Home Automation Using Voice Recognition And Arduino

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Abstract: Computerization of the encompassing environment of a present day individual permits expanding his work proficiency and solace. There has been a huge improvement in the zone of an individual’s standard undertakings and those can be mechanized. In the present times, we can discover the greater part of the general population sticking to their cell telephones and brilliant gadgets for the duration of the day. Subsequently with the assistance of a buddy cell phone, every day family assignments can be refined by embodying the utilization of the cellular telephone. Home Automation System (HAS) has been intended for devices running Android which acts as a medium to mechanize a 8 bit Bluetooth interfaced microcontroller, Arduino. It has been programmed to control various home apparatuses like lights, fans and numerous other home appliances all the more utilizing on/off transfer. This paper shows the computerized methodology of controlling the gadgets in a family that could be a replacement of conventional switches. The most celebrated and effective innovation for short range remote correspondence Bluetooth is utilized here to computerize the framework. The HAS framework for Android clients is a stage towards the simplicity of the assignments by controlling one or more distinct machines in any home environment.

Keywords: Automation, Home Automation System, Android

I. SYSTEM ARCHITECTURE

The Home Automation System (HAS) was produced utilizing Android Studio throughout exploration and now a User Interfaced (UI) Android Application program actualized on an Android based Bluetooth empowered cellular telephone, and a 8-bit microcontroller(Arduino) based transfer driver circuit with Serial Bluetooth Module, which can speak with the Home- - Appliances over Bluetooth join. The framework depends on serial information transmission utilizing Bluetooth remote correspondence as a part of request to encourage the machines control in a HAS. This framework guarantees a secured trade of information on remote correspondence. It additionally underpins customary ON/OFF arrangement of machines. A client interface (UI) on the Android empowered cellular telephone offers framework association.

![Figure 1: System Architecture](image)

II. DEVELOPMENT PLATFORM

This segment portrays the advancements utilized for building up the concept to utilize cell phone for Home Automation System. The Android cellphone application was accompanied by Bluetooth technology.
2.1 ANDROID
Android is a mobile operating system (OS) currently developed by Google, based on the Linux kernel. Android is presently running in phones, tablets, TVs and set-top boxes. Soon Android will be in cars, in in-flight entertainment systems on planes, and even in robots. Android applications are written in the Java programming language. The Android SDK gives apparatuses to code accumulation and bundling information and asset records into a file document with ".apk" augmentation called as an Android bundle. Android gadgets utilized the ".apk" document to introduce the application. Android's application system takes into account the formation of to a great degree highlight rich and novel applications by utilizing an arrangement of reusable segments.

2.2 BLUETOOTH
Bluetooth is a remote innovation standard for trading information over short separations. Bluetooth radio has a transmission between 2400–2480 MHz. It was developed by Telecom merchant Ericsson in 1994.

Bluetooth technology forms small ad hoc networks termed as Personal Area Networks (PANs) also provides a mechanism to emulate the RS-232 data cables.

Modern mobile devices embed small, low-powered and cheap integrated chips functioning as short-range radio transceivers for Bluetooth radio communications. Device pairing, authentication, encryption and authorization techniques have given recognition to Bluetooth technology due to its vital security mechanisms.

The Bluetooth utilized as a part of Home Automation System (HAS) Android cell phone application is the Bluetooth Serial Port Profile (BTSPP). RFCOMM is a connection-oriented protocol. It provides streaming communication between the devices. The btssp profile and RFCOMM protocol are used in the application to access the serial port and communicate using streaming data. All of the Bluetooth APIs is available in the android, bluetooth package.

2.3 ARDUINO
The Arduino Uno is a microcontroller board based on the ATmega328p. 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.

We power up the microcontroller by either connecting it to a computer using a USB cable or supplying it with an AC-to-DC adapter. The Arduino circuit acts as an interface between the software part and the hardware part of the project.

The Bluetooth module transmits the text to the Arduino Uno serial port. The text is matched against the various combinations of predefined texts to switch the appliances on/off. The appliance name and a command for on/off are stored as predefined command. For example, to switch on a fan, the user needs to say “fan on” and to switch it off he needs to say “fan off”. The appliances are connected via the relay boards to pin numbers 2, 3 and 4 of the Arduino Uno. When the matching text is detected the corresponding pin number is given a high or low output signal to switch the appliance on and off respectively.

For loading programs from personal computers the boards feature serial communication interfaces, including USB. The Arduino platform provides an integrated development environment (IDE) in order to interface the device. The hardware design specifications are openly available, allowing the Arduino boards to be programmed by anyone.

III. COMPONENTS REQUIRED

3.1. MICROCONTROLLER
A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application. We have used Arduino as microcontroller for giving signals to the relays and taking signal from the bluetooth device HC 06. It takes 5 V dc power supply

![Arduino Microcontroller](image2.png)

**Figure 2: Arduino Microcontroller**

### 3.2 DC RELAYS
A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit.

![DC Relays](image3.png)

**Figure 3: DC Relays**

### 3.3 DIODES
A diode is a two-terminal electronic component that conducts primarily in one direction it has low (ideally zero) resistance to the flow of current in one direction, and high (ideally infinite) resistance in the other. Diodes are used in the circuit for rectification and a single diode is used as freewheeling diode. All diodes are 1N4007.

![Diodes](image4.png)

**Figure 4: Diodes**

### 3.4 BLUETOOTH RECEIVER HC 06
Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). A Bluetooth receiver HC 06 is required for catching signal from android phone.

3.5 VOLTAGE REGULATOR IC
A voltage Regulator is used to provide correct voltage to individual components of a circuit. LM 7812 a voltage regulator IC is used in the 9V DC Power supply.

3.6 ELECTRICAL WIRE AND JUMPER WIRES
Electrical wire is used in the AC power supply and Jumper wire in the DC power Supply.

3.7 RESISTANCE AND CAPACITANCES
Resistances are used for current limiting and capacitances are used for reducing ripples in DC power supply as per specifications.

IV. CIRCUIT DIAGRAM

![Circuit Diagram](image-url)

Figure 7: Arduino Controlled Relay
V. WORKING
Using the above mentioned components we implement our system on a breadboard. The microcontroller device with the Bluetooth module and relay circuit needs to be attached with the switch board. Then we need to launch the android based application- “Smart Home” on our Smartphone. Through the application we can instruct the microcontroller to switch on/off an appliance. After getting the instruction through the Bluetooth module the microcontroller gives the signal to the relay board.

The application first searches for the Bluetooth device. If it is available, then it launches the voice recognizer. It reads the voice and converts the audio signal into a string. It produces a value for each appliance which will be given to the microcontroller device. The microcontroller uses the port in serial mode. After reading the data it decodes the input value and sends a signal to the parallel port through which the relay circuit will be activated.

VI. CONCLUSION
The system as the name indicates, ‘Home Automation using Voice Recognition and Arduino’ makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a Bluetooth module, Arduino microcontroller and relay circuits. Bluetooth is used as the communication channel between android phone and the Arduino microcontroller. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device’s display.
Due to the inexpensive materials used in the construction and further cost optimization if the device is taken to the market, it finds application in a wide area. Scalability of the project would be considerably easier as the device can be used in every building using electrical appliances and devices.

REFERENCES