

ANDROID PASSWORD BASED REMOTE DOOR OPENER SYSTEM

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Abstract - Safety and security is the major concern for all the people in the current situation of the world. The main problem in the previous lock system is that it is comrisable and also distribution of keys in a large organisation is a costly affair. The aim here is to develop a system which is advanced, and finding the solution to the problems present in the existing system along with decreasing the cost. The previously used traditional locks are usually heavy and these can be broken easily using certain tools, hence these lockers are not protective. So as per the aim it is explained here how android based remote door opener system can be developed which can be used to close as well as open the door. This done by sending password from the android based system via Bluetooth thereby assuring security and protection.

Key Words: Arduino UNO, Microcontroller, Bluetooth device, Android, Relay, Connecting Wires, etc.

1. INTRODUCTION

The security is a prime concern in our today's life. Everyone wants to a secure life as much as possible. Home/office security is the most important one for every home/office owner. Our main objective/aims at remote password based door opener system through an android application via Bluetooth. In this project the authorized person needs to be present within the Bluetooth range or the door but need not open the door manually. He just needs to enter the correct password through his android application to unlock the door. First the command send through an android application device. Bluetooth is used as a medium for sending commands. When commands are sent through an android device then Bluetooth receiver will receive those commands. These commands which receives through the Bluetooth receiver is then sent to the ATMEGA 323 microcontroller. These controller processes these commands and then checks the entered password. If the right password is entered it sends commands to the controller to open the door. And if the entered password is not correct there is a buzzer which will alert that entered password is wrong. There is an indoor reset switch which will lock the door from inside. An lcd display is also used to display the status of the door.

1.1 OBJECTIVES

There are some objectives need to be achieved in order to accomplish this project. These objectives will act as a

guide and will restrict the system to be implemented for certain situations:

1. Increase the security level to prevent an unauthorised unlocking of the door.
2. Getting the locking device connect to the Bluetooth device for short device signalling.
3. Lock the door by using password and Display using the LCD.
4. To unlock a door by android application using a unique password entered through the android application device.

2. LITERATURE SURVEY

There are many automated advanced door locking system has been developed and it's popularly used in commercial buildings and organization. Some of these automated doors locking system are based on RFID (Radio-Frequency Identification). The RFID cards are used as a key. The RFID card reader detects and validates the user accessibility. When the card is brought near the reader, it identifies the radio frequency of the card and thus verifies the key. However these systems are expensive. Various control systems have been designed over the years to prevent access to unauthorized user. The main aim for providing locks for our home, school, office, and building is for security of our lives and property. It is therefore important to have convenient way of achieving this goal. Automatic door locking system has become a standard feature on many different types of buildings and homes [2][4].

Lia Kamelia, Alfin Noorhassan S.R, Mada Sanjaya and W.S., Edi Mulyana has implemented a "Door - Automation System Using Bluetooth", The implementation is based on Android platform. So the implementation cost is less and affordable by a common user. With the wireless Bluetooth connection in microcontroller permits the system installation in more easy way [3].

Shilpi Banerjee has implemented an "Automatic Password Based Door Lock System". This system works on

predecided password concept. It increases the security level to prevent an unauthorized unlocking done by attacker. In case the user forgets the passwords, system gives the flexibility to the user to change or reset the password. This automatic password based lock system gives user more secure way of locking-unlocking the system [5].

Arpita Mishra, Siddharth Sharma, Sachin Dubey, S. K. Dubey has implemented a “Password Based Security Lock System”, the system works using keypad to enter a password to the system. If entered password is correct then door is open by motor which is used to rotate the handle of the door lock. System also includes extra features like adding new users and changing old password etc [1].

We surveyed many smart doors locking system. We found that these products are very expensive. Some of the implementation mentioned in the literature survey is very cost effective in implementation but do not provide multi user or multi level functionalities. We identified these requirements and thought to develop a system which is cost effective in implementation and having more advanced features like multi user and multilevel. These features are the need of time and such functionalities will make the system more useful.

3. SOFTWARE REQUIREMENT AND SPECIFICATION

A System Requirements Specification (SRS) (also known as a Software Requirements Specification) is a document or set of documentation that describes the features and behaviour of a system or software application. It includes a variety of elements that attempts to define the intended functionality required.

3.1 FUNCTIONAL REQUIREMENTS

A functional requirements defines a function of a system or its component. Where a function is described as a specification of behaviour between inputs and outputs.

