

Fingerprint Based Vehicle Starter and Vehicle Tracking System

Gopu Priyanka¹, Bala Bhadrani Pranavi², Krishnamsetty Manaswini^{3*}, A. S. R. Sai Srinivas⁴,
A. V. Rajan⁵

^{1,2,3,4,5}B.Tech. Student, Department of Electrical and Electronics Engineering, Vasireddy Venkatadri Institute of
Technology, Guntur, India

*Corresponding author: mkrishnamsetty.91@gmail.com

Abstract: Vehicle security is an important issue these days due to the rising number of vehicle thefts. Also, another issue with vehicles is carrying its keys. Here we propose a solution to this problem by using a fingerprint authenticated vehicle starter system. This system provides a secure way to start/stop the engine of vehicle. User should scan his finger to start the car. The system only allows authorized users to start the vehicle. Users can first register into the system by scanning fingerprints. The system allows many users to register as approved users. When into monitoring mode, the system checks for users to scan. On scanning, the system verifies if user is authorized user and starts vehicle if user is authorized only. In this project we also use GPS and going to track a vehicle using GPS and GSM. This Vehicle Tracking System with some modifications can also be used as Accident Detection and Alert System. Tracking is a process in which we track the vehicle location with help of GPS coordinates (latitude and longitude).

Keywords: Tracking, GPS, GSM.

1. Introduction

Fingerprint recognition technology allows access to only those fingerprints that are already stored in the memory. Stored fingerprints are retained even in the event of power failure or battery drain. This eliminates the need for keeping track of keys or remembering a combination password, or PIN. It can only be opened when an authorized user is present since there are no keys or combinations to be copied or stolen or locks that can be picked. This paper focuses on the use of fingerprint to open locks, as opposed to the established method of using a key. In order to prevent unauthorized access to these devices, passwords and other pattern-based authentication methods are being used in recent times. However, a password-based authentication has an intrinsic weakness in password leakage. While the patterns are easy to steal and reproduce. In this project, we introduce an implicit authentication approach that enhances the password pattern with an additional security layer. Biometric systems have over time served as robust security mechanisms in various domains. Fingerprints are the oldest and most generally used sort of biometric authentication. A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location.

This paper proposed to design a vehicle tracking system that works using GPS and GSM technology, which would be the cheapest source of vehicle tracking and it would work as an anti-theft system. It is an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS).

2. Finger Print Image Extraction

The library comprises a method for taking fingerprint images from the module's image buffer. If the process is called, it issues the appropriate command to the module (check datasheet) and receives an acknowledgement packet, if successful. Hereafter, the module begins to send the data packets which constitute the fingerprint image. The image is an 8-bit 256x288 grayscale bitmap image. This means that every pixel is represented using an 8-bit value (a byte) between 0–255 where 0 represents 'black' and 255 represents 'white'. In between these values are various shades of gray. The image contains width of 256 pixels and height of 288 pixels, where the total is $256 * 288 = 73728$ pixels or bytes. The module must send all 73728 bytes (one byte is each pixel) for the host computer/MCU to reassemble the image. To increase transfer speed, the module transfers the 2 pixels per byte instead. That is, normally each pixel = 1 byte, but instead the module takes the high nibble (4 bits) of one pixel and the high nibble of an adjacent pixel in the same row to create an 8-bit value that contains the data for both pixels. This way, the module transmits only $73728/2 = 36864$ bytes to the MCU at the cost of losing some of the image data.

E.g. PIXEL 1: 10100001 PIXEL 2: 01000110

Combined data: 10100100 (contains info about the 2pixels)



Fig. 1. Fingerprint sensor module

FP	ARDUINO
+5V	+5V(power side)
GND	GND
RX	TX
TX	RX

3. GPS Determines a Position

The working/operation of the Global positioning system is based on the ‘trilateration’ mathematical principle. The position is determined from the distance measurements to satellites. From the figure, the four satellites are used to determine the position of the receiver on earth. The GPS system consists of three segments space segment, control segment and user segment which are used by GPS satellites, military and civilian users respectively civilian applications for GPS in almost every field. Most of the civilians use this from survey to transportation to natural resources and from there to agriculture purpose and mapping too.

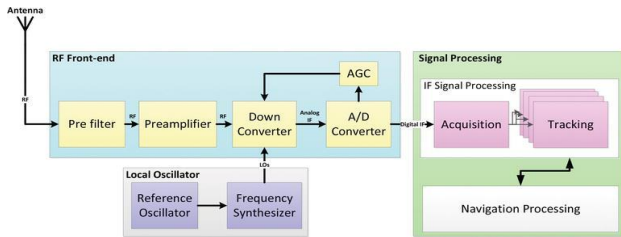


Fig. 2. Architecture of GPS

4. The GSM Network

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The GSM network is divided into three major systems the switching system (SS), the base station system (BSS), and the GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel system has an ability to carry 64 kbps to 120 Mbps of data rates. With two different streams of client data, each in its own particular time slot.



Fig. 3. Architecture of GSM

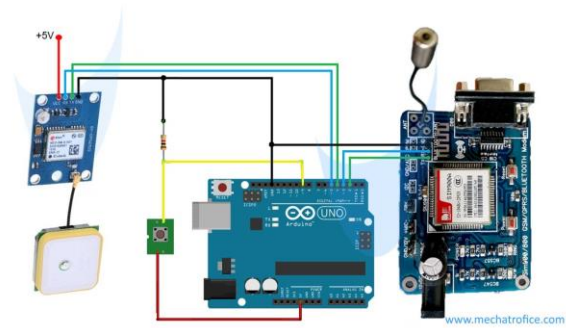


Fig. 4. Interfacing GSM and GPS with Arduino

Table 2
Connections between GSM, GPS and Arduino

GPS	ARDUINO (DIGITAL PINS)
VCC	+5V
GND	GND
RX	4 TH PIN
TX	5 TH PIN
GSM	ARDUINO (DIGITAL PINS)
GND	GND
TX	3 RD PIN
RX	2 ND PIN

5. Conclusion

This paper is about prototype of a fingerprint-based vehicle starting and vehicle tracking system. The agents of system are communicating well, and suitable output is given under user input. The system asks for the user's finger, process it, and give appropriate output based on if the finger is stored in the fingerprint module or not. The system is also able to enroll a new user's finger at the request but prompt for a passcode before it could be done. Passcode changing can also be done in the system. When an unauthorized user tries to start the vehicle then the alarm rings and message will be sent to mobile through GSM and GPS modules. Using GPS module, it finds the location of the vehicle. The output is viewed with the help of an LED. We have designed an anti-theft system that can be used to track a vehicle fitted with the proposed device in it. It can also be used in wildlife tracking, asset tracking, and stolen vehicle recovery. In the future, we may combine other related devices in a vehicle such as sensors. We can also create a server to see the vehicle route and other information on our laptop and we can save the path of it. The sensors mounted in our vehicle can give the vehicle information to our server and it can be developed as an intelligent tracking system. There are various reasons why car owners and public vehicle operators prefer to have GPS. You can use your GPS receiver to know your exact location anywhere in the world. Vehicle tracking systems are generally used by fleet operators for fleet management functions such as routing, dispatch, on-board information, and security.

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