

INTRODUCTION

In this modern era of development, automation of everything is the need of the hour. The basic aim of any development is to ease the human life. Home automation aims at automating the human lives. Activating the home appliances without conventional switch but by using a smart phone is known as home automation. Home automation is the use of one or more computerized remotes to control basic home functions and features remotely and sometimes automatically. An automated home is sometimes called a smart home. In present day world, more emphasis is put on wireless technology. It is because wired networks are messy and really complicated. These wireless technologies have impacted human life in a positive manner and human development speed has increased fore fold. The main wireless technologies used in home automation are GSM, Internet, Cloud and Bluetooth. Each technology has its own advantages and disadvantages. But Bluetooth based home automation systems have way more advantages. Devices can be connected from a range of 10m to 100m and this range can be increased by using piconet architecture. Also the frequency used for Bluetooth is 2.4GHz, which is globally available. The speed that can be fetched for Bluetooth services is up to 3Mbps. It is these basic advantages that have driven us to the idea of developing a Bluetooth based home automation system.

Android is the customizable, easy-to-use operating system that powers more than a billion devices across the globe – from phones and tablets to watches, TV, cars and more to come. Android is built on the open Linux Kernel. Furthermore, it utilizes a custom virtual machine that was designed to optimize memory and hardware resources in a mobile environment.

Android is open source it can be liberally extended to incorporate new cutting edge technologies as they emerge. The platform will continue to evolve as the developer community works together to build innovative mobile applications. Android breaks down the barriers to building new and innovative applications. Android provides access to a wide range of useful libraries and tools that can be used to build rich applications.

Google's argument is that Android is open because the code is opened to all, because Google doesn't charge for the platform, and because developers have access to it all. The only restriction is on Google services, for which the company demands that phone makers conform to certain specifications. Google's take on Android is that they make it as open as possible.

FEATURES

- Voice Command

The project will have an android application in the user's android device. This application is designed to receive the voice commands from the user. The application will automatically convert the voice signals into digital data and send these signals to the microcontroller.

- Smart Speech Sense

The application will be coded as such to decode the meaning of any statement from the user. The user won't be restricted to use of any particular command set. He would just have to state out his problem & the application will itself sense the meaning of the user's speech & convert it into respective available command.

- Bluetooth Range

The system can have a variety of Bluetooth ranges. Depending upon the use, required Bluetooth range module can be used the system. It thus makes the system cost dependent upon the kind of use of the system.

Objective of the project

- To develop a Bluetooth based home automation system with Arduino UNO Board and an Android application.
- Remote controlled home automation system provides a simpler solution with Android application technology.
- Remote operation is achieved by any smartphone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation

Definition of the Problem

In the current modern world the people are becoming more reliable on electronic appliances for their work and just to provide more comfort to the people we have thought of smart feature of home automation by which the people can operate the appliances by the voice command on their mobile phone and no need to open or close the switch.

Basic example:

People usually are outside the home for many reasons like travelling and they want to control some devices from a far distance. Examples:

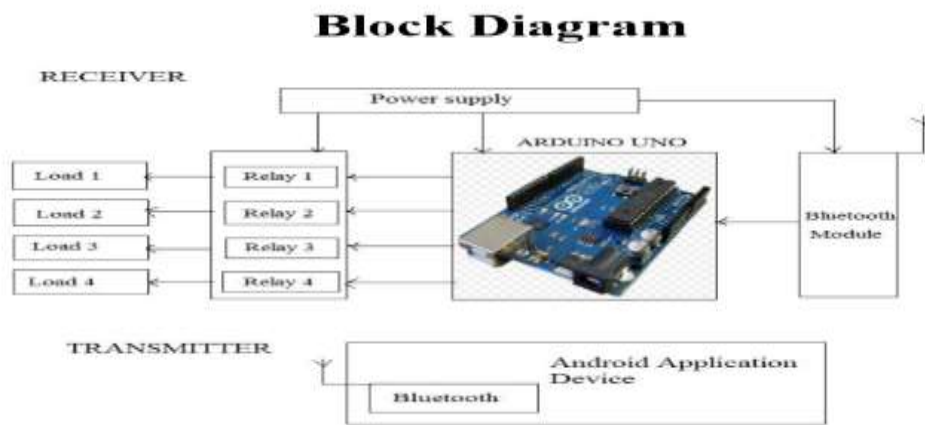
- i. Want to fill the water tank.
- ii. Want to turn off the light and electronic devices at rooms.
- iii. Get feedback about the temperature.
- iv. If somebody at your home.
- v. Total control on your home.

