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## HOME AUTOMATION USING ARDUINO

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**Abstract:** Every day we are aiming for a relaxed and more convenient method of living. Technology plays an anchor role in making our homes more automated and hence more convenient. This research objective is to design and implement a cost effective but yet flexible, adaptive and secured Home automation system. This paper is about home automation system which would use a Smartphone to enable the authorized user to operate all the appliances. The system has three components: an Arduino microcontroller for connecting the appliances, a Bluetooth module for signal transfer, and a Smartphone with running the Android application. Android Application decodes the user's voice command and extracts the exact meaning of his command. The design is based on an Arduino Uno board and the appliances are connected to this board using switches. The Smartphone interacts with the Arduino via Bluetooth. The main aim of the system development is to be low cost and scalable according to the requirements. Password protection can be used to be more secure. Voice controlled House Automation System makes the use of voice to control devices. The advantages of using voice as an interfacing medium are many. Firstly there is no need of training of operating technology. Secondly, the simplification of services would give us wider adoption of existing technology and would help people with varied disabilities access the same technology..

**Index Terms -** Android, Arduino, Microcontroller, Bluetooth

### I. INTRODUCTION

the main attraction of any automated system is reducing human labor, effort and time. 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. upcoming technology is natural language processing which enables us to command and control things with our voice. in modern era more importance is put on wireless technology. due to wired networks are messy and complicated. These wireless technologies have great impact on human life in a positive manner and human development speed has increased.

The main technologies used in home automation are GSM, Internet and Bluetooth. Each technology has its own merits and demerits. But Bluetooth based home automation systems have an upper hand. Devices can be connected from a range of 10m to 100m and this range can be increased. Also the frequency used for Bluetooth is 2.4GHz, which is available globally. The speed that can be fetched for Bluetooth services is up to 2.8 Mbps. So these advantages made way for high development in Bluetooth based home automation

### II. LITERATURE SURVEY:

It was from 1880s wireless communication was started. Nikola Tesla gave the idea of using remote control for vessel and vehicles in 1898.[1]Further with the study of electrical appliances the idea of home automation. A.R.Al-Ali and M.Al-Rousan were the first to develop Home automation system using java programming.[2] It mainly used Wi-Fi as a medium for communication between software and hardware component. The main drawback was the range as the range of Wi-Fi was limited hence the user has to be within the range. An android based home automation was then developed. [3] It used internet in the place of Wi-Fi and its disadvantage was Unavailability of Internet.

Embedded smart home management scheme was presented [4]. It was based on use of Ethernet network. The system also had GSM support for the issue of unavailability of network. It was thus costly and hence was the only disadvantage.

presented the idea of Bluetooth based Home automation.[5]It used arm processor (ARM9 and ARM7), and so the system has a complex architecture.

### III. 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 and automatically. The application will the 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 command & the application will itself sense the meaning of the user's speech & convert it into respective available command (this is done by Google).

