

Multi-Level Security for Automotive–RFID Based Technology with LabVIEW Implementation

Priya Darshini .V¹, Prakash.R², Prasannabalaje.S.M³, Sangeetha Monica.T⁴

Abstract

Security has become a prominent parameter for all the electronic gadgets. This proposed paper aims at securing the automotive and also preventing the unauthorized persons from accessing it. The technologies such as Radio Frequency Identification (RFID), thumb registration system and face recognition will be applied for the security measures. This proposed system will also be implemented in LabVIEW using Educational Laboratory Virtual Instrumentation Suite II (ELVIS). Initially, the RFID system will be authenticated. The importance of this system is that, it gets verification from the Road Transportation Office (RTO). The user will require an authentication to get proceed to the thumb registration module by which the efficiency of the thumb is enhanced using Pattern Matching Algorithm (PMA). Face recognition system is a technique which will be used after the thumb registration system. At last, this system allows the user to drive the car. For emergency, a key insertion slot will be placed in the system through which the user can insert the key. During this emergency mode of operation the camera captures the driver's image and sends it to the owner's mobile as Multimedia Messaging Service (MMS). The owner will provide the authentication password; this in turn allows the user to drive the vehicle. Global System for Mobile communication (GSM) module is also kept inbuilt for tracking purpose. Among the different technologies proposed, RFID technique is briefly discussed in this paper.

Keywords

Educational Laboratory Virtual Instrumentation Suite II (ELVIS), Global System for Mobile communication (GSM), Multimedia Messaging Service (MMS), and Radio Frequency Identification (RFID).

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1. Introduction

Recent surveys conducted by United States of America (USA) reported, about 625 vehicles are stolen in an average for a day. The present security system lacks in providing the tighten security to the automotive. The ultimate aim of this paper is to provide a hi-tech security to the automotive. The existing barcode reader verification system possess the main disadvantage “line of sight” [1,2]. The radar communication security system overcomes the barcode readers line of sight problem. This system also possessed a problem. It is that, it takes a longer time to respond as well as the instrumentation setup and the logical analysis of the system proved to be costlier[3,4]. These problems were solved by the RFID technology. The solution will be briefly discussed in this paper.

2. Literature Review

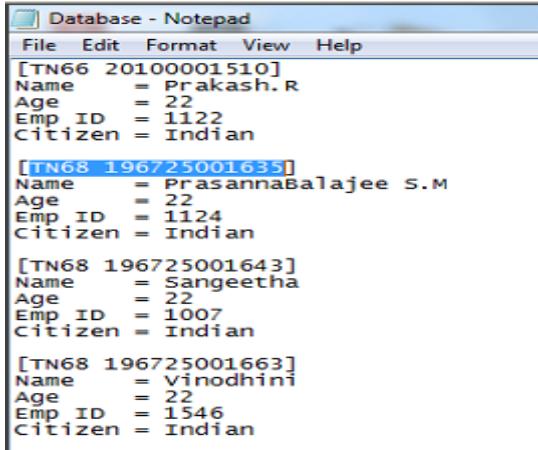
This System analyzes an Immobilizer Engine Control Unit (ECU) using Radio Frequency module application innovated. The wireless characteristics of radio frequency module enhance the system to be unreachable to the vehicle thieves seemed to be a problem to the community upon their vehicle safety [5].

3. Operational Feasibility

Pre-Processing Databases and Images

In order to implement this RFID module the necessary requirement is the Pre-processing database. A database will be designed which contains the parameters like name of the person, tag number, license number, age, employment ID, and blood group. All these data of a particular person will be feeded separately in a data base. The user flashes the given card; the radiating field in the tag radiates the required data through the RFID reader [6]. The data once received will be transmitted through the transmitter to the RTO. The database present in the office compares the data received to the data which is already present. It transmits the compared result to the user and the result will be displayed using the LCD display. The detailed function and the analysis

of the system will be discussed in this paper. The database of the RFID system is shown in the figure 1



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Database - Notepad
File Edit Format View Help
[TN66 20100001510]
Name = Prakash.R
Age = 22
Emp ID = 1122
Citizen = Indian

[TN68 196725001635]
Name = PrasannaBalajee S.M
Age = 22
Emp ID = 1124
Citizen = Indian

[TN68 196725001643]
Name = Sangeetha
Age = 22
Emp ID = 1007
Citizen = Indian

[TN68 196725001663]
Name = Vinodhini
Age = 22
Emp ID = 1546
Citizen = Indian

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Figure 1: Database of the System

4. Block diagram of the system

The block diagram of the overall system is shown in the figure 2. It comprises of many modules such as RFID system, Thumb Registration system, face recognition system as its main segments .It also includes different modules such as GPS, Toggle switch for toggling purpose, and Retrieving switch along with the LED and LCD indication .All these modules are supplied with power with the help of Power supply unit.

