Design and Implementation of a Module Door Lock System Based on Java Language and raspberry pi Board

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ABSTRACT

Identification technique using Bluetooth of a personal smart device is very useful and applicable method. in this proposed system, this technique used in order to control an electromagnetic lock. The proposed system consist of two main sides which are hardware and software. Hardware side consists of smart device, Raspberry pi board, Relays and electrical lock. the software side consist of Java language for program the application in smart device and python language for programing Raspberry pi. When user reach around the reading range area of the lock system, he can open or close the lock by just send a command using application in his device. so this proposed system can be used in state of all the keys of a user. So it is easy and useful
Keywords: Door lock, raspberry pi, Java and Bluetooth.

1. RELATED WORK

Different kind of techniques are used to control automatic door lock in order to increase security of home/office and also type of luxury. Identification step is the important step which is give permission only for authentic person to control door lock. Next paragraphs will show the identification techniques used by other researchers.
- Manasee Patill and S.R.N. Reddy Proposed wireless technology to do the automation home/office. Inside door is controlled by RFID while outside gate is controlled by using ZigBee and GSM. RFID system (reader/tag) is used to perform identified from authorized person [1][2].

- Gyanendra K Verma and Pawan Tripathi proposed passive RFID system to implement a digital security system containing door locking system[3]. RFID technology is used for secure access and keeping record of the user[3].
- I. Yugashini, S.Vidhyasri and K.Gayathri Devi proposed automatic door accessing system by using face recognition. Only the person which his image is match with one saved in database of secure system can be access to the secure system and open the secure door[4].

- Safaa A. Mahdi proposed and design system that allows unlocking a secure door depending upon the time zone which is a user-defiend period of time. Authorized are performed using "credential". The credential may be a card, fingerprint, token or a personal identification number. The time zone is used to regulate the cardholder access to allows automatically lock / unlock doors[5].

2. PROPOSED SYSTEM

This proposed system is mainly consists of two parts which are hardware and software. The first one is responsible the physical work like receive and transmit signals, it consist of small efficient processor called raspberry pi. This part is very important for receive and process signals coming from personal smart device. It connect to the door lock from side and to Bluetooth from other side as shown in practical image bellow
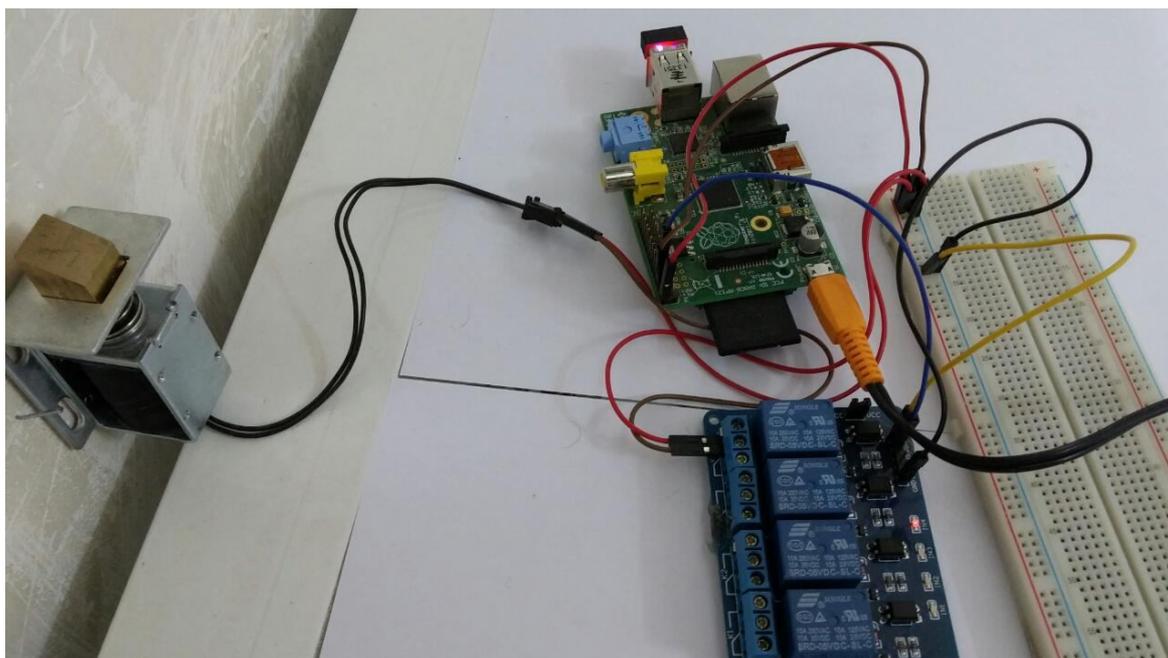
Figure1. Overall practical work

