

HOME AUTOMATION FOR BEDRIDDEN PATIENTS USING BT VOICE CONTROL

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Abstract

Home automation sector is expanding rapidly which can be used to support bedridden patients. Patients who are confined to their beds are unable to perform any type of job without the support of others. Using voice instructions as an input to a microcontroller to operate home appliances is one solution to this challenge. Those who are confined to their beds can use voice commands to manage a variety of gadgets. The entire system is designed to be voice controlled, eliminating the need to type anything.

Key words: Home Automation system, voice commands, disabled people, Internet of Things.

Introduction

The notion of a home automation system has been around for a while and is getting more popular these days. [1].The world's demographics reveals a pattern in which the old population is quickly growing as people's average life expectancies rise. Home automation is aimed at two groups of people: those looking for luxury and those with special needs, such as the elderly and disabled. The goal of the Wireless Home Automation is to provide a system that can listen to voice commands and regulate the on/off status of electrical items in the home and can also control mechanical devices such as door etc.[2]The ability to operate household gadgets via smart technology could be extremely beneficial to people with physical limitations and the elderly[3].Now a days The Internet of Things is the most widely used platform for communication. The number of IoT users is expected to increase dramatically in areas where the economy grows rapidly[4].The main objective of this research is to develop a system that can act as a assistant for the elderly and physically impaired at home. [5].The majority of smart home systems communicate with each other via wireless technologies [6].Here we will be using Bluetooth voice control for arduino app as a connection between phone and Bluetooth. The user will be sending voice commands as an input to the Bluetooth via Bluetooth voice control app. Humaid AlShu'eili, Gourab Sen Gupta, Subhas Mukhopadhyay designed a Voice Recognition Based Wireless Home Automation System. The hardware design consists microphone ,central controller and appliance control modules .The communication .Zigbee protocol is used communication purpose. NorhafizahbtAripin and M. B. Othman developed a Voice Control of Home Appliances using Android with the help of Arduino. Input commands are provided either by touch or by voice.Operation of light and fan along with the speed of the fan are controlled with the help of input commands. A Graphical User Interface (GUI) is used for providing thintp commands. Y ash M ittal, P aridhi T oshniwal, Sonal Sharma, Deepika Singhal , Ruchi Gupta5 and V. K. M ittal introduced a A Voice-Controlled Multi-Functional Smart Home Automation System uses a mc and voice recognition module for sending voice commands to the microcontroller. Raju Hajare, MallikarjunaGowda,Suhani Jain, Pooja Rudraraju and Apoorva Bhat introduced a Design and Development of Voice Activated Intelligent System for Elderly and Physically Challenged. Speech Recognition system is used for generating required input

signals for microcontroller. Eneria platform is used as an interface between hardware and software. Voice Activated Smart Home Design and Implementation uses Raspberry Pi 3 module B for processing programming codes. Alexa is used for voice recognition of disabled people. This system is developed by Chan Zhen Yue and Shum Ping. Progress Mtshali and Freedom Khubisa introduced a A Smart Home Appliance Control System for Physically Disabled People. For capturing input commands from users smart camera, power strips and plugs are used. Voice commands are obtained with the help of digital assistants. HarisIsyanto, AjibSetyo Arifin and Muhammad Suryanegara developed Design and Implementation of IoT-Based Smart Home Voice Commands for disabled people using Google Assistant. NodeMCU ESP8266 is used for hardware implementation. Google Assistant is used for capturing the voice commands.

Materials and methods

Arduino Uno: The ATmega328P microprocessor is used in the Arduino Uno. The operational voltage of arduino uno is 5V. The input voltage range of arduino is from 7V to 12V.

Relay: A relay is an electrically controllable switch. It has one or more control signal input terminals as well as functional contact terminals. It is used when a low-power signal is needed to control several circuits.

Bluetooth HC05: The HC-05 Bluetooth Module is a straightforward Bluetooth SPP module that can be used to establish a wireless serial connection. It is used as an interface between smart phone and microcontroller.

Step down transformer: It is a device which is used to convert high voltage from the primary side to low voltage at the secondary side.

Bridge Rectifier: It's a full-wave rectifier that uses diodes in a bridge circuit to convert alternating current to direct current.

