

# IOT Based Home Automation Using Bluetooth with Security Enhancement

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**Abstract:-** The world is moving very fast towards automation. Day by day People have less time to handle any work so adapt automation is simple way to handle any device or machine will work to our desire. This paper presents how to implement the effective Home Automation System with IOT and device. These frameworks are provide help to satisfy the requirements of the aged and also physical disabled at homes. In addition, the concept of home automation system can improve the traditional living standing of homes. The elemental system uses a wireless Bluetooth device provides a wireless access to Smart phones. The system style doesn't take away the present electrical switches and provides a safe management over the electrical switches with low voltage usage technique. This technique is meant to regulate electrical devices all over the house with simple putting in it, simple use and price effective style and implementation.

**Keywords:-** IOT, Bluetooth, IDE.

## I. INTRODUCTION

Home automation systems area is one with advancement to the mechanical processes whereby human efforts area required with the machinery and instruments to control various operation in homes. It involves automatic operation of home appliances with totally different technologies and controlled over any of the devices like desktops, laptops smart phones or tablets. Home automation system makes the operations of various home appliances a lot of convenient and also saves energy. With the energy saving conception, home automation or building automation and smart homes makes life very straight forward today. It involves automatic operations of all electrical or electronic devices in homes or perhaps remotely through wireless communication like Internet of Things (IOT), Wi-Fi and Bluetooth is a system of connected physical objects that is accessible through. The 'Thing' in IOT may be someone with a monitor, i.e. objects that are assigned an information science address and have the power to gather and transfer knowledge over a network without manual help or intervention. Android software system is technology among the leading and most popular most well-liked systems in smart phones. Smart phones affordability increases day to day because of their sizes , technology enhancement with different movability. Android applications put in smart phones are also will be update every moment. The operator should use the screen of the phone to regulate the house appliances. This project

is an android application that possesses the potential to regulate any kind of electrical appliances providing full remote access from smart phone using Bluetooth. Bluetooth technology is Wireless radio transmissions in an exceedingly short distance providing a necessary technology to make convenience, intelligence and controllability. This generates the personal space networks in the home surroundings, wherever of these appliances are interconnected to each other employing with a single controller.

## II. PROBLEM IDENTIFICATION

When we design a home automation system, we have to consider the fact that the user should be able to connect to that Bluetooth module from any device he would wish to connect. Also he should able to change the host from one device to other device and that module should work accordingly. On displaying any error or fault, it should have the ability to diagnose it and the system should start working immediately when an instruction is given to improve the nature of wireless technology. A field programmable gate array (FPGA) board is used here to provide high security to our system but although any mobile user can connect with this system, this also lead to connect any unrecognized person with the home, using Bluetooth software in their smart phones.

## III. WORKING PRINCIPLE

This system contains the different microprocessor based electronics devices like Bluetooth module, Arduino Uno, Relay drivers, step down transformer as power supply and some software applications those are as follows:

- The Bluetooth module is used to connect the mobile and Arduino Uno for the operations of appliances at any interval by the help of Bluetooth signal.
- For the interfacing and process the signals the Arduino Uno is used here.
- For the ON and OFF operations of the appliances the relay drivers used as electromagnetic switch.
- For the different loads individual relays is used either at same driver or at different drivers for each relays.
- The operations and the system conditions are displayed on the smart phones or on an alpha-numeric display.