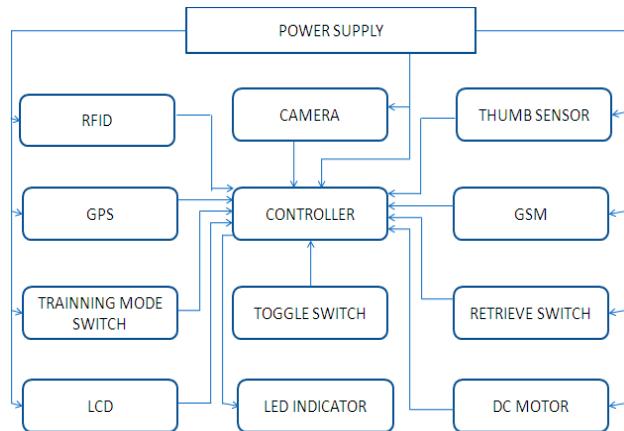


Figure 2: Block Diagram of the System

5. Study of RFID

The radio frequency identification (RFID) technology is an automated item identification technology which

enables computer based systems to identify objects under various circumstances. This technology grants computer based systems a fundamental and strong ability of identifying objects without direct contact to the objects which has many applications [7]. It is a system based on wireless communication between the RFID tag and reader in the near field of an antenna. The bidirectional communication is realized by magnetic coupling between the reader and the tag.

6. RFID system

The modules that are required to design this system are as follows Voltage Maintainer circuit, Oscillator block, Transistor-Transistor Logic (TTL), Encoder. **Voltage Maintainer** converts 5v to 3.3v using IC-LM358 for maintaining at the appropriate voltages. These kinds of maintainers are preferred for baud rate at 2400 rates per second. The **Oscillator** will be employed in order to avoid the ripple factor. They also use the filters to achieve resonant frequency generated at the rate of 125 KHz at the baud rate of 2400.Helical type of antenna is employed in this paper. The **Transistor-Transistor Logic (TTL)** uses up to convert 3.3v to 5v of power supply.Zener diode is used to regulate the voltage. Common emitter configuration is carried out in TTL logic. The circuit diagram of RFID is displayed in the figure 3.

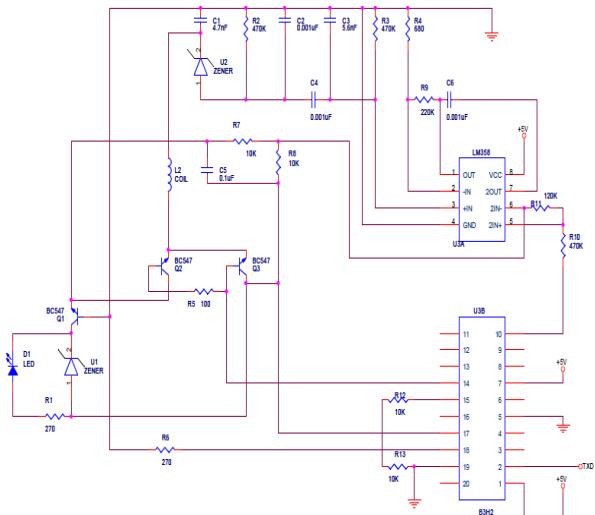


Figure 3: Circuit Diagram of RFID

7. Hardware Analysis

The 40-pin DSPIC controller (dsPIC30F4011) is the most important hardware required for this project .The connectors are used to connect the RFID. The

serial electronically erasable and programmable memory is used for the storage and memory operations in this project .Transmitter and the receiver (STT-433) are the hardware components required for the RFID module. The figure 3 displays the hardware analysis of only the RFID section. A detailed analysis of thumb and face recognition systems will be briefly explained in the forth coming issues of the paper.

