VEHICLE ANTI-THEFT SYSTEM USING BIOMETRIC IDENTIFICATION THROUGH IOT BASED TECHNIQUES

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ABSTRACT

Driving a vehicle without a valid driver's licence is a big concern in many countries nowadays. The suggested system includes a facial recognition identification tool in the form of a Raspberry Pi 4 camera, a ky-m6 finger print sensor module for authorised finger print identification, and an EM-18 RFID reader for authorised driving licence identification. A person who intends to operate the vehicle must provide his or her biometric information, which includes facial recognition, fingerprint authentication, and a unique RFID tag. These are the most common and reliable methods of personal biometric identification. We can prevent non-licensed drivers from driving and causing accidents by employing biometric authentication. The car will be lit once all authentications have been completed. If any of the authentications fail, the car will not be started and will not progress to the next phase. This improves vehicle security while simultaneously ensuring safe driving by averting collisions. The single board computer, which is a Raspberry Pi 4 module, is utilised to prototype the ignition system.

Keyword: - *Raspberry Pi, RFID, Fingerprint Module, Pi Camera*.

1. Introduction

Driving without a valid driver's licence is a major problem in several instances. According to the research Unlicensed drivers are the leading cause of accidents. As a result of risky road conditions, the number of accidents has grown. There has been a significant increase in the number of accidents. Driving without a licence is an issue for a multitude of reasons. It's likely that drivers who haven't received the necessary training are to blame. A component of the skills and knowledge required to drive safely and efficiently. Unauthorized drivers may also have fewer options. They'd be more inclined to follow driving laws if they did.

Vehicle theft is the result of the vehicle owner's lack of attention and the security of the vehicle system, which is influenced by a variety of factors. Automobile theft is a major contributor to India's rising crime rate. Although crime occurs across the country, metro centres suffer the majority of the load when it comes to auto theft.

In 2016, more than 2 lakh incidents of vehicle theft were registered across the country, according to government statistics. We'll look at how a real-time GPS tracker can help in the fight against auto theft in this article. When compared to the cost of replacing a car after it has been stolen, you'll be surprised to hear that the cost of a GPS vehicle tracker is extremely minimal[1], [2].

Driving without a licence was reported by 12% of cases and 1% of control drivers. Unlicensed drivers are more likely than licenced drivers to engage in risky driving behaviours, as well as to be at fault and critically injured in accidents. According to the research wing of the ministry of road transport and highways, 151,113 people were killed in 480,652 road accidents in India in 2019, an average of 414 per day or 17 every hour. Maharashtra was in sixth place with 32,295 accidents, but it had the second-highest number of fatalities (12,788), trailing only Uttar Pradesh with 22,655. Delhi remained the most dangerous city, with 1,463 deaths, followed by Jaipur (1,283), Chennai (1,252), and Bengaluru (1,252). (1,252). (768). With 447 people killed in traffic collisions[3], [4].

So here we can propose system consists face recognition, smart card, and figure print scan to access the vehicle. License details, face and figure print of authenticated drivers are stored in memory of raspberry pi. When person enter in the vehicle, camera capture image of person, then person has to tap his/her card, then he/she has to do a fingerprint scan, person face, card details, and figure print match with data stored in memory, after that ignition system of vehicle is activated. Otherwise, ignition will not work.

2. Related Work

2.1 Raspberry Pi module:

The Raspberry Pi is a small computer chip with laptop capabilities that can be used for a variety of real-time applications. Python software is a type of programmable code that is ideal for this board. The General-Purpose Input Output pins, which allow for programming, are utilised in a variety of applications[5].

The Raspberry Pi 2 improves the preceding device in terms of processing power. The Raspberry Pi 2 has an updated Broadcom CPU, which is an ARM Cortex-A7 quad-core processor with a 900MHz clock speed. It has 512 MB of RAM as well. For network engineers and software developers, the Raspberry Pi is a low-cost, low-power device for developing applications[6].

The Raspberry Pi (RPi) 4 Model B is a single-board computer the size of a credit card. It has a quad-core ARM Cortex-A72 processor running at 1.5GHz and 40 General Purpose Input/Output (GPIO) pins. It can take up to 4GB of RAM. A 5V micro-USB cable with a 2A ampere rating powers the device. A monitor with a micro-HDMI port can be used as a display, and the RPi can be controlled with a USB-based keyboard and mouse. Because the monitor is touch-enabled, the touch USB cable must be linked to the RPi's USB port; this new model has two USB 3.0 ports and two USB 2.0 ports. It also has two frequencies: 2.4 GHz and 5.0 GHz[7].

1. Raspberry Pi 1: models B, A, B+, A+, 512mb RAM, 700MHz, Processor ARM11, 2014
2. Raspberry Pi 2: Model A, 1GB RAM, 900MHz, Processor Quad core 64bit Cortex 47, 2015
3. Raspberry Pi 3: Models B, B+, A+, 1GB RAM, 1.4MHz, 64bit Cortex 53, 2016
4. Raspberry Pi 4: Model B, 2GB-8GB RAM, 1.5GHz, Broadcom BCM2711 Quadcore, 2019

2.2 Pi Camera:

To make the camera look like a surveillance monitor, Raspbian Jessie Lite software is utilised. The camera continuously records photos and then sends them to be processed. When it detects a face in an image, it sends an alert to the email address associated with the image. To generate the app password for emailing directly from Raspberry Pi, follow the instructions provided by Gmail[8].