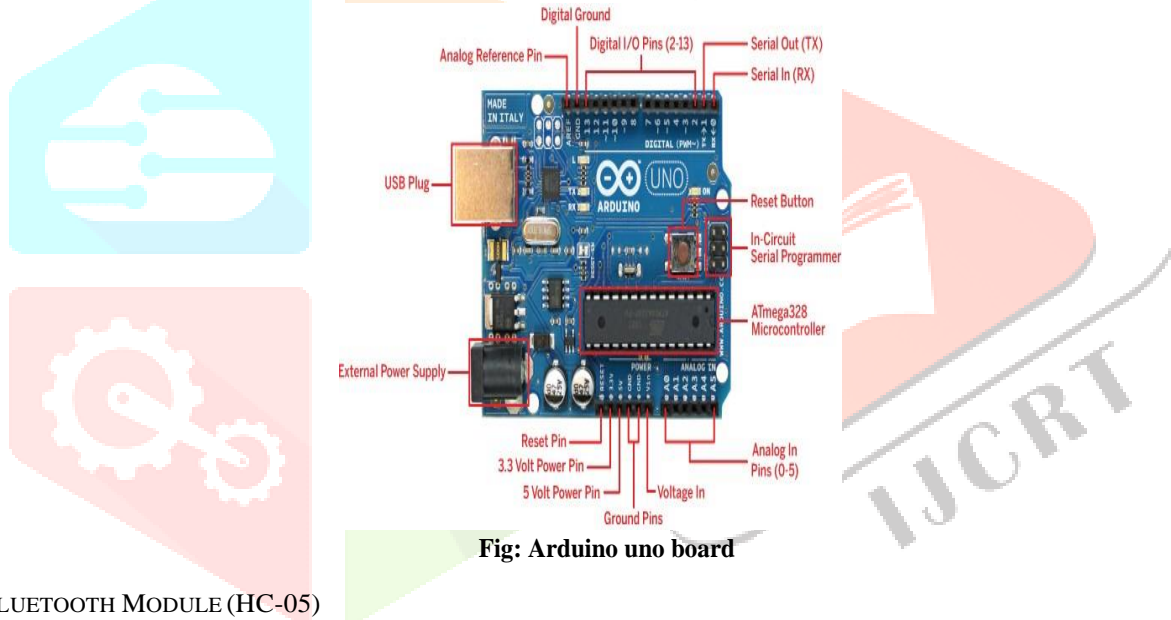
#### Bluetooth Range

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.

#### RESOURCES USED

##### Arduino Uno

[7]This microcontroller is based on the ATmega328. There are total of 20 pins (0-19) out of which 6 are analog inputs which can also be used as general purpose pins, a ceramic resonator of frequency 16MHz, an USB connection, a power jack and a reset button. It contains everything needed to support a microcontroller.



**Fig: Arduino uno board**

#### IV. BLUETOOTH MODULE (HC-05)

[8]Bluetooth Sub-modules work well with Arduino and other Microcomputers. HC-05 is a more capable module that can be set to be either Master or Slave. HC-05 is small (3 cm long) and run on 3.3V power with 3.3V signal levels, they have no pins and usually solder to a larger board. 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. "Breakout" Boards that make these easy to use are available and recommended. These mount the sub- module like that shown on the right on a slightly larger board.

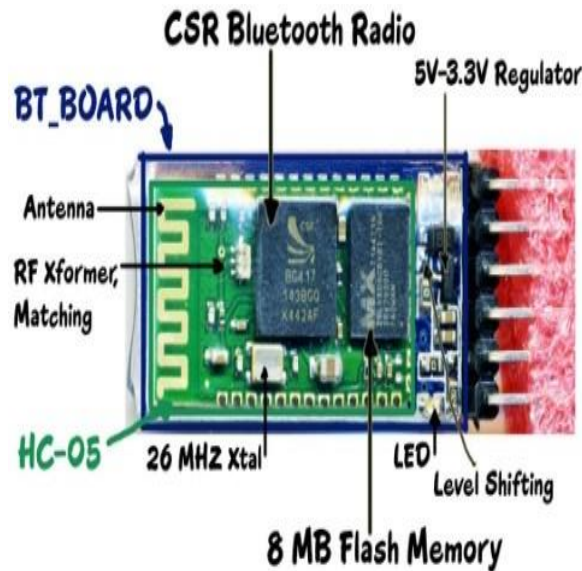


Fig: Bluetooth module

#### IV. SOFTWARE DESIGN

THE SOFTWARE SECTION INCLUDES SPEECH RECOGNITION SOFTWARE DESIGN AND EMBEDDED SOFTWARE DESIGN. VOICE RECOGNITION IS THE TECHNOLOGY BY WHICH SOUNDS, PHRASES ETC. SPOKEN BY INDIVIDUALS ARE CONVERTED INTO ELECTRICAL SIGNALS AND THESE SIGNALS ARE CHANGED INTO CODING PATTERNS TO WHICH MEANING IS ALLOCATED. THIS CONCEPT COULD MORE GENERALLY BE CALLED AS SOUND RECOGNITION OR SPEECH RECOGNITION. HUMAN VOICE IS MAINLY FOCUSED HERE, BECAUSE WE MOST NATURALLY AND MOST FREQUENTLY USE OUR VOICES TO COMMUNICATE OUR THOUGHTS TO. THESE HUMAN VOICES ARE CONVERTED INTO SIGNALS BY APPLICATION