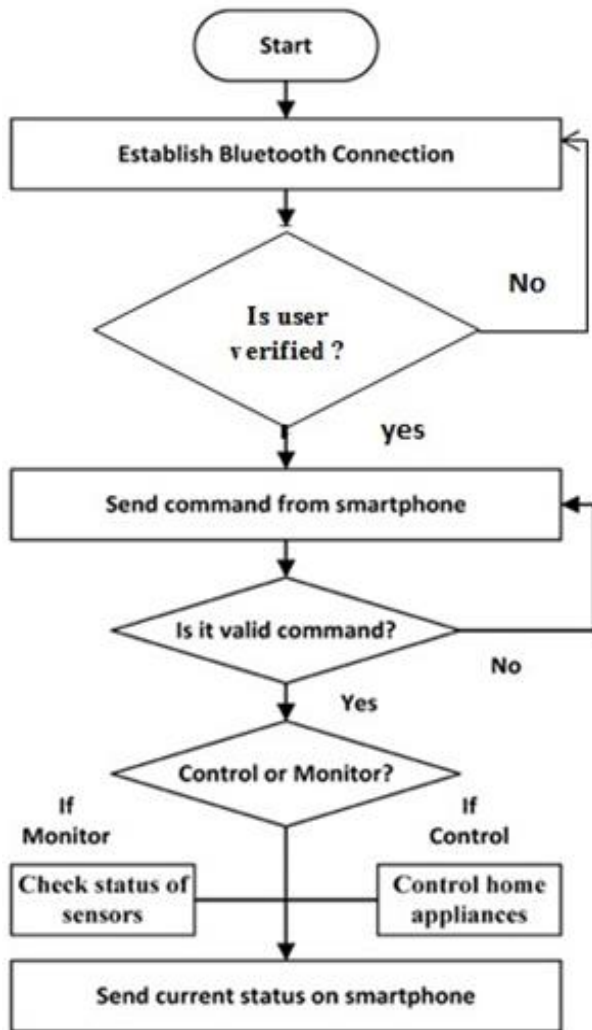


Fig 1:- Flow Chart of the Project

**IV. HARDWARE DESIGN**

The project system contains 3 main Hardware elements that is smart phone, Arduino Uno board and Bluetooth module.

Smartphone is employed to speak with Arduino board employing a smartphone application and Bluetooth Technology. During this analysis work Bluetooth module HC 06 and Arduino Uno used for hardware implementation.

**A. Arduino Uno**

Arduino Uno is microcontroller based open source hardware board in which ATmega328P microprocessor used. Here 14 pins are used as digital input or output and 6 pins uses as analog inputs which controls the switches or sensors and control multiple outputs and it operates on 5 to 9 volts DC supply and at 16 MHz quartz frequency clock . It has 32 KB flash memory, 2 Kb SRAM and 1 KB EEPROM.

**B. Bluetooth Module HC-06**

This device is employed for connection of Arduino Uno and smartphones. HC-06 could be a slave device and it will operates at 3 to 6 volts DC supply. It has 6 pins that is : State, RXD, TXD, GND, VCC and EN. For the communication of the Arduino and the Bluetooth device the RXD pin of HC 06 is connected to the Arduino TXD at pin 1 and the TXD of HC 06 connect to the RXD of the Arduino at pin 0.

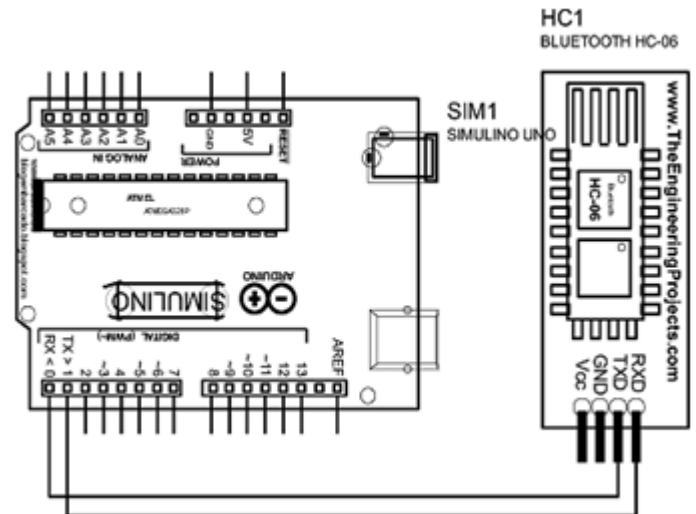


Fig 2:- Connection of Arduino with Bluetooth Module

**C. Relay**

The proper operation of the project requires an efficient, reliable and fast acting which basically consist of the relays and microcontroller devices. Relay is an electromagnetic device that is use to distinguish two different circuits electrically and connect the magnetically. usually for the interface of the relays electronic circuits associate with it that works on low voltages that works to trigger the devices at high voltages. for an example, a relay will use the 5V DC supply to trigger the 230V AC mains circuit or also higher voltages. A relay switch is operate through an armature which is attracted to an electromagnet or through plunger drawn into the solenoid and this is the input part of the relay that generate force when a low voltage applied to that .This voltage is termed as operative voltage. There are different sizes and configuration of the relays available in market according to operating voltage they are of 5V, 12V, 24V etc. The output section there are 3 terminal present (normally open (NO), normally closed (NC) and common point (COM) that connects or disconnect automatically and it consists of contact switch. once the operating voltage is applied in the relay coil it gets energized and therefore the COM changes contact to NO from NC. There are different relay configurations are in the market like SPST (single pole single throw), SPDT (single pole double throw) and DPDT (double pole double throw) that have completely different range of transmutation contacts. By mistreatment correct combination of contactors, the electric circuit is switched on and off.

➤ Relay Board Module

• Description

8 Channel Relay Board could be a easy and convenient to interface eight relays at the time for shift application in our project. Input voltage level support is common for the all relays on the board. Simple interface with Microcontrollers based mostly comes under analog circuits.



