

ANDROID PASSWORD BASED REMOTE DOOR OPENER SYSTEM

Pratima Shirsat¹, Sayali Rajput², Manali Nimse³, Pallavi Mhatre⁴

^{1, 2, 3, 4} UG Students, Department of Electronics & Telecommunication Engineering, Neral, India

Abstract - In the present scenario of the world, security is the major concern for all, and the security problem is being faced by every person. In previous lock system the main problem is that it is comparable and in large organizations the distribution of keys is a costly affair. The aim of our project is to create an advanced system which gets rid of the problems in the existing system while keeping the cost low. For locking a big area many locks are required. Basically traditional locks are heavy and are not protective as they can be broken down easily by using some tools. In this project we will explain how to make an android password based remote door opener which can be opened and closed using a password sent from an android smart phone using Bluetooth. The proposed system can give effective security in minimal cost.

1. INTRODUCTION:

This 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 is sent 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 are received through the Bluetooth receiver are then sent to the ATMEGA 328 microcontroller. This 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 the 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.

2. SYSTEM DESIGN

2.1 Block diagram

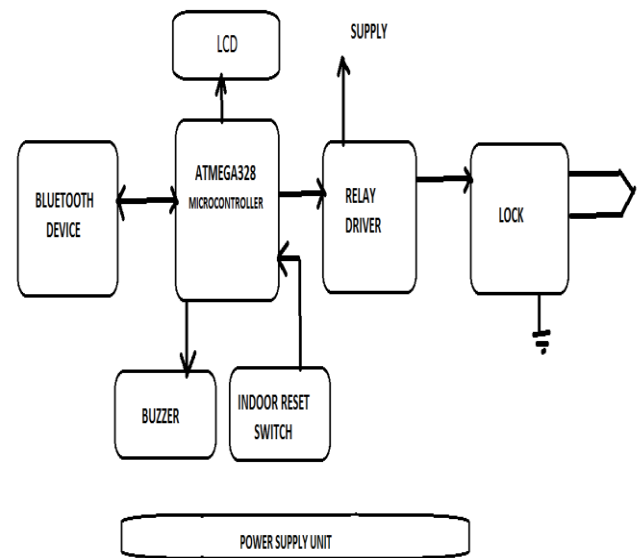


Fig 1. Block diagram

2.2 Description of Blocks

The major blocks used in the system are as follows:

2.2.1 Microcontroller (ATMEGA328)

An ATMEGA328 in DIP package, pre-loaded with the Arduino (16MHz) Boot loader. This will allow you to reprogram ATMEGA328 in an Arduino board without the need of an external programmer.

Atmel's ATMEGA328 8-Bit Processor in 28 pin DIP package. It's like the ATMEGA168, 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.

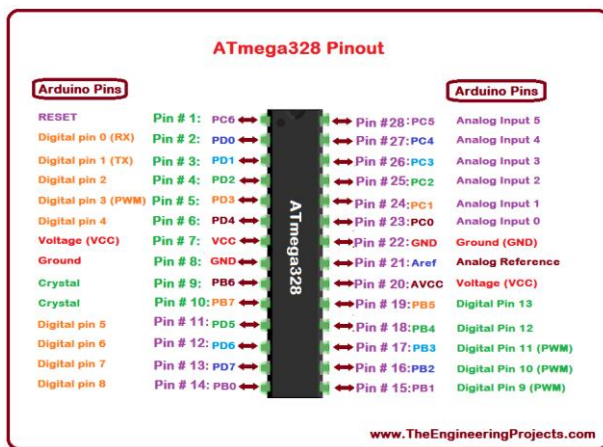


Fig.2. Pin diagram of ATMEGA328

2.2.2 Bluetooth Device

Bluetooth is a wireless communication system to replace cables on devices such as phones and other mobile devices. It operates in the ISM (Industrial Scientific Medical) Band of 2.4-2.83GHz. In our project we use the HC-05 bluetooth module. HC-05 module is an easy to use bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. It can be used for a serial port replacement to establish connection between MCU and GPS, PC to our projects, etc. • The HC-05 Bluetooth module has a 6 pins-VCC, GND, TX, RX, KEY, LED. • It comes pre-programmed as a slave, so there is no need to connect the key pin, unless you need it to change it to master mode. • If you are using a phone to connect to the bluetooth module, you can simply use it in the slave mode. The default data transmission rate is 9600kbps. HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds. This module works on 3.3 V. We can connect 5V supply voltage as well since the module

has on board 5 to 3.3 V regulator. As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

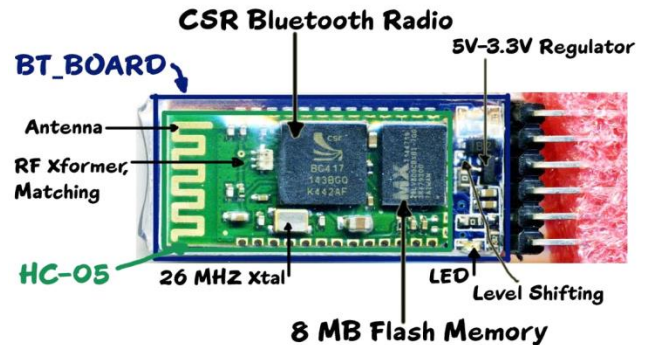


Fig 3. Bluetooth Module

2.2.3 Relay

Relay acts as a switch which is used to control the 230 volt AC supply. This relay will be turned off if there is no person inside the room. This relay can be used to turn off the electrical appliances like fan, tubes etc.

2.2.4 LCD

The LCD used here is 16x2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters. It is used to display the password entered and the status of the password. It can be used to display the various options and all the readings that have been stored in the EEPROM.

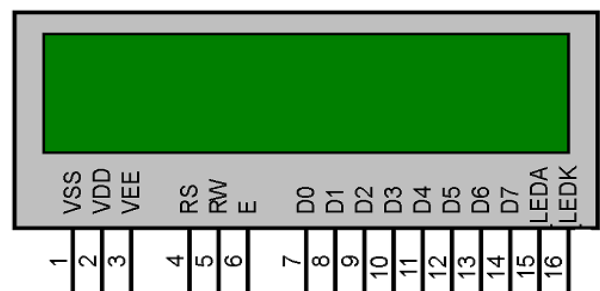


Fig 4. 16*2 LCD

2.2.5 Power Supply

The power supply gives +5v and +12v supply to the circuit. The power supply consists of four stages namely transformer, rectifier, filter, and regulator. Transformer is a step-down transformer taking input of 230v AC and

giving output of 15v at the secondary. This 15v AC is 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.

2.2.6 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 fulfills 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.

Application

1. This simple circuit can be used at residential places to ensure better safety.
2. It can be used at organization to ensure authorized access to highly secured places.
3. With a slight modification this project can be used to control the switching of a loads through password.

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 centered at 2.4 GHz. The core system employs 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 sends 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.

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