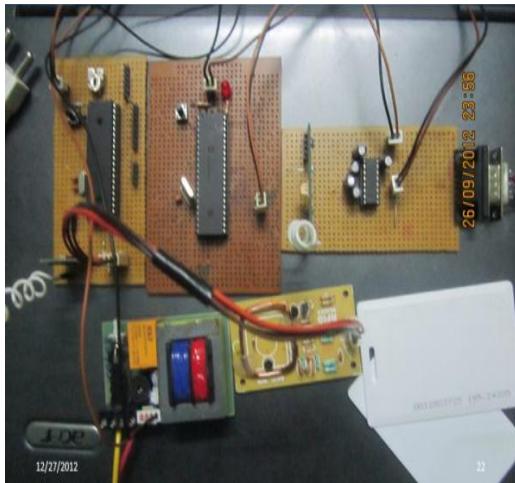


Figure 4: Component testing

7.1 RF Transmitter

The RF transmitter used in the project has the following features

- High Performance SAW Based Architecture with a Maximum Range of 100 feet at 4800 bps data rate.
- The transmitter operates from a 1.5-12V supply, making it ideal for battery-powered applications.
- RF Transmitter invokes Remote Keyless Entry (RKE) having no external components and no tuning required.
- This transmitter operates very well in 433.92 MHz Frequency

7.2 RF Receiver

The radio frequency receiver module is designed in such a way to work for the remote controllable applications. The circuit is designed with SMD components and the module size is small enough to be able to be fitted in almost any application.

7.3 Antenna Selection

Some of the basic parameters noted in selecting this antenna are:

1. The Helical antenna is used because of its loss less transmission
2. The projection of this antenna will be placed outside for the fast transmission of signal
3. The only constrain in using this antenna is, it might be interrupted when a frequency of 433MHZ prevails in the corresponding scenario.

8. Software implementation

Software testing has to be done essentially before the hardware is implemented. OrCAD 10.5 is the software used for the designing of the circuit .For testing the designed circuit MpLAB 8.33 and LabView 2011 is utilized. The block diagram representation of RFID in labview is shown in the figure 4.

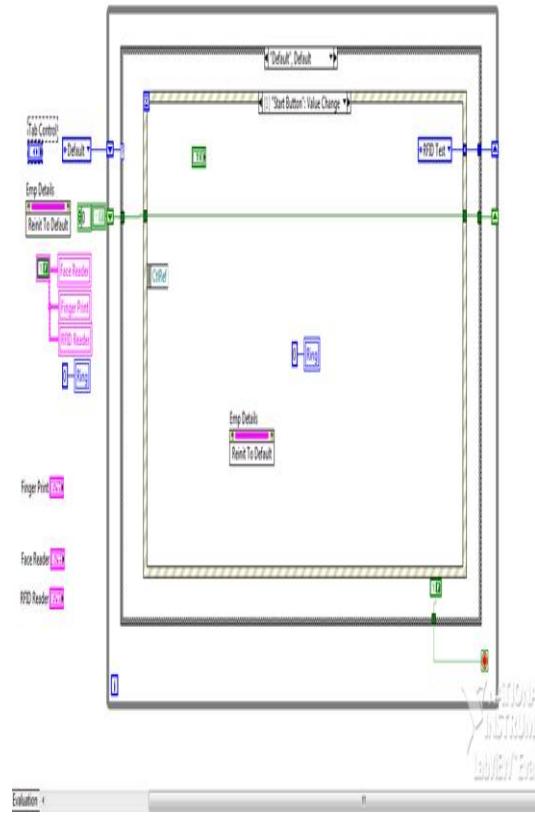


Figure 5: Block Diagram of RFID

9. Results and discussions

The system after testing it with the Labview software, found that the initial step was successful. The result of this system will be shown in the figure 5.

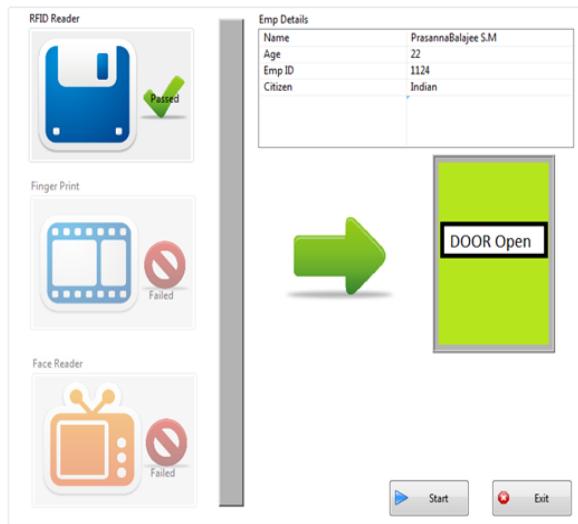


Figure 6: Front Panel of RFID Module

10. Conclusion and future work

Hence, the RFID system is finally designed and it totally deals with the external security to the automotive .As discussed in the proposal, the work of thumb registration system and the face recognition module are in progress. In future this project will extend its security for the human beings to safe guard their valuable life from accidents. Even if occurred, the monitoring necessities such as the status of the person, the heartbeat, the pulse of the human and the condition of the patient will be reported to their relatives and the nearby hospitals .These ideas will be implemented in future.

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