# "HOME AUTOMATION SYTEM USING ARDUINO"

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## Abstract

*This system is designed to assist and provide support in order to fulfil 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 0 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

Interactive computing, with wirelessly connected embedded devices that are being used in various day– to–day activities, are changing and improving the standards of the quality of life. Based on this interactive computing and communication technologies, many devices/products are now emerging and with this multimedia intelligence it is providing comfortable, secure and convenient personal services everywhere whether it is home or various industries and making a lot of users comfortable. Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. With the help of this system you can control your home appliances from your mobile phone. You can turn on/off your home appliances within the range of Bluetooth. Our system includes 2 different modules:

1) Hardware module
2) Software module

## 2. PROPOSED ARCHITECTURE DIAGRAM

The nature of home automation is introduced. It is argued that end users should be able to define how the home system reacts to changing circumstances. Policies are employed as user-defined rules for how this should happen. The architecture of the Homer home automation system is briefly overviewed. The Homer policy system and the Homeric policy language it supports are explained. A technique is described for offline conflict analysis among policies (the analogue of the feature interaction problem). A substantial worked example shows how conflict detection is performed on a range of sample home policies
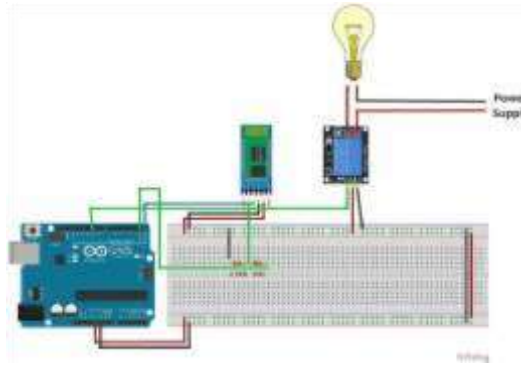
**Fig 1**: **Architecture of the system.**

## 2.1 EXISTING SYSTEM

Home Automation nowadays can be done in different ways. A variety of solution for connectivity is available such as SMS, Wi-Fi, Radio Frequency or Bluetooth. Among the possible hardware for the main system are microcontrollers including Arduino, computers even a Raspberry Pi or a combination of two. Microcontrollers are cheaper than computers. Choosing the right device depends on the size of project.

Most commercially available home automation systems are all-in-one solutions which require that all controllable appliances are from the same company, or must be approved as compatible with said company's system. Moreover these systems normally come with a proprietary, dedicated device which acts as the control center. To control the system from multiple locations, additional control devices must be purchased. These complex systems usually need to be integrated when the building is constructed and must be planned in advance. They are also difficult to upgrade or replace once installed. The overall investment adds up considerably and is financially infeasible in most cases. These drawbacks hinder the popularity of such systems.

## 2.2 PROPOSED SYSTEM

**Block Diagram:**

This paper propose a system in which the electrical appliances like fan and light are operated at a suitable distance with the help of Bluetooth module and Arduino. The block diagram of the proposed system is shown in figure 1. Bluetooth module is connected with the Arduino which interfaces the mobile phone with the Arduino. The Arduino controller is programmed such that the fan and the light are controlled based on the data sent by the mobile phone to the Arduino through the Bluetooth interfacing module.
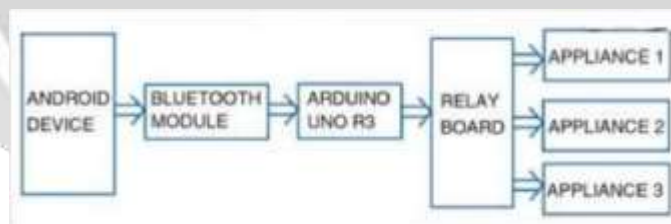


**Figure 2: Block diagram of proposed system**

## 2.3 Bluetooth (CH 05):

It is wireless technology standard for exchanging data over short distances (using short wavelength radio waves) from a fixed and mobile devices and building personal area networks ranges approximately 10 meters (30 feet). It is more capable module to use with Arduino [2].

**Arduino:**

Arduino is an open source platform used for building electronic projects. It consists of both the programmable circuit board and a piece of software or IDE that runs on a computer used to write and upload computer code to the physical board.

**Fan:**

In this module we are using a 12 volt cooling fan for which a adapter is used for power supply.