3.2 NON-FUNCTIONAL REQUIREMENTS

Software requirement can be non-functional and also be a performance requirements. Non-functional requirements are the characteristics or attributes of the system that can judge its operation.

3.3 HARDWARE REQUIREMENTS

Hardware requirement analysis is to define and analyse a complete set of functional, operational, performance,

interface, quality factors, design, criticality and test requirements. Water Level uses the Arduino board along with the ultrasonic sensors.

3.3.1 Arduino Uno Board

It's actually the control board [Fig 1] which communicates with the Android Apps and triggers the door strike based on the command received from Android Apps.

3.3.2 Bluetooth Module Hc05

Bluetooth Module is used for communication channel between Arduino Uno and Mobile Phone.

3.3.3 Relay Switch

Relay switch is used to Switch On/Off the Electric Door Strike. Based on the valid key received by Arduino Board, it controls the Electric Door Strike using Relay Switch.

3.3.4 Android Smartphone

It is used as User interface. User need to install Android Apps which is developed to control the lock and configuring the basic functionalities of the system

4. SYSTEM DESIGN AND IMPLEMENTATION

4.1 BLOCK DIAGRAM

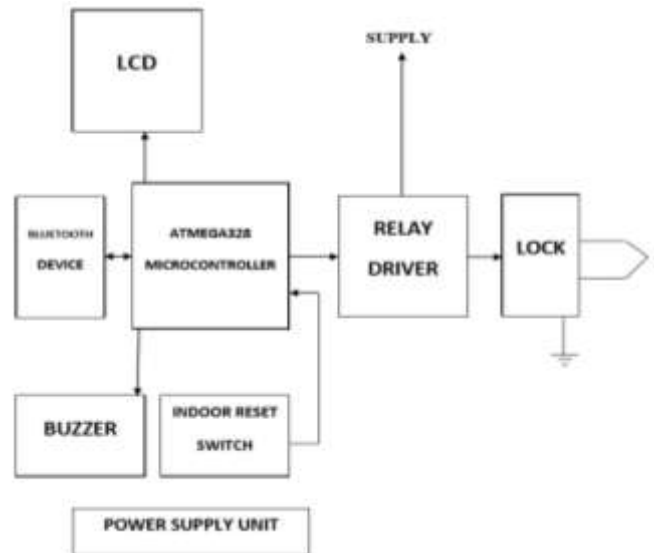


Fig. -1: Block Diagram

4.1.1 Microcontroller (ATMEGA328)

An ATMEGA328 in DIP package, pre-loaded with the Arduino (16MHz) Boot loader. This will allow you to replenish ATMEGA328 in Arduino board without the need of an external programmer. Atmel's ATMEGA323 3-Bit Processor in 28 pin DIP package. It's like the ATMEGA163, with double the flash space. ATMEGA328 Memory Includes 32KB of programmable FLASH, 1KB of EEPROM, 2KB

SRAM,10,000 Write and Erase Cycles for Flash and 100,000 for EEPROM, Data retention for 20 years at 85°C and 100 years at 25°C. Atmega328 has 28 pins in total. It has 3 Ports in total which are named as Port B, Port C and Port D. Port C is an analogue Port and it has six pins in total. So, in simple words, ATmega328 has 6 analogue pins. Port B and Port D are digital ports and have 7 pins each. So, in total ATmega328 have 14 digital pins. It also supports Serial Communications, we can perform serial communication via Pin # 2 (RX) and Pin # 3 (TX). It also supports SPI Protocol. It needs a crystal oscillator for generating the frequency. You can use crystal oscillator ranging from 4MHz to 40 MHz. Arduino UNO board uses 16MHz crystal oscillators. ATMEGA328 has Additional Features namely Internal calibrated oscillator, Power on reset and programmable brown out detection, External and internal interrupts, 6 sleep modes including idle, ADC noise reduction, power save, power down, standby, and extended standby. ATMEGA328 has Operating voltage 1.8 – 5.5V, Operating temperature range -40°C to 85°C.



rectified by bridge rectifier consisting of four diodes, which converts the AC wave into fully rectified wave. The next stage is the filter stage consisting of capacitor, which converts the fully rectified wave into the DC wave with some ripple. Last stage is the regulator stage. Regulator removes the entire ripple and gives pure DC.

