DESIGN AND IMPLEMENTATION OF VOICE CONTROLLED HOME AUTOMATION USING IoT

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ABSTRACT

Home automation's notion is to make any home 'smart'. A smart home is precisely a set-up of devices which are unified and can be controlled by the user, in many convenient ways possible. As the days pass the world population is established to be getting older. This nurtures the need to provide supporting systems for the elderly and the physically challenged, especially those who live all by themselves and require an easier system to make their lives hassle free. For this to come in action we made use of the upcoming technology - natural language processing which allows us to command and control things with our voice along with a microprocessor, our paper presents a micro controller based voice controlled home automation system. Adding onto it we interfaced an LCD screen in order to display the commands for reassurance and making trouble shooting easier. Such a system will enable users to have control over every appliance in thier home with their voice. The control circuit consists of an ArduinoNano microcontroller and a voice recognition module, which processes the user commands and controls the switching of devices along with an LCD screen to display the commands. The connection between the microcontroller and the voice recognition module is established via WIFI, a widespread wireless technology used for sharing data.

Keywords— ArduinoNano, Home automation, Smart home, Voice recognition, WIFI module

I. INTRODUCTION

The prime and most important goal of modernization is to fabricate in order to reduce effort. 'Web of Things' with the loom of the most recent decade, we are constantly in the chase to push pervasive computing in all kinds of diverse backgrounds. This is the most essential novelty to encourage human edge. Voice Controlled Home Automation System abbreviated as (VCHAS), is planned to operate on bases of the users voice and what he/she stores prior. Achieving the purpose of hassle freeness. Home automation has been around for the past few years making our lives better and easier. Another improvement that was made to home automation was adding IoT to it along with controlling the devices via a mobile application and even voice. The primitive man understood that

the best way to communicate was by speech and it also tends to be the easiest. Using the same concept in home automation, we opted to initiate home automation using voice as it is the most convenient way to do so [1].

The benefits of utilizing a voice interface as a medium are ceaseless. There are many existing home automation systems which use Smartphone applications in order to control the turning on and off of devices. However to eradicate the usage of smart phone as well we have used a voice recognition module which will pick up the voice commands given by the user and act accordingly[2].

Adding on to it troubleshooting becomes a problem when you have a concise kit and an acknowledgment of the command received would help a great deal, hence we interfaced an LCD screen with the micro controller to display the commands given by the user in order to acknowledge and make it easier for trouble shooting in required cases. Voice controlled home automation system gives leverage to the power of Arduino providing it with a holistic voice controlled automation system.

The system is simplified by allowing home appliances to be controlled by our voice. The need of immense knowledge in English is not required as the user just needs to mention the appliances name and the action they want it to do as in ON or OFF. Doing so the appliance will respond to the users command and if it is valid and was stored in the voive recognition module it will reciprocate the assigned task. There is no simpler and user friendly way to control devices than by our voice itself.

II.   RELATED WORK

In the present day home automation is getting the chance to be mainly vital with the true aim of improving our current situation. Home automation or computerization offers a present day way of living in which a person gets the chance to be in charge of his entire house using a device (in our case his/her voice) , from turning on a TV to locking/opening doors; it gifts us with the reward of imperativeness[3].

Modern houses are progressively shifting from conventional switches to centrally controlled switches, which involve remote controlled switches. Presently, conventional wall switches are placed in different parts of the house making it difficult for the user to go near them to operate most of the time people tend to leave the appliances running in sheer laziness or lethargic-ness of having to get up from their spot to switch them off , in return allowing wastage of energy . Even more it becomes more difficult for the elderly or physically handicapped people to do so. Voice controlled home automation helps reduce the hassle and make it more smooth and easy to control the electrical loads based on an input signal. This system is especially beneficial in case of handicapped or aged people who find it difficult to walk and operate the electrical switches to turn on or off the loads. The Voice recognition module receives this input signal from the user (his voice) which is voice commands to turn on or off the loads. Here 4 loads are used to demonstrate light, fan and television. All these loads can be individually turned ON/OFF [4].