Fig 3:- 8 Channel Relay Module

• Description of the module.

These module offers 12 VDC at 336 mA with 8 SPDT relays output that is used for individually for numerous loads. Relay are of 5VDC/230 VAC with triggering level voltage of 3 to 5 VDC .The individual trigger pin available for all relays along with power and triggering LED indications. For Power supply screw terminal connector available, The total dimension of the board is 152 mm \* 60 mm with 4 mounting holes.

D. Power Supply

Although the whole project is work on the 12 volts DC supply ,that is supplied either by 12 volts battery or by 12 volts AC to DC adapter which is consist of the step down transformer ,and the bridge rectifier linked with the 4.7 microfarad capacitor. . The Arduino board also powered via the USB connection using PC or Laptop or with an external power supply source. The adapter can be connected by plugging a 2.1mm plug into the board's power jack. The board can operate on an external DC supply of 6 to 15 volts. If supplied with less than 7V, then during operation the 5V pin of board may supply less than 5 volts and made the board may be unstable. If using more than 12V, the voltage regulator used in the board may overheat and damage the board. So the recommended range is 7 to 12 volts DC. To give the full 24 hours supply to the system mostly they are connected with power inverter used at home for the uninterrupted power supply.

V. SOFTWARE ARCHITECTURE

A. Arduino IDE

IDE stands for Integrated Development Environment, entire programming for projected system is finished in Arduino IDE tool. For serial communication between Arduino board and smartphone the Baud rate of 9600 bits per second used. Arduino IDE command " Serial.available( ) " is employed to receive data directly from smartphone and "Serial.println" command is used to transmit information directly from Arduino board to smartphone.

```
if(string == "A") % condition check
{
void LightOn()
{
digitalWrite(Light, HIGH);% Turn ON the light
}
}
if(string == "B")% condition check
{
void LightOff()
{
digitalWrite(Light, LOW); %Turn OFF the light
}
}
```

Fig 4:- Codes for Switching of Appliances

B. Bluetooth Terminal Application

A smart phone application named Blueterm could be a easy mechanical man app which will create dominant the pins of Arduino from associate degree mechanical man phone wirelessly attainable. Blueterm employs a straight forward mechanical man computer program to regulate Arduino digital and PWM pins, send text commands from phones through Bluetooth module to Arduino and receive knowledge from Arduino over Bluetooth serial module. Terminal emulator name VT-100 for communicating with any serial device using a bluetooth serial adapter and emulate serial communication over Bluetooth by RFCOMM/SPP protocol.



Fig 5:- User Interface Bluetooth Terminal Application

VI. PROBLEM SOLUTION

After connecting with the system firstly the system ask for the password that is either pin or passcode that is digitally verified by the system ,that the password enter in the system is correct or not thereafter the system give the full monitor and control access to the connected user. The one can be done by easily includes the some line of codes in software used for programming of arduino uno. It increase the security of the entire system and also stop the unrecognized user to connect with the system.



```

void checkPassword()
{
if (password.evaluate())
{
digitalWrite(greenLED, HIGH);
lcd.print("User verified Access Granted");
}
Else
{
digitalWrite(redLED, HIGH);
lcd.print("Access Denied");
}
}

```

Fig 6:- Codes for Password Implement

## VII. RESULTS AND CONCLUSION

The main aim of this paper was to propose the solution for the problem concerned with security purposes in the home automation basically related to software change and that is related to the Arduino IDE software that we use in this project that is necessary for the check for the connected user is recognized one or not to enhance the security purposes.



Fig 7:- Final Connection of the Project

In this paper, the architecture of low cost and flexible home Automation system using Arduino microcontroller based on the bluetooth wireless system is proposed and implemented. We use Arduino because this is easy to understand & its coding is very easy. By implementing this type of system we can also ensure the energy conservation that is waste every day in the huge homes and bungalows. By help of this system we can increase the efficiency of the appliances and also we can have the complete control over the home appliances from a long distance. This will Increase the comfortability of human being and it will reduce the Human efforts. The Proposed system is analyzed and tested several times within the range of 20 meters and it achieved 100% accuracy.

## VIII. FUTURE WORK

This Proposed system is able to operate and control the appliances within short range only within 20m , for future research work it is recommended to increase the range and interface more sensors and also interface with the Google assistant system for enhance the security apart from this project, it should be a low cost and user friendly system. Moreover the home automation system can also be interfaced with biomedical (EMG) signals and It will be beneficial for physically challenged people, they will be able to control the appliances using their muscle's movement only.

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