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SPEECH RECOGNITION HOME AUTOMATION SYSTEM FOR VISUALLY CHALLENGED PEOPLE USING IOT

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ABSTRACT

Home automation is one of the major growing industries that can change the way people live. Some of these home automation systems target those seeking luxury and sophisticated home automation platforms; others target those with special needs like the elderly and the disabled. Typical wireless home automation system allows one to control house hold appliances from a centralized control unit which is wireless. These appliances usually have to be specially designed to be compatible with each other and with the control unit for most commercially available home automation systems. The developed system can be integrated as a single portable unit and allows one to wirelessly control lights, fans, air conditioners, television sets, security cameras, electronic doors, computer systems, audio/visual equipment's etc. and turn ON or OFF any appliance that is plugged into a wall outlet, get the status of different sensors and take decision accordingly.

The system is portable and constructed in a way that is easy to install, configure, run, and maintain. The perfect user interface still does not exist at present and to build a good interface requires knowledge of both sociology and technology fields. According to major companies that are involved in speech recognition researches, voice will be the primary interface between humansand machines in the near future. The problem lies with the situation of the elderly or disabled people, who cannot usually help themselves to move around, and might require external assistance.People who live alone might also need a helping hand at home. Therefore, a voice-controlled homeautomation system is designed, so that the users can perform certain tasks by just the use of their voices, moreover, the system is designed to have a hand-held device(remote) so that the user can easily speak their commands, otherwise they would have to walk over to the microphone to speak. Having a remote will make the system more user-friendly and portable.

Keywords: Home Automation, Voice Control, Smart Home, Ubiquitous Computing, WirelessCommunication.

I. INTRODUCTION

This project presents the design of the low-cost home automation system using the IoT (Internet of Things) technology along with the feature of speech recognition. The Internet of things(IoT) is the inter-networking of physical devices, vehicles, buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objectsto collect and exchange data. In this project IoT technology is used to control the home appliances wirelessly over the internet. The computing module used is a Raspberry pi development board.The project also aims to provide a speech control interface to the users to control the appliances. Speech recognition is provided using an online Speech-To-Text platform called wit. The home automation system listens for the user's speech and whenever a defined phrase is identified it triggers corresponding action to switch appliances on or off. With speech recognition physically challenged people can control appliances with much more ease.

II. LITERATURE REVIEW

1. Bluetooth based home automation system using cell phones:

In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

2. GSM based home automation system using cell phones:

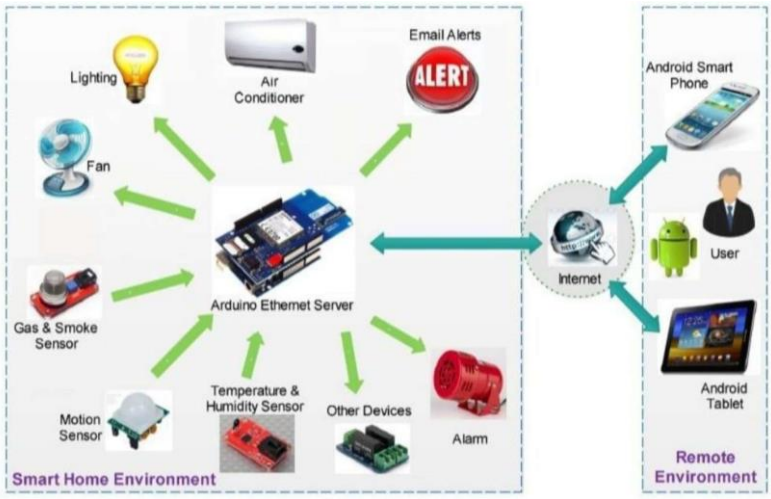
Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. In figure shows the logical diagram the work of A. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the commandwhich received GSM module. Figure. Mobile-based home automation from the work of A. Alheraish

3. Home Automation System Using Speech Recognition and Machine learning:

Artificial Intelligence is the art in computer science through which we want the computer system to perform that action which involved intelligence. In response to these actions the machines react on the basis of past experiences. To explore the idea of artificial intelligence lets have some examples like Self-driving Cars, Face recognition, Web searches, Industrial robots, Missile guidance and Tumor detection. Like many morecomplex problems are already solved by using Artificial Intelligence. Due to interdisciplinary nature of Speech recognition, it makes this as most complex area of computer science. Naturally the speech is dynamic. Artificial Intelligence has a special impact in home automation with the new emerging technologies and learning methods. Itis a highly beneficial for the disable person if the home automation system works on the basis of voice/speech recognition. Ant colony Optimization found very helpful in solving many issues regarding decision trees. This system helps the disabled persons to perform their routine tasks efficiently.