Voltage regulator: It maintains steady voltage during load changes and power fluctuations.

Table 1 describes the list of components and their pictures.

Fig.1. Block diagram of home automation system

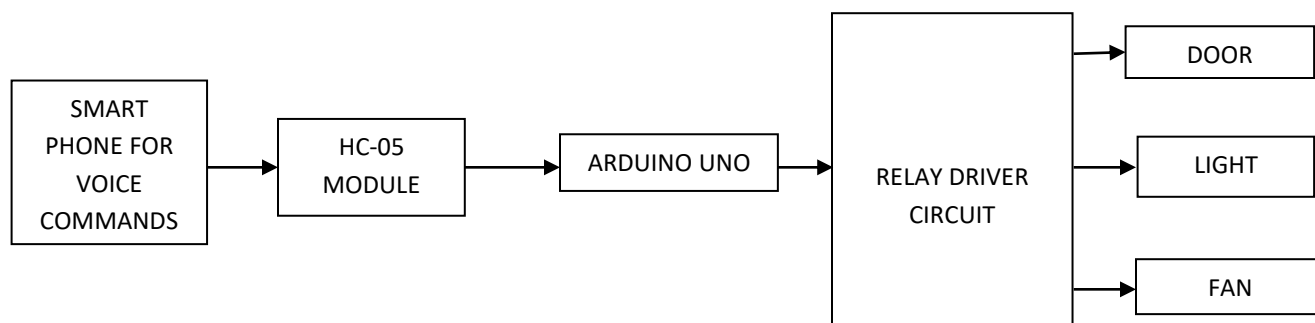


Figure1 describes the functional block diagram of home automation system. This system receives voice commands through Bluetooth voice control for voice commands app on smart phone. Prior to this Bluetooth connection between smart phone and Bluetooth module must be established. BT voice control acts as an interface between Bluetooth and smart phone. These commands if valid will be sent to microcontroller through Bluetooth. The Arduino Uno is used to actuate the

devices as per voice command. The output signals generated from the arduino has low power which is not sufficient to drive the output devices .To overcome this problem we are using relay driver circuit. The main purpose of the relay is to drive larger currents to operate the devices with the help of low power signals. In this home automation system we will be controlling light, fan and door.

Table No.1: components and their pictures







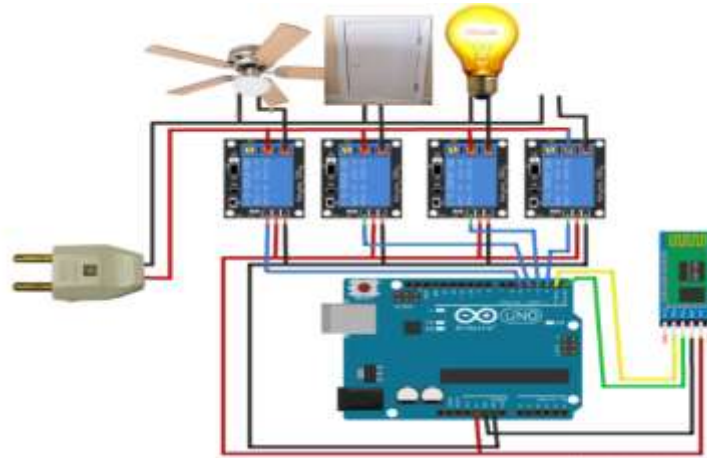
S.no	Component name	Component picture
1	Aurduino uno	
2	Relay	
3	Bluetooth hc05	
4	Step down transformer	
5	Bridge rectifier	
6	Voltage regulator	