Methodology & Experiment

Components:

- Hardware requirements
 - Arduino UNO
 - Bluetooth Module - HC-05
 - 12V Relay
 - Power Supply
 - Breadboard
 - Led
 - Resistor 220 ohm
- Software Used
 - Arduino IDE
 - Eclipse Android SDK(Software Development Kit)
- Programming Languages Use
 - Embedded C/C++
 - Java & XML

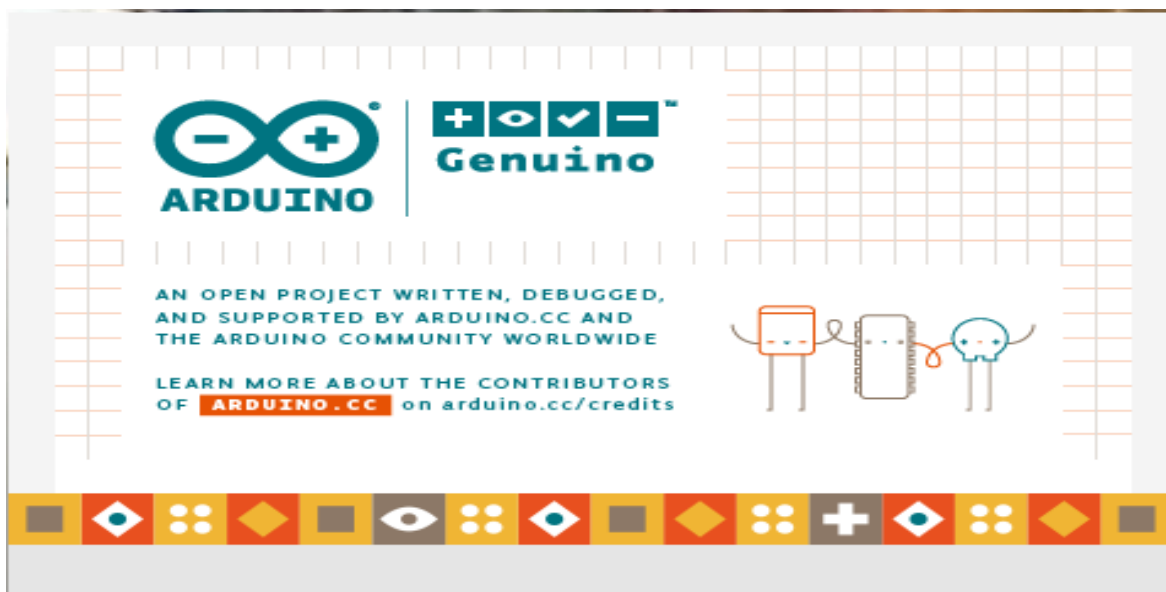
Circuit diagram:



Android application used:



Software used:



Arduino code:

sketch_apr27a | Arduino 1.8.1

File Edit Sketch Tools Help



sketch_apr27a\$

```
int ledPin1 = 12;
int ledPin2 = 11;
int ledPin3 = 10;
String readString;

void setup() {
  Serial.begin(9600);
  pinMode(ledPin1, OUTPUT);
  pinMode(ledPin2, OUTPUT);
  pinMode(ledPin3, OUTPUT);
}

void loop() {
  while (Serial.available()) {
    delay(3);
    char c = Serial.read();
    readString += c;
  }
  if (readString.length() > 0)
  {
    Serial.println(readString);
    if (readString == "*switch on light#")
      digitalWrite(ledPin1, HIGH);
    if (readString == "*switch off light#")
      digitalWrite(ledPin1, LOW);
    if (readString == "*switch on fan#")
      digitalWrite(ledPin2, HIGH);
    if (readString == "*switch off fan#")
      digitalWrite(ledPin2, LOW);
    if (readString == "*switch on bulb#")
      digitalWrite(ledPin3, HIGH);
    if (readString == "*switch off bulb#")
      digitalWrite(ledPin3, LOW);
    readString="";
  }
}
```

Done compiling.

Sketch uses 3714 bytes (11%) of program storage space. Maximum is 32256 bytes.
Global variables use 306 bytes (14%) of dynamic memory, leaving 1742 bytes for local variables. Maximum is 2048 bytes.

Basic methodology:

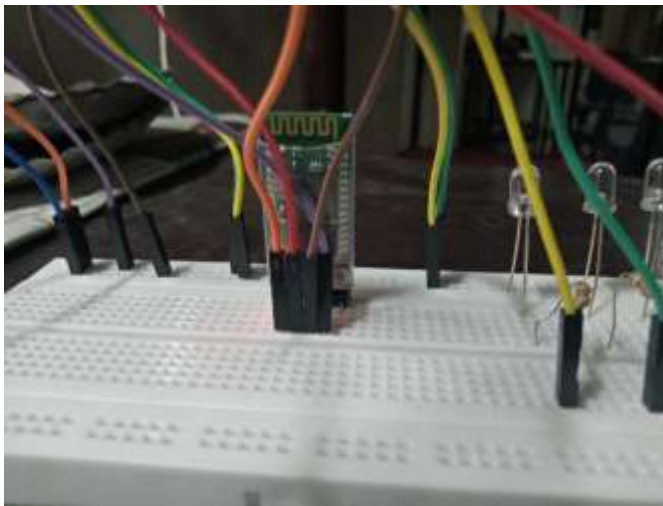
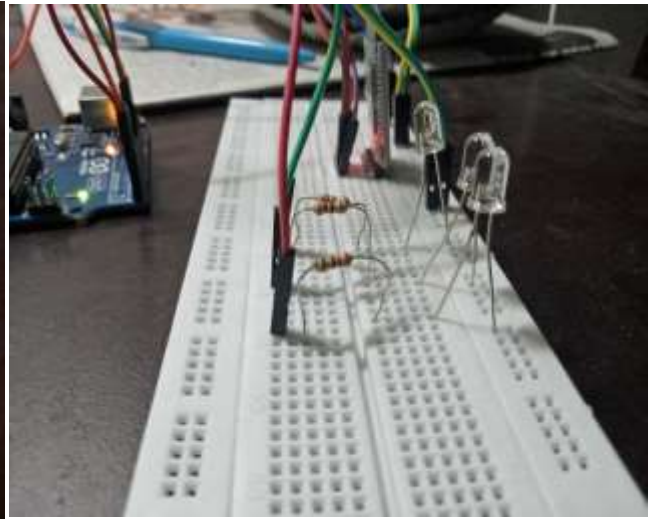
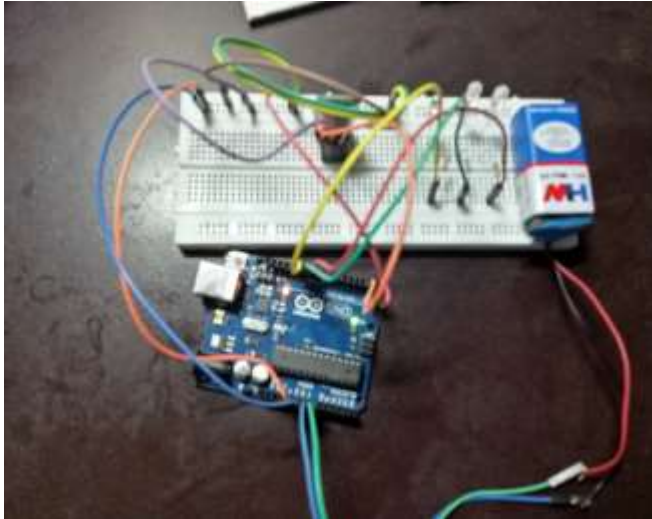
Using the system the code for switching the appliances on/off using Bluetooth is inserted into the Arduino board and after that the circuit based on the circuit diagram is made and then the different appliances are operated using the android device.

Working:

On giving commands using mobile such as the “switch on light” or “switch on fan” or “switch on bulb” the corresponding part will work and on giving command such as “switch off light” or “switch off fan” or “switch on bulb” the corresponding part will stop working.

Home automation applications:

Snapshot of working model:



Summary / conclusion

In this project, we have shown the design and features of a Smart Home Automation System. It is Bluetooth based, hence wireless and can be flexible in terms of cost. It has a special feature for smart speech sense, which would decode user's sentences into appropriate commands. The system also connects with sensors, thus helping in detecting LPG leakage, intrusion detection or fire breakout.

It provides the flexibility & system reliability with low cost as well as less maintenance. It provides remote access to the system to deliver service at any time of the day. With this system, we can control as well as monitor the devices at remote location. This project can also be used for following applications:

- 1) Industrial automation
- 2) Farm Automation

Advantages

- It is a robust and easy to use system.
- There is no need for extra training of that person who is using it.
- All the control would be in your hands by using this home automation system.
- This project can provide the facility of monitoring all the appliances with in the communication range through Bluetooth.
- The schematic of Arduino is open source, for the future enhancement of the project board can be extended to add more hardware features.

Disadvantages

- Bluetooth is used in this home automation system, which have a range of 10 to 20 meters so the control cannot be achieved from outside this range.
- Application is connected after disconnect of the Bluetooth.
- When the new users want to connect, first download application software and then configuration must be done.
- High power consumption because of Bluetooth connectivity.

Future scope

In future, the system could use more concepts of Artificial Intelligence so as make it more user friendly and increase the automation. Another function that may be added is developing the system for different languages other than English.

- Memory can be used to store the appliance status during power failure.
- Appliance scheduler/timer can be implemented using RTC (Real Time Clock)
- Can be changes to an IoT device using WiFi connectivity.

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