4.1.6 Android

Android uses a Java based language. To develop an Android app, a tool named Eclipse is required as well as Android's SDK, which is an add-on for the Eclipse program. When creating a new application for the Android, the platform version must be selected, e.g. 1.5, 1.6, 2.1, or 2.2. However, the version can differ on the Android device depending on which Android device is being used. The three main components required in the creation of the Android app are: the java file, which is a file that contains all code required for completion of desired tasks and functions; an xml file, which contains the layout for how the application will look to a user; and a resource folder, which contains all images, sounds, and graphics files needed for the application. For Arduino firmware, the IDE is provided as the open source by the company. The tool can run on multiple platforms, e.g. Windows, OS X, and Unix. The language is a Wiring-based language which is similar to C/C++ style. Two programs were created for this project that had to be able to communicate with one another via Bluetooth channel. One was on the Android mobile device, and the other was on Arduino board, inside the in-home security controller. They needed to be able to communicate with each other in a secure manner over short range. Bluetooth fulfils both these requirements and was used as the communication protocol for the project. The Android app was created in two major development steps. The first step had the MAC address of the microcontroller directly coded into the app for initial testing, and the second was an improvement of the first in that it allowed a user to search for the device, which becomes the final design. The basic steps for connecting to Bluetooth were the same for both versions of the application.

5. RESULTS AND SNAPSHOTS

This chapter contains the snapshots of the graphical user interface (GUI) of the proposed system showing the interface and the intermediate results.

The results of the test series shows the minimum system of the Arduino microcontroller circuit system has a minimum value 9600 Bits per second, with 8 data bits and 1 Stop Bits. The whole system in this project operates in the power of 12 volts. A function of this IC is to make the input voltage 220 volts of electricity into the main 12 volt DC, so it is safe and does not damage the circuit. Testing was conducted to determine the changes or differences in

voltage. Further testing is to examine the connectivity between Bluetooth on android Smartphone with Bluetooth module series HC-05 and the connection between keypad with Microcontroller. All of these tests show that all goes according to design connections. Final testing is testing the connection System to lock/unlock the door automatically. The test is performed to test the Arduino output in giving output on the LED and Relay for opening and closing the systems.

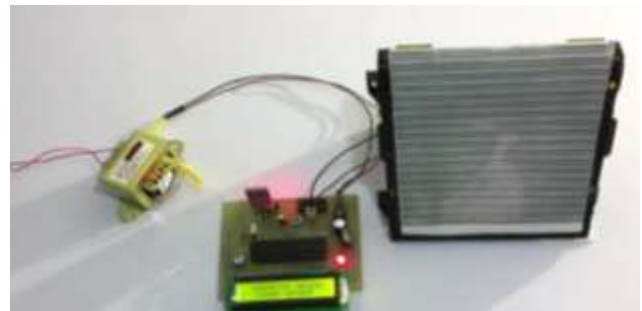


Fig. -5: Android based door opener representation

The Fig. 5 shows the representation of the Android based door opener system. The LCD displays the present status of the door.



Fig. -6: Android based door opener representation 2

The Fig. 6 shows the initiation of the project by using android device. The password is added to continue with the outcomes.

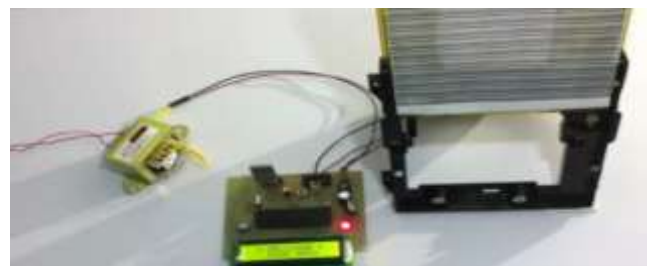


Fig. -7: Android based door opener representation 3

The Fig. 7 shows the initiation of the project and LCD displays *WELCOME* only when the password given is correct.

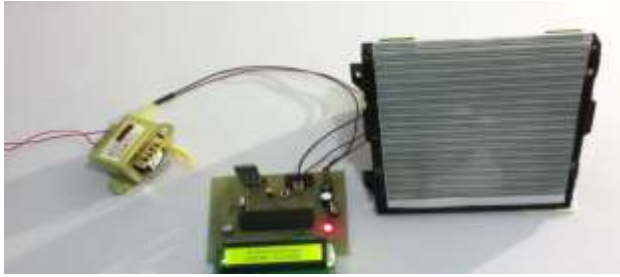


Fig. -8: Android based door opener representation 4

The Fig. 8 the system will provide the outcome of opening as well as closing the door by the given command through the android device. The LCD displays the present status of the system.