Fig.2.Circuit Diagram



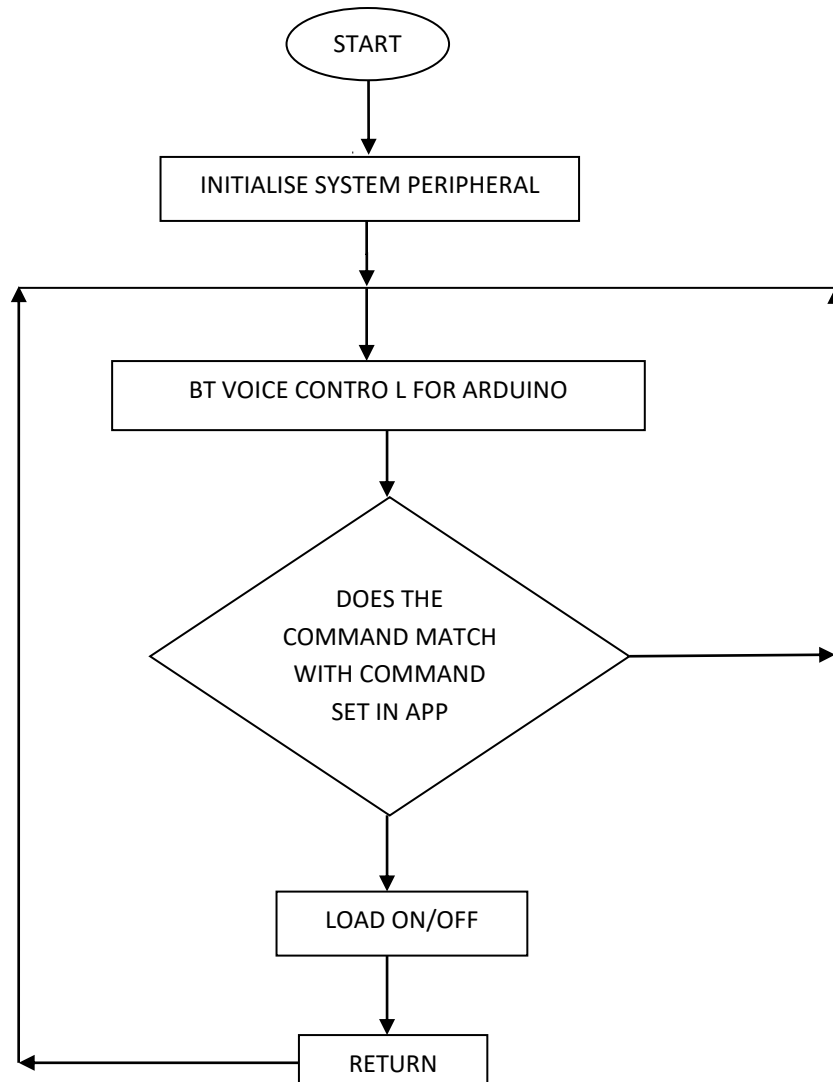
The 230V power supply from the switch is given to a step down transformer to convert it into 12V ac. The transformer's output is coupled to a bridge rectifier, which converts it to 12V dc. The output from microcontroller is connected to a relay driver circuit which consists of four relays. Out of four the output of three relays are connected to loads i.e., light ,fan and door. The circuit diagram of home automation system can be seen in figure2.

While using BT voice commands for bluetooth app the respective voice commands for switching on the light, turning o the light and opening the door are: ON, START and DOOR ON.

Here we use 3 relays by giving the inputs like 000 001 010 011 100 101 110 111.

- When 000 is given then the 3 devices i.e., Light and fan will be off and the door will be closed.
- When 001 is given then the 3 devices i.e., Light will be on and fan will be off and the door will be closed.
- When 010 is given then the 3 devices i.e., Light will be off and fan will be on and the door will be closed.
- When 011 is given then the 3 devices i.e., Light and fan will be on and the door will be closed.
- When 100 is given then the 3 devices i.e., Light and fan will be off and the door will be opened.
- When 101 is given then the 3 devices i.e., Light will be on and fan will be off and the door will be open.
- When 110 is given then the 3 devices i.e., Light will be off and fan will be on and the door will be opened.
- When 111 is given then the 3 devices i.e., Light and fan will be on and the door will be opened.

System flowchart



Results and discussions

When the home automation system is completely operational for switching applications and turning on home appliances, the user interface is updated to reflect the current condition. Using voice recognition, home automation is aimed to control equipment remotely at low cost.

The purpose of voice recognition is to ensure that voice can be identified, understood, and interpreted. The android phone has been programmed using voice recognition in this project. The user's command will then be assessed using the BT voice control app. In this project, the BT

voice command app will analyze the command inputs which are ON, FAN, ON AND FAN, DOOR OPEN, ON AND DOOR OPEN, DOOR OPEN AND FAN, ON/FAN AND DOOR OPEN User commands will be collected and transmitted to the Arduino through Bluetooth. Table 2 describes the functionality of devices with respect to voice commands.