This system solves the issue by interfacing a unit with home appliances that switches these loads based on the input received from the user. Developing a home automation setup using voice gives the user complete

control aspects of his/her home. When it comes to controlling devices truly based on voice the first query that arises is how secure the system is [5]. Voice recognition module is uniquely crafted to filter voices and recognized only the ones that are stored. It only responds to the commands that are stored in it and can store up to 18 commands.

However the already existing home automation devices which are voice controlled are operated via smart phone applications, which is another hassle for the physically impaired or the elderly as they are not very comfortable with using these devices. Hence a better and more efficient system has to be made to ease this issue and give a better automation facility to everyone [6].

III.   PROPOSED WORK

With constant advancement in technology and with emerging products in the field of IoT it still is required to incubate products which will make people's lives easier and hassle free to manage. Especially in the field of home automation. Voice is a boon and we pretty much use it in order to day lives for communicating using the same idea we allowed the same boon to be used in order to communicate with home appliances[7]. Using a voice recognition module interfaced with Arduino Nano which is then controlling relays that have devices attached to them.

3.1 Methodology:

In order to eradicate the hassle of using a smart phone to control the devices in our home we interfaced a voice recognition module to Arduino Nano. This further is connected to relays that control each device. An LCD screen is interfaced to show the commands that are received by the user and make it easy when trouble shooting is required[8]. The voice recognition module requires 12V of power and the rest of the devices require 5V so a voltage regulator is used to tackle that issue.

The voice controlled home automation system uses a voice recognition module to receive and filter out voices/commands given by users and an Arduino Nano as the micro controller. The key components of the system are:

- Voice recognition module.
- WIFI module.
- Arduino Nano.
- LCD screen.
- Relays.
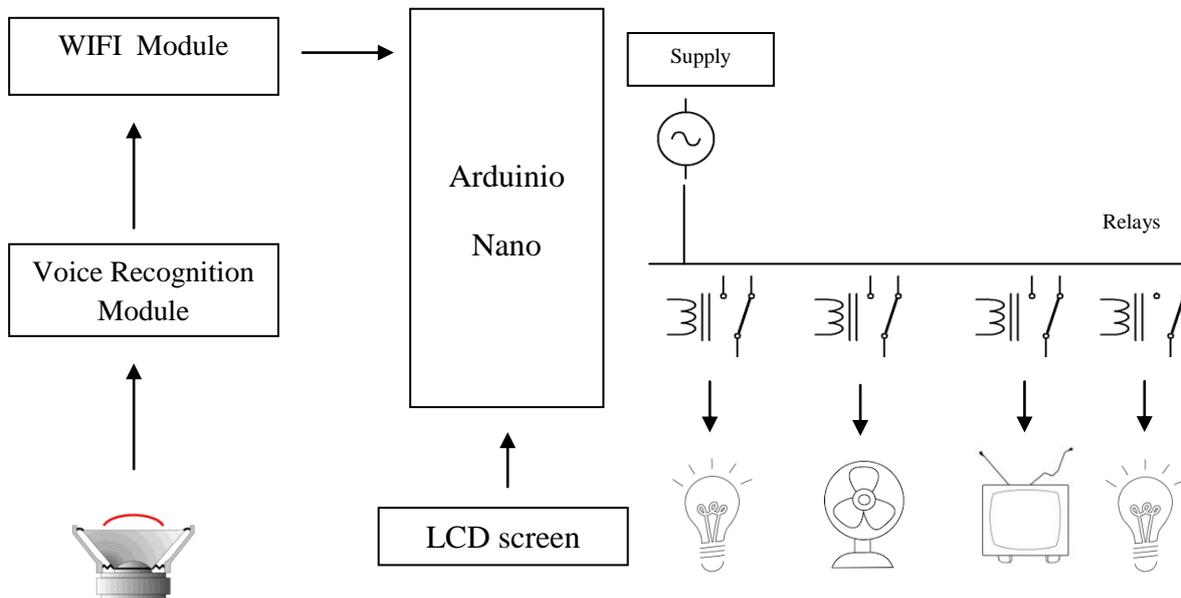
Figure 1: Block diagram of the system

