Voice Enabled Home Automation Using IOT

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Abstract: The internet of effects(IOT) is the inter-networking of physical bias, and other particulars bedded with electronics, software, detectors that enables these objects to collect and change data. Then we use voice control medium for home automation. The technology is natural language processing which enables us to command and control effects with our voice. By this medium we can control any appliance by our own voice commands. It's substantially significance to old aged people and physically handicap people.

1. Introduction

The Internet of Things, or IoT, means, the billions of physical devices around the world that are connected to the internet, all collecting and sharing data with each other. All because of the arrival of super-cheap computer chips and the availability of wireless networks, now it's possible to turn on anything. Connecting up of all different objects and adding sensors to them adds a level of digital intelligence to communicate real-time data without involving a human being.

With the help of the IOT home automation make further simpler. In moment's world Automatic systems are being preferred over homemade system. The main magnet of any automated system is reducing mortal labour, time and crimes due to mortal negligence. The home automation using Internet of things has been experientially proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled ever through internet. The designed system not only monitors the detector data, like temperature, gas, light, stir detectors, but also actuates a process according to the demand illustration switching on the light when it gets dark.

There is many mechanisms used for home automation. Here we use voice control mechanism for home automation. The technology is natural language processing which enables us to command and control things with our voice. By this mechanism we can control any appliance by our own voice commands. It is mainly importance to old aged people and physically handicapped people. It will enable them to control their home devices with ease, without going through much pressure or stress of moving about. Here we are discussing two mechanism using voice.

1) Using Arduino Uno
2) Using Raspberry Pie

2. system design USING ARDUINO UNO

The key components of this system are:

- Android based phone
- Bluetooth module
- Relay boards
- Arduino Uno

I. Android Based Phone

Android is mobile operating system based on linux kernel and currently developed by google. Actually, we need an android phone with perfectly working microphone and Bluetooth facility. This mobile application will connect to the Bluetooth module and then converts the voice commands to string. And this string is passed to the Arduino Uno with the help of bluetooth module.

II. Bluetooth Module

Bluetooth is a wireless technology for exchanging information over a short-range distance. Here, we use HC-05 Bluetooth module to connect the mobile and Arduino Uno. It receives the information in form of strings and transmits it to the serial port of Arduino Uno.

III. Relay Board

Relay board is just an electromagnetic switch. It is activated when the current is applied to it. In this project the relay circuit is used to turn the appliances on and off. When the Arduino uno detects the command, they transmit a voltage through a relay connected to the device (home appliances) which we wanted to access.

IV. Arduino Uno

Arduino Uno is a microcontroller board based on the Atmega328.It has

- 14 inputs or output pins
- 6 analog inputs
- 16 MHz ceramic resonator
- USB connection
- A power jack
- ISP header
- Reset button

It stores a set of predefined commands in the form of strings. When the user sends a command the Arduino Uno matches those strings against the various combinations of predefined commands to access the appliances. For example, to switch on the television we need to say "Television on".

Arduino Uno

3. Working Model

This working modeling needs an android application to convert the voice commands to string and transmits it to the Arduino Uno through the bluetooth module. The bluetooth module is connected to Arduino Uno serial port and Arduino is connected to relay board which is already connected to each of the home appliances with a unique pin number to each of them. Through this android application we can instruct the micro controller to switch off/on the appliances. After getting the instruction through the bluetooth module, the microcontroller gives the signal to the relay board.
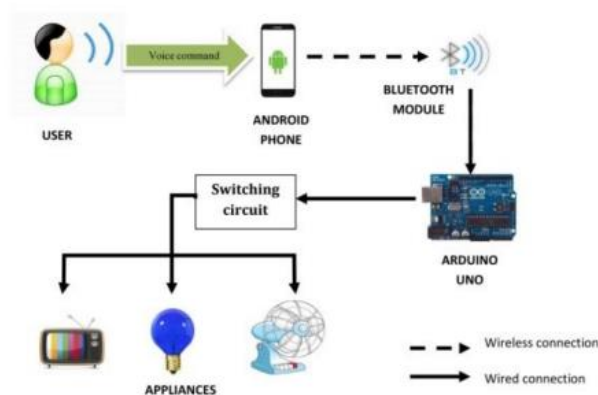
Block Diagram of the System

The first application searches for bluetooth devices for the connection. When the connection establishes it launches the voice recognizer. It reads the voice and coverts the audio into string format and transmit it into Arduino uno serial port. Arduino matches the string against the predefined commands and send signal to corresponding relay port. The appliances are connected to the relay board to pin numbers 1, 2, 3 . etc. When the matching text is detected corresponding pin numbers is given a high or low voltages to switch the appliances on and off respectively.

