# ARDUINO BASED HOME AUTOMATION USING ANDROID APPLICATION

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**Abstract:** This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort. There has been a significant development in the area of an individual's routine tasks and those can be automated. In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion – a mobile phone, some daily household tasks can be accomplished by personifying the use of the mobile phone. Analyzing the current smart phone market, most users are opting for Android based phones. It has become a second name for a mobile phone in layman terms. Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an Bluetooth interfaced arduino which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This paper presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system. The HAS system for Android users is a step towards the ease of the tasks by controlling one to twenty four different appliances in any home environment.

**Keywords**: Home automation, Smart home, home appliances, Bluetooth, Arduino , Android.

## 1. Introduction

Today's homes require sophistication control in its different gadgets which are basically electronic appliances. This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet connectivity. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad hoc network with a connectivity options like Bluetooth. With the advent of mobile phones, Mobile applications development has seen a major outbreak. Utilizing the opportunity of automating tasks for a smart home, mobile phone commonly found in normal household can be joined in a temporary network inside a home with the electronic equipment. Android, by Google Inc. provides the platform for the development of the mobile applications for the Android devices. Home automation system is a mobile application developed using Android targeting its vast market which will be beneficial for the masses.

Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort. There has been a significant development in the area of an individual's routine tasks and those can be automated. In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion – a mobile phone, some daily household tasks can be accomplished by personifying the use of the mobile phone. Analyzing the current smart phone market, novice mobile users are opting for Android based phones. It has become a second name for a mobile phone in layman terms. Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an 8 bit Bluetooth interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This project presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system. The HAS system for Android users is a step towards the ease of the tasks by controlling one to twenty four different appliances in any home environment.
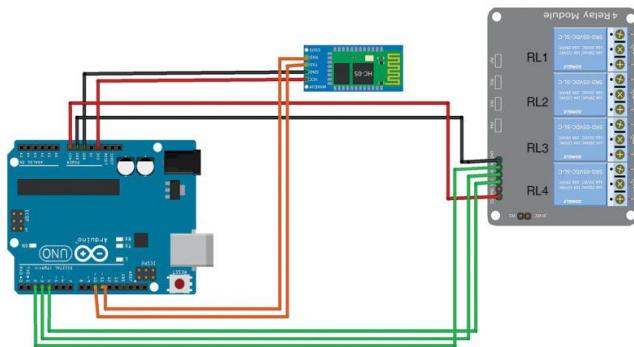
## 2. Proposed System

The proposed system will have following features:
1. Arduino
2. Devices controlled through android app, also through voice commands.
3. Mobile control
4. Bluetooth

## 3. Implementation

The circuit diagram of the proposed system is:



### 3.1 Hardware Requirements:

### 3.1.1 Arduino:

BLOCK : Microcontroller

TYPE : ATMEGA328

ANALOG/DIGITAL : Digital

PINS FOR INTERFACE : 20 Pins

PHOTO/CIRCUIT SYMBOL :



Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer (e.g. Flash, Processing.) The boards can be assembled by hand or purchased preassembled; the opensource IDE can be downloaded for free. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to

support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

### 3.1.2 Relay
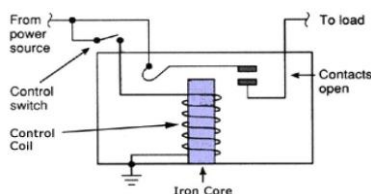


A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay but the relay can control something that draws much more power. A relay is used to control the air conditioner in your home. The AC unit probably runs off of 220VAC at around 30A. That's 6600 Watts! The coil that controls the relay may only need a few watts to pull the contacts together. A relay switch can be divided into two parts: input and output. The input section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in different configuration of operating voltages like 6V, 9V, 12V, 24V etc. The output section consists of contactors which connect or disconnect mechanically. In a basic relay there are three contactors: normally open (NO), normally closed (NC) and common (COM). At no input state, the COM is connected to NC. When the operating voltage is applied the relay coil gets energized and the COM changes contact to NO. Different relay configurations are available like SPST, SPDT, DPDT etc, which have different number of changeover contacts. By using proper combination of contactors, the electrical circuit can be switched on and off.
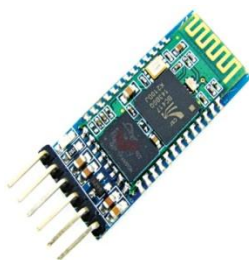
### 3.1.3 BLUETOOTH MODULE

BLOCK: Communication

TYPE:   HC-05

ANALOG/DIGITAL: Digital

PINS FOR INTERFACE: 4 Pins

PHOTO /CKT SYMBOL:



**DESCRIPTION:**
Bluetooth module used in this project is HC-05, which supports master and slave mode serial communication (9600-115200 bps) SPP and UART interface. Using these features it can communicate with other Bluetooth-enabled devices like mobile phones, tablets and laptops. The module runs on 3.3V to 5V power supply.

### 3.2  Software Requirements
### 3.2.1  Basic 4 android
MIT App Inventor software was used to create the Android app.The front end of the application is as shown below:

### 3.2.2 Arduino.cc

The software program for home automation using Android app is written in Arduino programming language called Processing. Arduino Uno is programmed using Arduino IDE software that you can download from arduino.cc. The developed code is then burnt to the chip using a USB cable

### 4. Conclusions

The purpose of the system is to use mobile phone's inbuilt Bluetooth facility for automation. Different hardware and software unit of the system are described. The complete application software has been designed using Android, using C Language. The HAS furnishes a good paradigm for any Automation System based on Android Mobile Phone and Bluetooth.

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### Biographical Notes

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