**LED:**

A light emitting diode is a two-lead semiconductor light source. It is PN junction diode which emits light when activated. There are various colors of LED'S available.

**IR Sensor***:*

The transistor section includes an IR sensor which transmits continuous IR rays to be received by an IR receiver module and IR output terminal of the receiver varies depending upon its receiving of IR rays [3][4].

## 2.3 HARDWARE DESCRIPTION ARDUINO

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board    we can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package [5].

### Features of the Arduino UNO Board

- Arduino is a USB interface like a serial device. The board directly plug in to the computer so it is easy and comfortable to interface with the computer.
- It is an open source device and very easy to debug the problem so it is more advantages between the large community peoples. In order fast up for application it has 16 MHz clock [6].
- It has inbuilt in voltage regulation in order to manage power inside and can be directly powered by USB without any external power.
- This board has 13 digital and 6 analog pins to connect the hardware with the external environment. With the help of these pins we can directly plug in the real-world data.
- This board has ICSP connector which is necessary to re boot load our chip and has 32 KB of flash memory for storing our code.
- An onboard LED and reset button is attached in order to make debug process easy.

### Bluetooth Module

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data

Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It has the footprint as small as 12.7mmx27mm.

### Modes of Bluetooth Module

The module has two modes of operation, Command Mode where we can send AT commands to it and Data Mode where it transmits and receives data to another Bluetooth module. The DATA mode is the default mode used in various applications.
Baud Rate: 9600 bps, Data: 8 bits, Stop       Bits: 1 bit, Parity: None, Handshake: None  Passkey: 1234
Device Name: HC-05
Before applying power to the module connect the key pin to high this put the module into command mode at 38400 bauds. If the KEY pin is high this will configure the current baud rate.
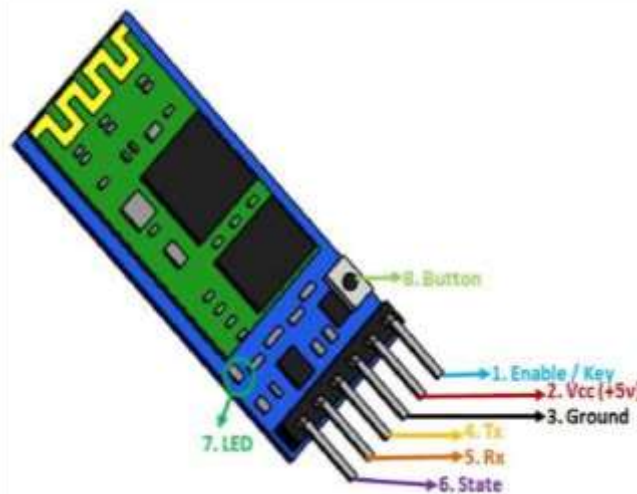


**Fig3: Pin Description of Bluetooth Module**

### 3. Relay



**Fig 4: Relay H152S module**

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, and DPDT etc. which have different number of changeover contacts. By using proper combination of contactors, the electrical circuit can be switched on and off.
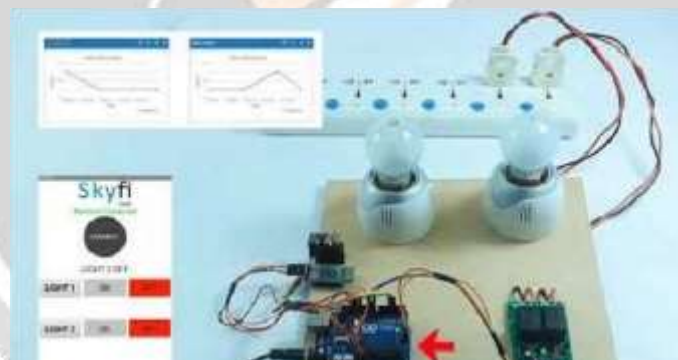


**Fig4: Hardware Arrangement Diagram**

### 4.    FUTURE SCOPES

In future product will conclude better dimensions, look and many features listed below.

• 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 Wi-Fi connectivity.

• A useful feature would be to add a wireless system which can send the encrypted char code to controller, hence enhance the security of the system.

• It will be connected to the internet and will be able to take queries from the user, isearch them over the internet, find the precise answer and return that to the user again.

• After all, it'll work like an assistance not real world but virtual world.

## 5. 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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