3 TIER CAR SECURITY SYSTEMS

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ABSTRACT

In this proposed paper, three tier security system for cars is achieved using Code Hopping, RFID (Radio Frequency Identification) and LabVIEW. Code hopping is used to send a different code every time to lock or unlock the car with the help of RF (Radio Frequency). The RFID signal is used to control the engine immobilizer. The car will start only if the RFID signal matches to the one stored in the engine immobilizer. LabVIEW is used as an override in case the keys get lost or get locked inside the car.

Keywords: Code Hopping, RFID, Engine Immobilizer, LabVIEW, RF

I. INTRODUCTION

Automobile security has attained many rapid changes but the cost of all the security upgrades is so high and it is not affordable for all the vehicle owners. Another problem is that there is no safe override available in case the keys get lost or are locked inside the car. The project is aimed at providing a safe override in addition to basic security systems that already exist. The override is provided by using a password protected VI.

II. EXISTING SECURITY SYSTEMS

KEELOQ is a proprietary hardware-dedicated block cipher that uses a non-linear feedback shift register (NLFSR). It is embedded in the centre lock system of the car. Every time the lock or unlock button is pressed on the keyfob it produces a unique code that is encrypted. The code is decrypted and if it matches the lock or unlock operation is completed. It requires at least three weeks of brute force attack to decrypt this code.
ICATS or Intelligent Computerised Anti-Theft System was developed by Maruti Suzuki. An electronic chip is embedded in the keyfob of the car. It sends a signal every time the key is inserted. If the code matches the code that is stored in the Engine Control Unit, the car starts otherwise the power to the ignition is cut off and the car does not start.

III. SYSTEM

The opening and closing of doors is controlled by sending a rolling code through RF (Radio Frequency) transmitter receiver pair. The RF works at a frequency of 433 MHz and has 1 MHz of bandwidth. Whenever the lock or unlock button is pressed on the keyfob a 40 bit code is generated which is transmitted with the help of UART. The code is generated with the help of an algorithm which generates a new code every time the button is pressed and is called a rolling code. A rolling code transmitter is useful in a security system for providing secure encrypted radio frequency (RF) transmission. Upon comparison of the fixed and rolling codes with stored codes

and determining that the signal has emanated from an authorized transmitter, a signal is generated to actuate an electric motor to open or close a movable component.

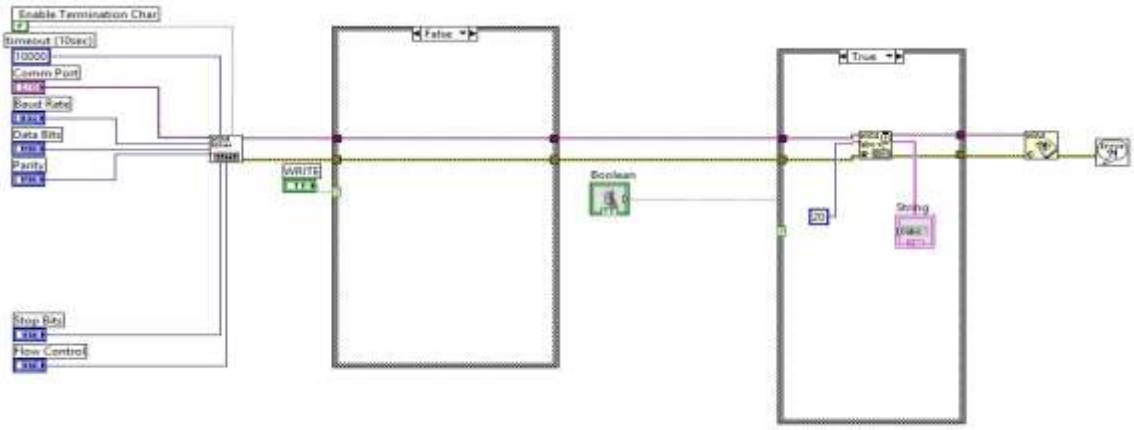

Fig. 1 Block Diagram for RF Transmission

The Engine Control Unit is controlled by sending a unique code through a RFID tag. RFID sends the code through electromagnetic field. A passive RFID tag is used in this case as it provides a range of 5-10 cm which is ideal for this application. So we use a 125kHz passive RFID tag and reader in this project.

