

# BLE Based Lock using Atmega 328

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**Abstract**--In this project we presented a smart lock which operates using Bluetooth in a mobile device, so it becomes more easy and efficient to use. It is also based on Android and Arduino platform which are open source software and also free. In this project, a system called BLE based lock using Bluetooth-based Android Smartphone is proposed and prototyped. The hardware design for lock system is the combination of android smart phone as a task master, Bluetooth module as command agent, Arduino microcontroller as controller center / data processing center, and solenoid lock as output.

**Keywords**— BLE module HC-05; Solenoid lock; Atmega 328 microcontroller, Bluetooth supporting/operating android application.

## I. INTRODUCTION

Now days most mobile phones are a smart phone, which offers more improved, features in networking issues than regular cell phones. According to an investigation 1.4 billion smart phones has been in use 800 million of them run Android, 300 million run Apple's iOS, and 45 million run Windows Phone [4]. Every smart phone support wireless technologies such as Bluetooth and infrared, in order to transfer data wirelessly.

In this project we have introduce a lock which operates using Bluetooth Low Energy module (HC-05) and ATMEGA 328. Whenever the user turn on the Bluetooth of his mobile and comes in the specified range of Bluetooth the lock will get open. The Bluetooth technology works on 2.4GHz frequency which connects devices in 10m to 100m range based on Bluetooth device class [5].

## II. LITERATURE SURVEY

There are some factors that must to be considered while designing a smart home system there are some factors that needs to be considered such that the system should be low-priced, scalable so that it I will become easy to integrate new devices into the system, and it should be user friendly.

The basic requirement for any home automation system is about the security. The door lock is the major device for security system. This system uses mobile device to lock and unlock the door. Rather than using a key, it sends a command which is delivered digitally via Bluetooth on mobile devices. The use of solenoid lock using Bluetooth on a Bluetooth supported smart phones in addition to providing ease of use and also provide superior security over conventional keys. The system is designed to lock/unlock an electronic solenoid lock, which is controlled through a Bluetooth-enabled smart phone using BLE module.

Implementing the Java programming language for the android platform versions like 2.3.4 Gingerbread and 3.1 Honeycomb a smart home security system for the disabled and senior citizens is developed.[1]. The connection between android platform and the lock using wired connection, so it will be more superior to support different wired as well as wireless technologies such as Bluetooth, Zigbee, Wi-Fi, World Wide Web[3].

R. Piyare has introduced design and implementation of a low cost, flexible and wireless solution for home automation, especially on ON/OFF the lamp and to ON/OFF the television automatically. However, this is a basic system without advanced features like integration of RTOS, and also not has light sensors that are used to intelligently control the home appliances without human intervention. All research that mention above, inspired our research to make a research about the device that providing a safe and superior solution for controlling home automation [2].

## III. BLOCK DIAGRAM

The block diagram of this project is shown in figure1. Atmega 328 AVR Micro-controller is the heart of the project. By using an android application we send the data to Bluetooth HC 05 module which in turn manipulate the data n send to the controller (Lock /unlock). All the required data like registered Bluetooth devices addresses are stored within the memory of the controller. The ULN 2803 amplifier is use to amplify the signal coming from the controller which is compatible to drive the solenoid lock. Depending on the signal coming from controller the lock will get lock/unlock. Button is used for manually opening lock from inside and key is use for new registration.

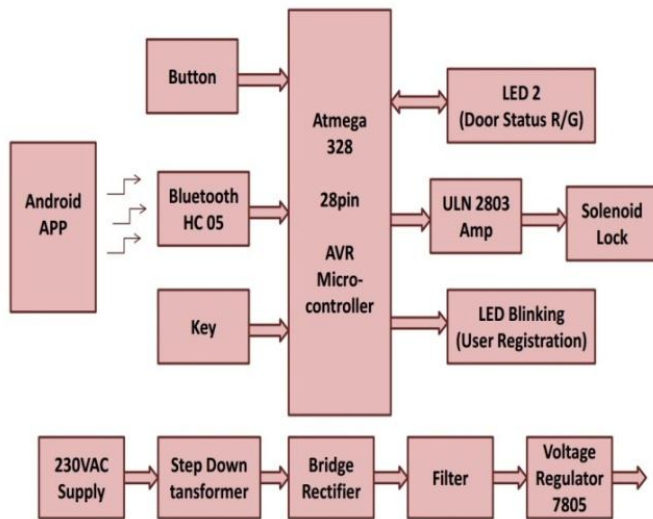


Figure 1. Block Diagram

New registration can be done only when the system is in registration mode. The system will enter into this registration mode only after pressing the key. Once registration mode is activated the Bluetooth supported android mobile device which connects to the system first will be registered. By register we mean that the address of the Bluetooth device is stored. There are three LED's red for lock is closed, green for lock is open and blue for indicating registration mode.

#### IV. HARDWARE AND SOFTWARE

Arduino micro controller act as the heart of the whole system. The micro controller can be connected with other circuits to perform certain tasks. The Arduino microcontroller using ICAT Mega328 works by entering the program the been created and ready for instantly use. Bluetooth module used in this circuit is HC-05, which operates on a 3.3VDC power from the Arduino microcontroller. Pin (TX1) provides path to send data on the Bluetooth module HC-05 with microcontroller whereas Pin (Rx0) provides the path for receiving data on the HC-05 Bluetooth module with microcontroller while the path GND provides path for connecting the data between HC05 Bluetooth module with microcontroller.

The system required a program that must be compatible to the micro controller. Programming language for the Arduino microcontroller is C language. To run the program and burn the program into the micro controller we need a software i.e. Arduino.

#### V. EXPECTED RESULT

The expected result is that whenever any authorized user comes within the specified range from the lock then it is possible for that user to lock/unlock the lock. Also a new user can be authorized by entering into registration mode pressing key which is provided along with the system.

#### VI. CONCLUSION

This project based on Android and Arduino platform which are Open Source Software and also free. So the implementation cost is more economical and it is acceptable by a common person. Accomplishment of wireless Bluetooth technology in microcontroller allows the system installation in more easy way. The system will be successfully design and prototype to control the condition of lock using an Android Bluetooth-enabled phone and Bluetooth module HC-05. So through this project we have created a new lock which is easy to use and very useful for protecting the premises.

#### VII. ACKNOWLEDGMENT

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