we came up with the idea of Vehicle Validation and Driver Authentication System which will work smartly for more security of the vehicle.

Unlicensed driving is a matter of concern for several reasons. It is possible that drivers who have not undergone proper training and testing might be deficient in some aspect of the knowledge and skills required to drive safely and efficiently. Also, vehicles which don't have proper documents are still running on the road which results in problems for other people as well as for the Police Officers. Traditional approaches such as fingerprint Matching, Smart Card and many more features, techniques might be used to find the genuine owner of the Vehicle. The system, after scanning the proper smart card, gives the full access of the motor vehicle to the driver. Therefore we came up with our Project Vehicle Validation and Driver Authentication System which will help everyone in many aspects.

II. LITERATURE SURVEY

From the previous research papers we have surveyed that: from paper [1] Karanam Geethanjali, Poola Sireesha, Ravuru Prathima they submitted a Fingerprint-based licensing system for driving. In paper [2] Makwana foram R., Rahul R Menon, Patel Harsh K. they developed Automobile driver authentication using Electronic Driving License. In paper [3] Ekberjan Derman and Albert Ali salah they developed Continuous real-time vehicle driver authentication using convolutional neural network-based face recognition they faced challenges in Performance that can get affected by limited sample size and the quality of the image taken. In paper [4] Sai Deepika Regani, Qinyi Xu, Beibei Wang, Min wu, k.J. Ray Liu, they submitted developing an In-Car driver authentication using Wireless Sensing in this system they lack implementation of the submitted system. In [5] Michael Phelan offered a Driver Authentication system and a method for monitoring or praepostor and controlling vehicle usage, in this a centralized database encompassing a software application that can be accessed by an authorized user via a data communications network utilizing a remote computer to configure. In [6] the author used a driving license as the ignition key to a car using RFID. Author has proposed a system in which the identity of the driver will be downloaded into the car and verified for authentication and validity of the license. In [7] the author used a driving license for authenticating the driver by considering three parameters viz., license expiry date, vehicle ownership and category of vehicle of which a driving license has been issued.

III. METHODOLOGY

The Vehicle Validation and Driver Authentication system aims at verifying and validating the authorization of a driver as well as the vehicle. The system provides a concept of modularity, extensibility and scalability which would enable vehicle owners to keep track of their documents, provide ease of access while driving a vehicle and also authorities to monitor and ensure law enforcement.

The proposed system involves use of various hardware are as follow:

[1] The Raspberry Pi 3 Model B is the earliest model of the third-generation Raspberry Pi with Quad Core 64bit CPU, 1GB RAM, Wireless LAN and Bluetooth Low Energy (BLE) on board, 100 Base Ethernet, 40-pin extended GPIO, 4 USB 2 ports, 4 Pole stereo output and composite video port, Full size HDMI, Micro SD port for loading your operating system and storing data, Upgraded switched Micro USB power source up to 2.5A

[2] The Fingerprint Sensor - R307 can store upto 1000 fingerprints. The operating voltage of the R307 module is 3.3 V and there is a possibility of USB operation in it. The fingerprint detection output option is also available in the R307 sensor module. Here, we are using the #fingerprint sensor to capture our fingerprint and display the output with the help of Raspberry Pi

[3] The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. It also supports communication over I2C and UART protocols.

[4] GSM/GPRS/GNSS Bluetooth HAT Expansion Board GPS Module SIM868 would Support Making a Call, Sending Messages, Data Transfer wirelessly and also over cellular networks.

A. Modules

[1] Nodes: The node collectively refers to the hardware raspberry pi, gsm/gps hat and the fingerprint sensor as a single operational unit. Which would be responsible for collecting information from users and vehicles, like location, license, vehicle documents and fingerprint of the driver.

[2] API Server: The server would be responsible for all the validation of information gathered from the node. And sending appropriate encrypted responses to the node for further operations.

[3] Third Party Document Server: The server provides a pre-built architecture for extending and adding documents required which can be used by any service provider like Insurance provider for integration with the node.