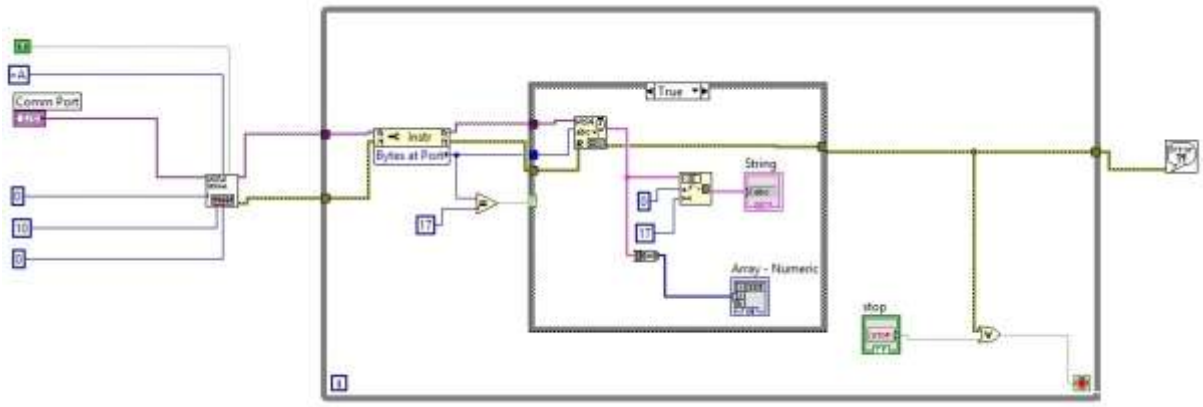

Fig. 2 Block Diagram for RFID

The override is provided by using LabVIEW. In LabVIEW we can use password protected VI to secure the block diagram or we can delete the block diagram so that it cannot be accessed by any user and data stored in it cannot be modified. We can send both the RF and RFID codes using LabVIEW. The code is sent by serial UART communication.

IV. HARDWARE

The hardware components used in this project are:

1. Atmega-8
2. RF Module (433 MHz)
3. RFID Tag
4. RFID Reader
5. PL 2303

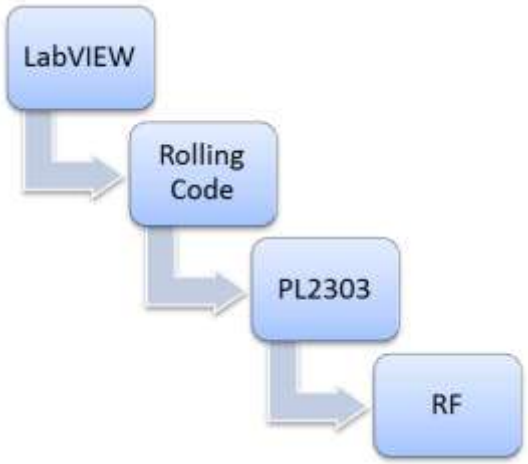

Fig. 3 Steps for RF Transmission

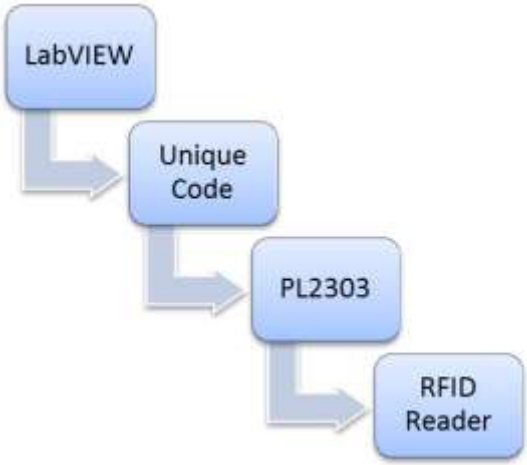

Fig. 4 Steps for RFID Code Transmission

V. CONCLUSION

This project creates an efficient and cost effective system for security of cars. It is difficult to decrypt a rolling code and almost impossible to replicate RFID tags without knowing the tag ID. Moreover this system provides a safe override using LabVIEW which cannot be hacked.

VI. FUTURE SCOPE

The system can be further improved by using longer rolling codes and better techniques of encryption. The RFID tags can also be made safer by using longer codes. The location of the car can be tracked using GPS. A message can also be sent to owner's phone in case of a break-in by using a GSM module.

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