Fig. -9: Android based door opener representation 5

The Fig. 9 is displayed if the given password is wrong. And thus the user cannot operate the door.

6. EXISTING AND PROPOSED SYSTEM

6.1 EXISTING SYSTEM

The existing system largely consists of physical lock and keys. The problem with existing system is that the physical key is easy to manipulate also for multiple doors one needs to carry multiple keys. This increases the hassle of carrying multiple keys as well as the possibility of the keys being misplaced. Physical key also limits the number of people who can access the particular lock.

There is no security the intruders can use their intelligence to open the door and they can do any crime especially stealing activities. If there is any gas leakage or fire we cannot detect it. With the help of this system, one can easily avoid the incoming of any offenders and strangers too. The system tends to make secure door opening mechanism so that the door only unlocks when a authorized person opens it by entering the right password. If Gas or fire sensor detects any gas leakage or fire respective sensor will detect and it will give siren and along with that it will send message using GSM. And if any intruder comes the door it will sense using IR sensor and it gives siren. And using LCD display it displays everything. Keyless system, hence no more worries of losing of keys. Since, it is the system having password facility, provide security as well. Increases the security

level to prevent an unauthorized unlocking of the door. Gives an indication for unauthorized entry. It avoids any crimes especially stealing activities.

6.2 PROPOSED SYSTEM

The main idea of designing digital locking system is to provide many modern security features than mechanical lock. The system has a Bluetooth Receiver by which the password can be received. This password should be entered through an application installed on Android mobile. When entered password matches with the password stored in the memory then the DC motor rotated clockwise so that the door is opened then it will be paused for some time and again rotated anti-clockwise so that door is closed. If we enter a wrong password then appropriate message is displayed on the LCD. Applications are entrance doors, car doors, bank lockers etc. Many times people misplace their keys or accidentally lock their door. In these cases it is really difficult to enter the house. This project is designed to overcome this problem. Main concept behind this project is to open a door using a password entered through an Android application. As well as turning on the Buzzer when password is entered wrong for multiple times. To use the proposed system user needs to install a Bluetooth application and then perform the following steps:

- Open the installed application
- Connect the mobile device to the system via Bluetooth.
- Now pair the system with the mobile device using default pairing code.
- Enter the password and if the password is correct access is granted else access will be denied by the system.

The additional privileges can be added to this system to make the next version of security system. The system can be more specific by making changes for the modern house. For examples:

1. The door opener system must be modified for the household containing children. There is always an age limit for kids to have an android set of their own. And parents may find it difficult to be around with their kids during their work hours. There can be a modification in the system, to keep a keypad facility to the children to enter. The user must note down the timing of the subjects' arrival and send a message to the door opener to activate the keypad. Then the subject will click on the key buttons and unlock the password if it is typed

correct. By this modern solution the safety and security is provided.

2. The door opener system must be modified to hold a security camera in it. The camera must be connected to the android device and if there any mislead of the system then the alert must sent to the user.
3. The door opener system must be modified to alert the police in case if there is robbery or any misbehaviour occurred in the household. The door knob should contain a camera facing directly to the front pathway. By this modification, in case if there is a pedestrian robbery then the notification should be sent to the police department on the spot.
4. The door opener system must also be used for informing the accident occurred on the front pathway and to make the health department arrive soon by sending the location of the accident had taken place.

7. CONCLUSION

The project aims to unlock a door by using android technology by entering a password through android device. It creates an advanced system which gets rid of the problems in the existing system while keeping the costs low. This system involves Bluetooth technology. The Bluetooth RF transceiver operates in the unlicensed ISM band centred at 2.4 GHz. The core system employ yes a frequency hopping transceiver to combat interference and fading. This Bluetooth device is connected to the microcontroller. This project also involves android application. Android application send data through Bluetooth. Pairing is done between the android device and the microcontroller and the door gets open. In future we can put fire sensors so that in case of fire, the doors will automatically get open.

8. FUTURE ENHANCEMENTS

In future, fire sensors can be applied so that in case of fire, the doors will automatically get open.

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