III. PROPOSED SYSTEM

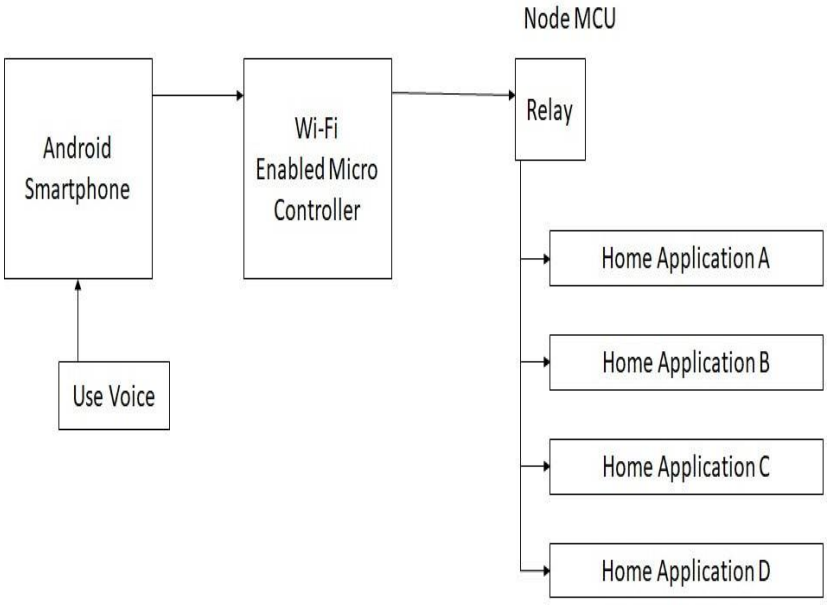
In the proposed design, a low-cost smart home system for remotely controlling and monitoring the smart home environment is presented. An overview of the proposed system architecture. The system consists of a voice recognition using the Android platform and an Arduino Ethernet based micro web-server. The Arduino microcontroller is the main controller that hosts the micro web-server and performs the necessary actions that needs to be carried out. The sensors and actuators/relays are directly interfaced to the main controller. The voice recognition environment can be controlled and monitored from a remote location using the voice recognition, which will communicate with the micro web-server via the internet. Any internet connection via Wi-Fi or3G/4G network can be used on the user device.



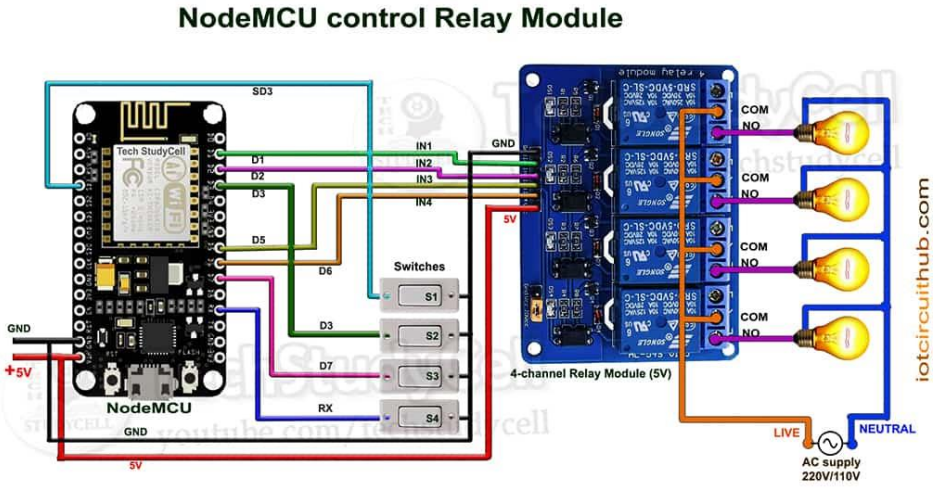
The features that the proposed design offers are the control of energy management systems such as lightings, power plugs and HVAC (heating, ventilation and air conditioning) systems; security and surveillance system such as fire detection and intrusiondetection with siren and email notifications; automatic smart home environment control such as maintaining a certain room temperature; voice activation for switching functions and has user authentication to access the smart home system.