The other main device of the hardware is Bluetooth transceiver, it is responsible to make connection between raspberry pi and personal smart device. This part is shown in figure bellow
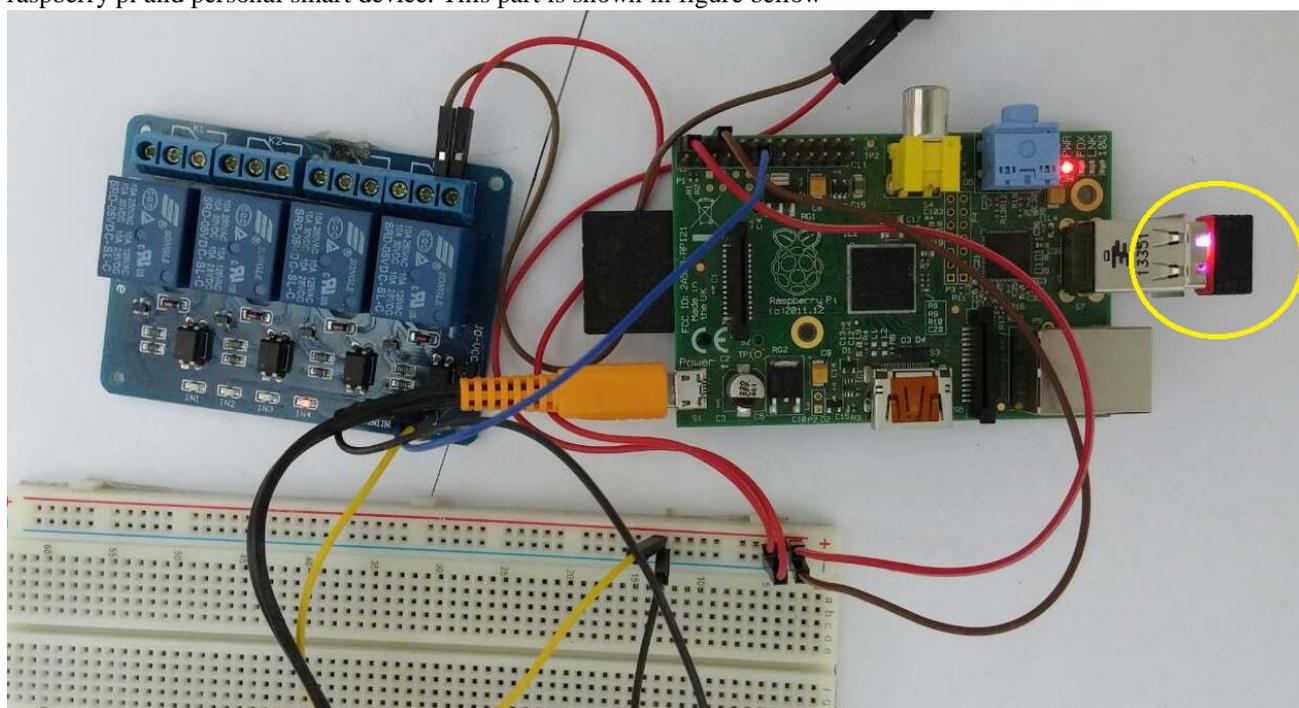