B. Connection

Connection Between RFID, GSM and Raspberry Pi using Breadboard where connections are done with the help of jumper wires. As shown in the figures below:

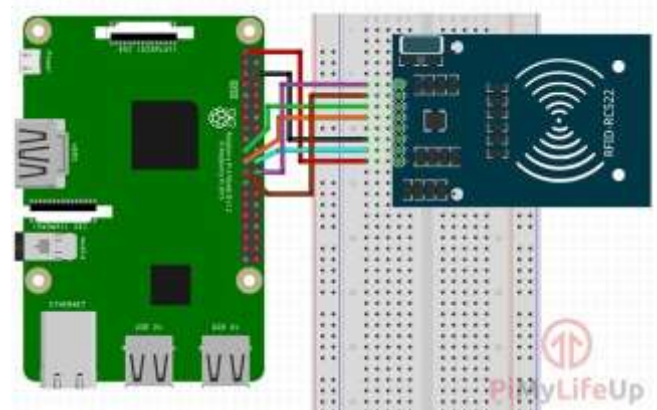


Figure 1 RFID Connection

In Figure 1, Connection of RFID are as follow:

SDA connects to Pin 24.

SCK connects to Pin 23.

MOSI connects to Pin 19.

MISO connects to Pin 21.

GND connects to Pin 6.

RST connects to Pin 22.

3.3v connects to Pin 1

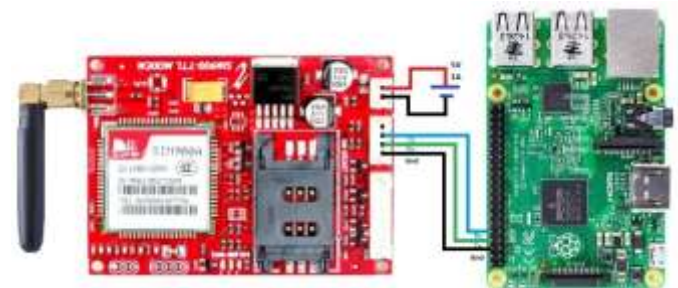


Figure 2 GPS Connection

In figure2, Connection of GPS module are as follow:

Gnd to 6

Rx to 8

Tx to 10

IV. RESULTS

A. Framework Design

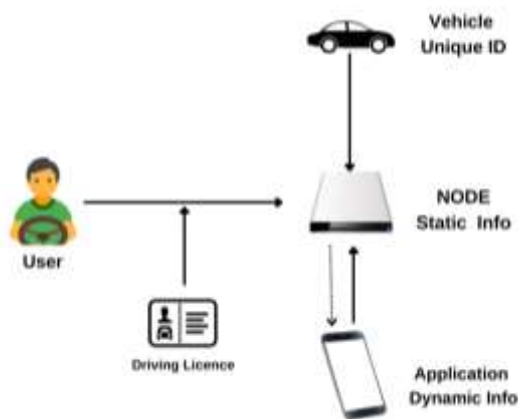


Figure 3 Framework

In this system, Node is used to store information about a user and his vehicle like license, RC, vehicle documents, fingerprints etc. An API server is used which will validate the information gathered from the node and send appropriate encrypted responses to the node for further operations.

Firstly, users need to sign in through the application for authentication then they will have to upload vehicle documents like RC, insurance papers, PUC, license etc. When the user starts the vehicle, the node will check for all documents like Insurance ,PUC and RC upon successfully checking all the documents it will ask the user to scan the RFID enabled License. After scanning the license it will go through biometric then the license will be validated through API server. After successfully validating it will allow the user to start a vehicle. In case the user changes the vehicle then the information can be updated. Also, if any of the documents renewal date is near then it will notify you of the same by popping up a message.

B. Assembling

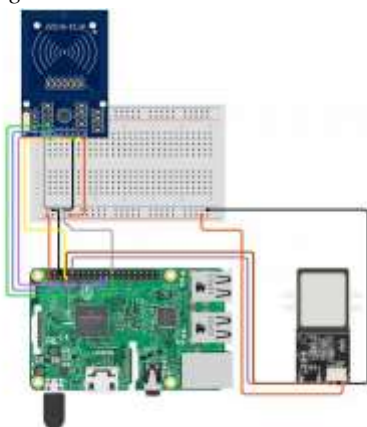


Figure 4 Circuit Design

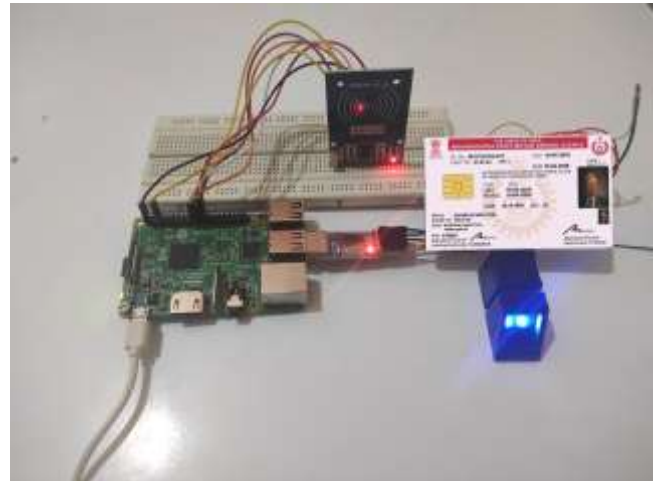


Figure 5 Final Assembly

Vehicle Validation and Driver Authentication system assembly comprises of three parts:

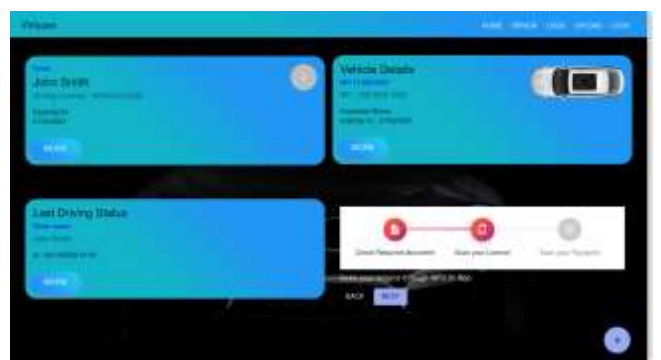
- [1] Initial Setup : Raspberry Pi is configured with all the prerequisites necessary for functioning of node..
- [2] Sensor Connection : Sensors such as fingerprint sensor, Rfid are connected to the main module i.e Raspberry Pi as per requirements.
- [3] Working Modules : After Setting up all the hardware and sensor connection, the module is tested and checked whether it passes all the test cases.

C. Final result



Screenshot 1

In screenshot 1 it shows the front page/ home page of the Vehicle Validation and Driver Authentication System. In this page it shows the remaining days of PUC and Insurance Validity.



Screenshot 2

In Screenshot 2, after clicking on unlock button as shown in screenshot 1 the next page appears and there are Driver details, Vehicle details, last driving status and document update field.



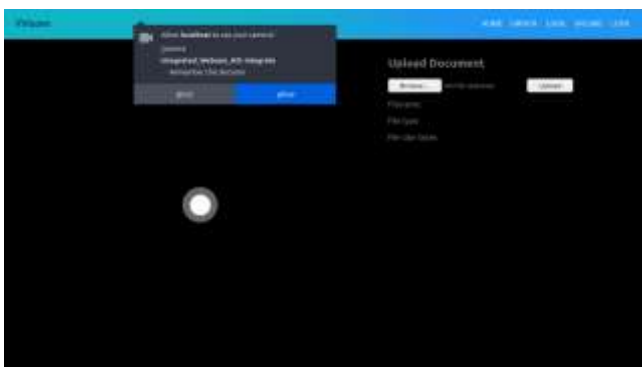
Screenshot 3

In screenshot 3, after clicking on the driver button as shown in screenshot 2 the next page appears and it shows a list of drivers in the system which have been uploaded.



Screenshot 4

In screenshot 4, after clicking on the logs button as shown in screenshot 3 the next page appears. It shows the drivers log and vehicle documents details.



Screenshot 5

In screenshot 5, after clicking on the upload button as shown in screenshot 4 the next page appears. It shows the document upload and live camera upload option in the page.



Screenshot 6

In screenshot 6, after clicking on the Lock button as shown in the screenshot the next page appears. It shows the Vehicle details and Driver licence details.

D. Features

[1] Driver Validation: Driver shows licence to ride the vehicle and get it authenticated online.

[2] Document Expiry Notification : Mobile Notification is sent through the app when the document expires.

[3] Security : Can trace a car remotely and also have a vehicle log of who used your car.

[4] Maintenance of Law : Every Vehicle Should have proper Document then only it will allow you to ride the vehicle.

[5] Child Safety : Underage can't ride as he/she does not possess any valid Driving licence.

[6] Document Storage : Storage of vehicle Rc book, Insurance, PUC certificate and Licence are in the proposed system.

V. FUTURE SCOPE

The proposed system can be further enhanced and greatly improved by adding new functionalities and in app services. By integrating a Signaling System in which we can use this system for traffic signals by using a radio module to stop the vehicle before the signal. Also, GPS Tracking with the help of GPS present in GSM module and integration of google maps can provide more efficient and robust tracking. Tracking with the help of GPS present in GSM module and integration of google maps can provide more efficient and robust tracking.

VI. CONCLUSION

The proposed system assures that only the authorized person can drive a vehicle. The system also provides facilities for documentation updation such as license integration, insurance renewal. It also gives the updated real-time ride logs in the application. The proposed system will help to maintain law and order in the society.

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