The system depends upon a transmitting section and a receiving section, that is apparent in system architecture diagram. The system is based upon the use of voice as a physical parameter, which is later conceived as a command by the VCHAS. The questionis about interfacing voice commands with the rest of the system. To move ahead with the process, a transducer is used, for the purpose of converting physical parameter of voice into an electrical signal. HM2007 (Speech Recognition Chip) is available with a pin, to which a microphone can be directly connected, for the purpose of speaking the command verbally into the circuit.

IV. BLOCK DIAGRAM



V. CIRCUIT DIAGRAM

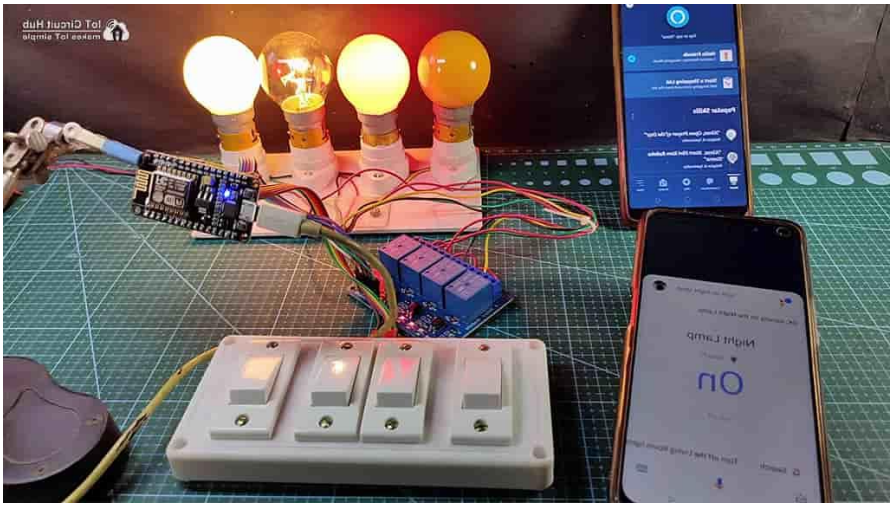


The circuit is very simple, we have used D1, D2, D5 & D6 GPIO to control the 4-channel relay module. And the GPIO SD3, D3, D7 & RX are connected with manual switches to control the relay module manually. We have used the INPUT-PULLUP function in Arduino IDE instead of using the pull-up resistors with each switch.

As per the source code, when the control pins of the relay module receive the LOW signal, the respective relay will turn off the HIGH signal in the control pin.

The Boot will fail if SD3 & D3 are grounded during the Boot process. So manual switch-S1 & switch-S2 must be OFF during NodeMCU boot. Now, if you want to use pushbuttons across the GPIO pins and GND pin instead pf switches.

VI. RESULT



You can also ask Google Assistant, to turn on the light ["Hey Google, Turn ON the Room Light "]. Thus, you can control the appliances like light, fan, etc. with voice commands using Google Assistant, and also monitor the current status of the switches from anywhere in the world from the Google Home App.

You can always control the appliances manually with switches or push buttons. and if the NodeMCU is connected with the Wi-Fi, then you can monitor the real-time status in Google Home and Alexa App.

VII. CONCLUSION

Controlling the home utilities via voice is just an amazing step forward towards thedevelopment in IoT sector, as this involves totally a wireless medium to create the connection. There are many Android-based applications which have been developed to initiate the working on this technology which also includes voice-controlled wheelchair etc. All the previous experiments and trials which are done before, we have utilized the same concept to implement it in an efficient manner, so that more people can be benefited which involves just a say of word to make the thingswork i.e., home utilities. Without a doubt, this technology will bring revolution in the people's life if that is implemented on the larger scale.

After performing deep research and study, we have introduced a platform, in which more effort scan result in the better format in future. But according to all the existing technology, this is something new in a number of aspects and it is worth to be accepted by a wide number of people because of its advantages towards the elderly and special people. Controlling the utilities like fan, light and heater in the wireless medium is absolutely an outstanding progress in this century, vulnerabilities and security issues are still under concern to make this technology even better than ever before.

We are looking on this technology with better focus to make the life even easier. It is the century where everyone is focusing on bringing the comfort in the people life. This is just one step leap towards the future goal, there are many other things which are coming ahead with more challenges.We must make sure while introducing any project, that it keeps the legal, ethical, social and environmental concerns to its best because these are the basic pillars for the success of any work that is done for the people welfare.

VIII. REFERENCES

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