Figure 2 Bluetooth transceiver

Electromagnetic door lock, it is responsible for open and close the door according the commands from the controller that receives its information from the person through personal smart device as shown in figure bellow.
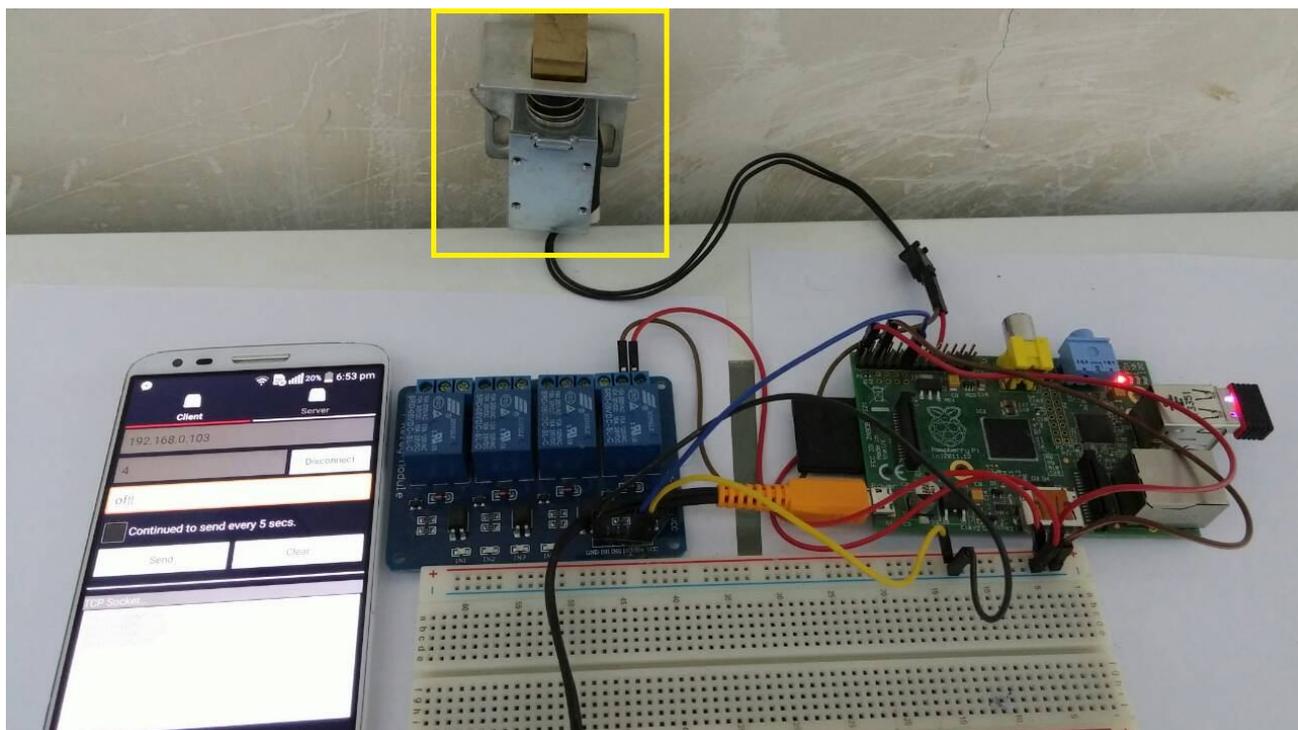
Figure 3. Lock and software application

The second part of this system is software. It is as shown in figure above, the graphical user interface is very easy. The application is programed in Java language. This application provide the ability to open and close the lock in easy method and secure.

3. RASPBERRY PI

It is small (about credit card in size) inexpensive (about 10$) electronic board supplier with different IC,s like RAM, CPU, wireless devices (WiFi, Bluetooth), USP boot, general purpose I/O port and others as shown in figure 4. We can programming it to perform the required task. Raspberry pi board can save and prosses information received from wired or wireless devices so it calls small single-board computers. The board is widely used in different kinds of control applications because its small size, and high efficiency[6].
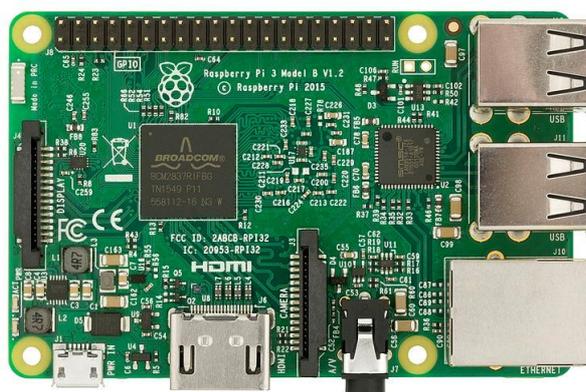

Figure 4. Raspberry pi board

4. BLUETOOTH

Is a wireless technology used for exchanging data through short distances by using short wavelength (UHF radio waves) from 2.4 to 2.485. Bluetooth is small in size as shown in figure 5, so it used with fixed and mobile devices, also used to build   personal area networks (PANs). Bluetooth protocols discover and configure the services between devices

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in easy way. This makes using services easier, because it has high security, network address (is an identifier for a node or network interface) and permission setup can be automated than with many other network types. Because it is easy to detect and connect between two Bluetooth devices, so it widely used in the industrial application[7].

Figure 5. Bluetooth Devices

5. JAVA PROGRAMMING LANGUAGE

Java is an efficient and one of the most popular programming languages so it is widely used with control systems, security systems and application programs. Some of its important properties is concurrent, class-based and object-oriented. Java application is developers "write once, run anywhere" (WORA), that is mean compiled Java code can run on any platforms that support Java without the need to recompilation it. Also, Java applications can run on any Java virtual machine (JVM) because it already compiled to bytecode that. Moreover, Java language is compatible to operate with different kinds of operating systems (OS) like windows, Android, etc[8].

6. CONCLUSIONS

• There are unlimited number of user can join the system
• This system is easy to use. It has friendly GUI
• The system is applicable
• This system is secure and has high level of accuracy
• There is an ability to develop this system in the future

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