#### V. BLOCK DAIGRAM



Fig: Block diagram of Home automation system

This block diagram shows clear picture of home automation using Android device. The home appliances are connected to Arduino microcontroller. The user with their android phone which is connected to micro controller which has interfaced Bluetooth module

#### VI. DESIGN

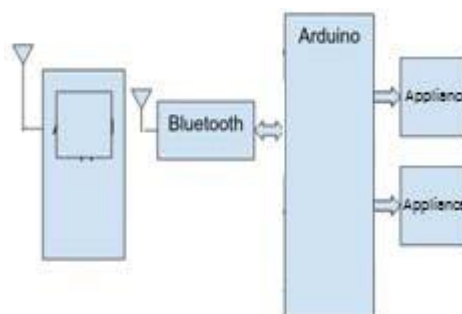
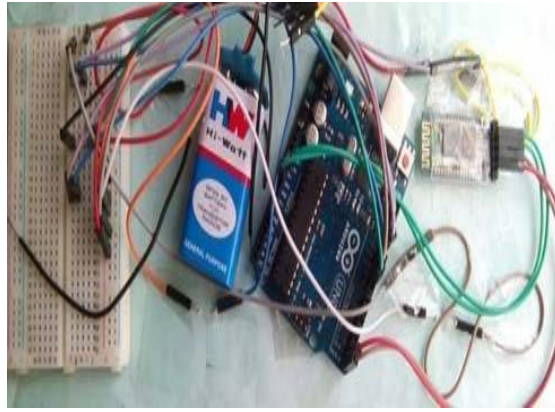


Fig: Block Diagram for Android Based Home Automation System Using Bluetooth & Voice Command



**Fig: Automation System**

The below figure shows the work flow of the device. At first the user must connect their android device to Bluetooth using the login credentials given. On authentication the user will be connected to the system. After the connection user has to open the application which will be preinstalled in the android phone. Now the user has an option for voice command in which the user gives their command in the form of audio.

#### **VII. Advantages:**

The system requires less cost and is very flexible. It also provides security to the system. Finally it makes home as "SMART HOME".

#### **VIII. CONCLUSION**

Voice Controlled Home Automation is a very different concept than what is presently available in the market. This would make automation easier. The people will be able to interact with the system. It also is an important aspect in the present world where people are so busy, this would help them in easing the basic functionality of their life. The world around us is going digital in every aspect we can imagine and it is happening fast, we also need to move forward with it. Our system is a great initiative step in automation, it would also provide with security. As it is based on voice recognition we can assign particular password to each user and the automation will respond to the correct passwords only.

In future, the system could use more concepts of Artificial Intelligence so as to 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.

#### **IX. REFERENCES**

- [1] Wikipedia link: [https://en.wikipedia.org/wiki/Home\\_automation](https://en.wikipedia.org/wiki/Home_automation)
- [2] A. R. Al-Ali and M. Al-Rousan, "Java-based home automation system", IEEE Transactions on Consumer Electronics, vol. 50, no. 2, pp. 498-504, 2004
- [3] Wireless Sensor Networks: Concepts, Applications, Experimentation and Analysis. 2016. p. 108. ISBN 9811004129. The use of standardized, with open standards over proprietary protocols provides the industry with the freedom to choose between suppliers with guaranteed interoperability. Standardized solutions usually have a much longer lifespan than proprietary solutions
- [4] Jump up^ "Research and Markets: Global Home Automation and Control Market 2014-2020 - Lighting Control, Security & Access Control, HVAC Control Analysis of the \$5.77 Billion Industry". Reuters. 2015-01-19. Archived from the original on 2016-05-05.