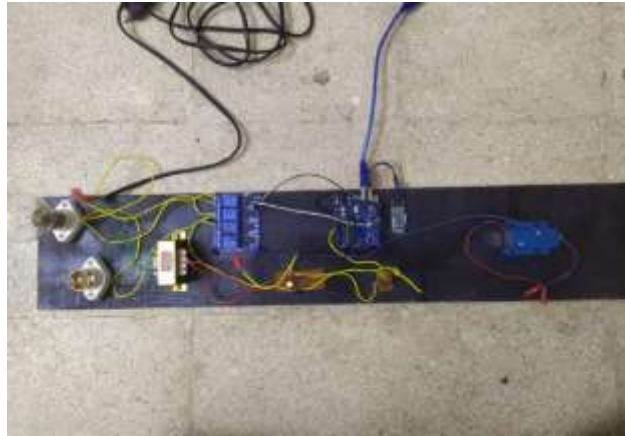
Input command	Relay 1	Relay 2	Relay 3	Device Status
-	0	0	0	Light-Off Fan-Off Door-Closed
On	0	0	1	Light-On Fan-Off Door-Closed
Fan	0	1	0	Light-Off Fan-On Door-Closed
On and fan	0	1	1	Light-On Fan-On Door-Closed
Door open	1	0	0	Light-Off Fan-Off Door-Open
On and door open	1	0	1	Light-On Fan-Off Door-Open
Door open and fan	1	1	0	Light-Off Fan-On Door-Open
On/fan and door open	1	1	1	Light-On Fan-On

Table.2. Result for each input using control using voice

				Door-Open
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Implemented system

Fig.2.Working model



Conclusion

A home Automation system using voice commands has been implemented in this paper. This method is designed for the elderly and crippled. The prototype that was created can be used to control electrical gadgets in the house. This solution allows the user to remotely manage their home appliances using voice-based speech recognition with the help of mobile phone utilising the BT voice control app for Arduino. This system mainly consists of 3 Components. Bluetooth module, Arduino and relay circuits. Bluetooth acts as interface between android phone and the Arduino.

References

- [1] N.btAripin and M. B. Othman, "Voice control of home appliances using Android," 2014 Electrical Power, Electronics, Communicatons, Control and Informatics Seminar (EECCIS), 2014, pp. 142-146, doi: 10.1109/EECCIS.2014.7003735.
- [2] H. AlShu'eili, G. S. Gupta and S. Mukhopadhyay, "Voice recognition based wireless home automation system," 2011 4th International Conference on Mechatronics (ICOM), 2011, pp. 1-6, doi: 10.1109/ICOM.2011.5937116 .
- [3] P. Mtshali and F. Khubisa, "A Smart Home Appliance Control System for Physically Disabled People," 2019 Conference on Information Communications Technology and Society (ICTAS), 2019, pp. 1-5, doi: 10.1109/ICTAS.2019.8703637.
- [4] H. Isyanto, A. S. Arifin and M. Suryanegara, "Design and Implementation of IoT-Based Smart Home Voice Commands for disabled people using Google Assistant," 2020

- International Conference on Smart Technology and Applications (ICoSTA), 2020, pp. 1-6, doi: 10.1109/ICoSTA48221.2020.1570613925.
- [5] R. Hajare, M. Gowda, S. Jain, P. Rudraraju and A. Bhat, "Design and development of voice activated intelligent system for elderly and physically challenged," 2016 International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT), 2016, pp. 372-376, doi: 10.1109/ICEECCOT.2016.7955248.
- [6] C. Z. Yue and S. Ping, "Voice activated smart home design and implementation," 2017 2nd International Conference on Frontiers of Sensors Technologies (ICFST), 2017, pp. 489-492, doi: 10.1109/ICFST.2017.8210563.
- [7] Y. Mittal, P. Toshniwal, S. Sharma, D. Singhal, R. Gupta and V. K. Mittal, "A voice-controlled multi-functional Smart Home Automation System," 2015 Annual IEEE India Conference (INDICON), 2015, pp. 1-6, doi: 10.1109/INDICON.2015.7443538.