The webcam is directly connected to the Raspberry Pi. We can observe our vehicles with software named telegram. The coding of the third part is made for the performance guarantee. When our system is on, the webcam is also power up[9].

The photographs are captured with a camera. The camera used in this project is a Logitech USB webcam. The camera has a resolution of up to 5 mega pixels, therefore the image will be clear. Pins 1 and 2 are powered by 5V and 3.3V, respectively. The camera operates on a 3.3V supply so that the board can utilise the remaining power. A 1A power supply is required for the inputs and outputs. The web camera has a 5-megapixel resolution, a 640 × 480 picture capture resolution, and a 30-frame rate. This camera configuration in the board is simple, and the camera can be easily plugged in and played[10].

The Arducam camera module connects to the Raspberry Pi's specific CSi interface, which is placed behind the Ethernet connector. The Raspberry Pi Camera Module is a 5-megapixel CMOS camera with a fixed focus lens that can capture both still photographs and high-definition video. Video is supported at 1080p at 30 FPS, 720p at 60 FPS, and 640x480 at 60 or 90 FPS. Stills are captured at a resolution of 2592 x 1944, while video is supported at 1080p at 30 FPS, 720p at 60 FPS, and 640x480 at 60 or 90 FPS[11].

2.3 RFID Module:

Because of the technology's low cost, the usage of a Radio Frequency Identification (RFID) system for security purposes is becoming more popular. This study describes an RFID-based anti-theft system for automotive security. The Arduino Uno module and RFID technology are used in this system. For the initial design, Proteus software was used to create the Arduino electronic circuit. The RFID and the Arduino have a serial communication link. As a security strategy, an immobiliser was included, which insured that the car engine would stop if other strategies failed. The system was designed with cost-cutting and operational efficiency in mind[12].

RFID tags used to track people's belongings could pose a huge security and privacy concern to both businesses and individuals. Without the owner's permission or knowledge, a tag will respond to a reader in a natural way. Many readers and one controller or host workstation can make up the system. A reader can communicate with many tags, which can be attached to nearly anything (including shelf products, medical ID bracelets, and pallets)[13].

Radio Frequency Identification (RFID) is the abbreviation for Radio Frequency Identification. RFID tags connected to items use electromagnetic fields to identify and track them. The tags contain information that has been saved electronically. RFID cards are divided into two categories. The first is a passive card, and the second is an active one. Passive tags do not require any power to operate, but active tags require power for reading and writing actions[14].

RFID (Radio Frequency Identification and Tracking) is a means of uniquely identifying and tracking goods using electromagnetic fields. Reader, tag, and antenna make up an RFID system. The tag reacts with its unique information after the reader transmits an interrogating signal to it via antenna. RFID tags that are passive are powered by the RFID reader's electromagnetic energy[15].

2.4 Fingerprint scanner:

The fingerprint module was utilised to read the images of the finger prints. We're utilising the KY-M6 fingerprint module in this example. It has a capacity of 160 images. The LED will generate an IR ray when the person places their finger on the reader. The photons are absorbed by the haemoglobin in our blood. The area where the IR rays are absorbed will appear black, while the rest will appear light. The image will now be captured by the CCD camera beneath the fingerprint reader. The signals will be sent to the microcontroller[16].

The next step in fingerprint enhancement is fingerprint segmentation. The region of interest (ROI) and backdrop are typically employed in this segmentation method to recognise the fingerprint image. ROI contains all of the information required for fingerprint recognition. To improve authentication performance, fingerprint features are

retrieved from ROI. It is known as fingerprint segmentation because the background is eliminated from the image, separating the region of focus[17].

Biometrics will help you secure your project, and this all-in-one optical fingerprint sensor will make fingerprint recognition and verification a breeze. The image rendering, calculating, feature-finding, and searching are all handled by a high-powered DSP processor, which is generally found in safes. Connect through TTL serial to any microcontroller or system and send data packets to snap images, identify prints, hash, and search. You can even enrol fresh fingers directly - the onboard FLASH memory can store up to 162 finger prints[1].

In terms of safety and security, the voting issue remains critical. This work is about the design and development of a fingerprint-based web-based voting system in order to provide high performance and security to the voting system. We also leverage web technology to make the voting system more practical[17].

3. CONCLUSIONS

This paper shows that microcomputers such as Raspberry Pi are suitable option as part of vehicle anti-theft system. It is cheap and functional way how to control different peripherals. Function of Raspberry in our paper is face recognition, RFID authentication and fingerprint authentication using mentioned technologies for vehicle safety. Biometric system gives face recognition and fingerprint authentication, and RFID technique provide unique tags to identify the user. in our conditions it means to enter in the vehicle, the database for identification and authentication occupants, their permission to access the system and execute the specific act.

4. REFERENCES

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