IV. RESULT AND DISCUSSION

The project works on the basis of a voice recognition module which differentiates it from the existing home automation models. Making it more feasible and easy to use. The user needs to speak out a command which was previously stored in the voice recognition module and the Arduino Nano will respond with the respective action of receiving a signal. The LCD screen displays the commands given by the user for re assurance and acknowledgment.
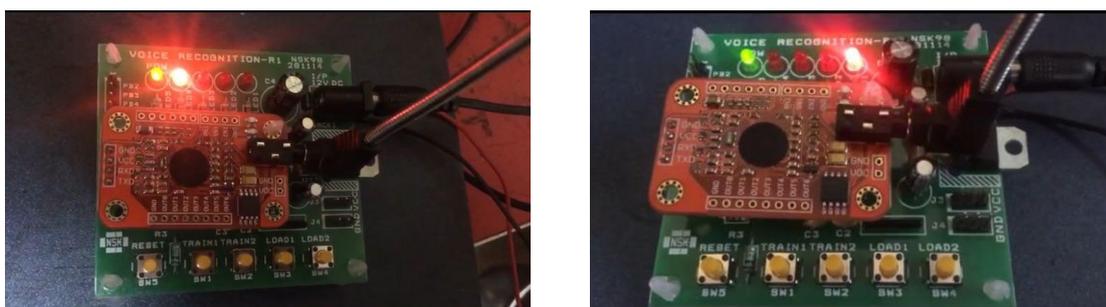
Figure 2: Training the voice recognition module

V. CONCLUSION

It can be alleged that the design and implementation of voice controlled home automation using IoT was indeed a successful one. This framework comprises of an ArduinoNano board, a WIFI Module, a LCD screen, a voice

recognition module, relays and home apparatuses. It is easy to understand and it is economaical. As we used ArduinoNano board instead of Arduino UNO the system is more compact and is feasible to handle. Likewise it can be inferred that the aims of this project has been met and they are as per the following:

- Constructed a remote home computerization frame controlled by a voice and the commands are displayed on the LCD screen.
- Designed and carry out a home automation framework yet a productive one.
- Designed an easy to use and a protected framework to control home appliances particularly pointed to help the elderly and the impaired.

4.1 Future scope:

There are a number of recommendations for future work, some of them are:

- Interface cloud so as to enable distance monitoring.
- Display on LCD if a particular device is switched on for a long time.
- Allow monitoring and force shut down via cloud interfacing.

REFERENCES

[1] Armando Roy Delgado, Rich Picking and Vic Grout "*Remote- Controlled Home Automation Systems with Different Network Technologies*" Centre for Applied Internet Research (CAIR), *University of Wales, NEWI, Wrexham, UK*

[2] "Smart Home Automation," [Online]. https://www.cleverism.com/smart-home-intelligent-home-automation/

[3] [Online]. http://arduino.cc/en/Guide/Introduction.

[4] Mohamed Abd El-LatifMowad, Ahmed Fathy, Ahmed Hafez "*Smart Home Automated Control System Using Android Application and Microcontroller*" International Journal of Scientific & Engineering Research*, Volume 5, Issue 5, May-2014 ISSN 2229- 5518*

[5] Folea, S. ; Autom. Dept., Tech. Univ. of Cluj-Napoca, Cluj-Napoca, Romania ; Bordencea, D. ; Hotea, C. ; Valean, H – "*Smart home automation system using Wi-Fi low power devices*" Published in: Automation Quality and Testing Robotics (AQTR), *2012* IEEE International Conference.

[6] Arduino Uno Projects: http://arduino.cc/en/Main/arduinoBoardUno

[7] Chakradhar, B., KrishnaveniI, S., and Naresh , D. 2013. "*Bluetooth Based Home Automation and Security System Using ARM9",* International Journal of Engineering Trends and Technology (IJETT) , *Vol. 4 Issue 9, Pg 4053-4058*

[8] Mukesh Kumar, Shimi S.L. *,"Voice Recognition Based Home Automation System for Paralyzed People"*, International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) *Volume 4, Issue 10, October 2015.*