4. system design using RASPBERRY PIE

Raspberry Pie is a microprocessor which contains Raspbian as the operating system which execute the code for the desired output. We are going to use to Raspberry pie 3 model b which has 1gb ram, wireless LAN and Bluetooth 4.1 installed already. The main programming language used here is python which is programming friendly and memory efficient. Here, we replace the Arduino uno with Raspberry pie, because of the Arduino's limitation in processing speed and handling interrupts.

Relay Board

Relay board is just an electromagnetic switch. It is activated when the current is applied to it. In this project the relay circuit is used to turn the appliances on and off. When the Raspberry Pie detects the command, they transmit a voltage through the relay connected to the device (home appliances) which we wanted to access.

Voice Controlled Module

Jasper is an open-source platform used to create voice-controlled applications. Together with some hardware Jasper provides always-on tool which you can ask questions or can be applied to control your home with your voice from several meters away. Jasper's design was specifically correct for the Raspberry pi (Model B). It requires a USB microphone or any other input hardware should be connected to Raspberry Pi. An internet connection is needed for logging in to the Pi from computer during the software installation.

We will be using Jasper software for voice recognition of the commands given at the microphone used. The jasper software will use pocket sphinx for further processing. Pocket sphinx is an open-source speech decoder. Advantages are that it is quick and is developed especially for android and embedded systems like the Raspberry Pi. It does not transfer microphone data over the internet so your personal information is safe. The recognition is performed offline. Disadvantages are that it does not have a very high recognition rate and it has a lot of dependencies. We can also use google STT or AT&T STT instead of pocket sphinx.

Working Model

The microphone will receive the voice commands given from the user. Jasper will use the recognition software in this case Pocket sphinx a STT engine used to produce according data. This data will be given to raspberry pi which will switch on/off the devices with the help of a relay switch. Thus, home automation will be implemented using our voice. In addition, we have also designed a code based on the working schedule of the user. Based on his/her usage of the appliances on each day the data will be used to automatically switch on/off the devices for that interval of time.

5. ARDUINO UNO V/S RASPBERRY PIE

ARDUINO UNO	RASPBERRY PIE
Open Source	Closed Source
From atmega family	From Arm family
Clock speed- 16 MHz	1.5 GHz
Requires less RAM (2kb)	Requires large Ram(more than 1 GB)
It is microcontroller	Based on microprocessor
Simple hardware structure	Complex structure
C/C++ are the languages used	Python is used
Cheaper in cost	Expensive
Perform single task at a time	Can perform multiple tasks
Does not support wifi	Support both Bluetooth and wifi

6. CONCLUSION

The project will enable us to bring every appliance at every corner of our home under our control from a single point without having to get up and manually switch on or off the appliance. The use of a Bluetooth module assists the use of this system from various locations in our house. The system is further simplified by allowing appliances to be controlled by our voice. The user need not have to have to immense knowledge over the language of English. Just by saying the appliance name and the corresponding number assigned to that particular appliance, and telling it to switch on or off will enable the user to have complete control over any appliance without any effort.

This system, though primarily aimed to reduce human effort, will be of much importance to old aged people and physically handicapped people. It will enable them to control their home devices with ease, without going through much pressure or stress of moving about.

References

1. https://www.geeksforgeeks.org/difference-between-arduino-and-raspberry-pi/amp/
2. https://linuxhint.com/advantages-and-disadvantages-arduino/
3. https://www.instructables.com/Iot-Based-Home-Automation-System-With-Speech-Recog/
4. A Review of home Automation using IOT applications(2016) By H.Santhi,Gayatri P School of Computing Science and Engineering,VIT University,Vellore,Tamil Nadu,India. [2] Vidyasagar (2015).
5. Vidyasagar (2015). Android Phone Enabled Home Automation. Journal of Academia and Industrial Research(JAIR)
6. Universita'degli Studi di Roma' La Sapienza. [4] Amrutha S (2015). Speech Recognition Based Wireless Automation of Home Loads-E Home System
7. Amrutha S (2015). Speech Recognition Based Wireless Automation of Home Loads-E Home System