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Home Automation using Voice Commands in the Hindi Language

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Abstract - *Home Automation has gained light over the past few years. It is viewed as a necessity than a luxury in many aspects. With the help of home automation, it has eased the daily lifestyle of the physically disabled and elderly age group of our society. Our proposed system reaches out to help these neglected groups of our society by giving them a sense of independence in their daily chores for different functionalities and purposes. We aim in developing an economical and efficient home automation system that will work in proximity to home appliances. The voice command recognition is achieved using dedicated hardware components and an Arduino board to read inputs. Thus our system can be used for the conversion of existing homes into smart automated homes at economical, robust and flexible approaches.*

Key Words: **home automation, speech recognition, voice commands, internet of things, economical home automation**

1. INTRODUCTION

Smart Home Automation system is becoming popular these days and voice-controlled smart home environment is getting special attention. voice recognition technologies with fully embedded systems are already available[1]. Various sensors and smart devices are already available on the market, as well as HA systems, which let users connect, monitor and control their devices. Mobiles and Web applications are used to control various Home Automation Systems(HAS). Meanwhile, we are witnessing the growth of popularity of voice command interfaces (VCI). Recently, a number of devices have appeared on the market, which are powered by the online voice recognition engines, and can serve as the VCI for HA systems[2]. An essential part of SHAS is to enable the various electrical devices and electronic gadgets in it to interact and communicate with each other. In SHAS, simple remote-controlled systems to complex computer/micro-controlled home automation technologies and different wired/wireless technologies may be used for this.Few widely used wireless technologies with globally accepted standards are: GSM, Wi-Fi, NFC and Bluetooth. These can be used to communicate with the smart electrical devices via smart mobile devices such as smartphone or tablet [3]. In this paper we use voice recognition to control smart home appliances. Apart from the traditional methods like keyboard or switches for controlling the device, voice control is one of the easiest methods to give input commands and also, since it can be adapted and customized to a particular speaker's voice therefore voice recognition is a more personalized form of control. As Hindi voice commands are considered only that will be useful for people in India. Also this system is very much cost-effective than any other Voice based Home Automation System available in today's market.

1.1 Advantages of System

Home Automation allows you to gain the perks of high-end technology and its functionalities which wasn't possible in the past. Our proposed system points to many advantages:

1. Our proposed system provides flexibility to the user integrated with our module. He/She can monitor or control all the devices from one place.

2. Our proposed system proves to be economical as compared to the existing systems. Thus this system is devised in such a way that it is easily affordable by the common man.

3. Our system reaches out to the often neglected group of society which are the elderly people and the physically disabled. Thus making their life easier. Our system aims in providing them a sense of independence in daily lives.

4. Only 10% of India's population can fluently understand and reciprocate in English; which leaves out the other 90% population which conveys only using their regional native language.

2. LITERATURE SURVEY

Yash Mittal el al. [3] proposed a multi-functional `Smart Home Automation System' (SHAS), that can be adapted to a user's voice and recognize the voice-commands, independent of the speaker's personal characteristics such as accent. An Arduino microcontroller board is used for processing and control which makes this system cost-effective. Thus for converting existing homes into a smart home this prototype i.e Smart Home Automation System(SHAS) can be used.

Chen-Yen Peng et al.[4] designed and built a tailor-made function for users without their attempt. Commands are taken from Google Home's voice recognition and Bluetooth signals are transferred to Raspberry Pi to control the connected devices. The proposed paper mainly focuses on researching combining characteristics of Google Home with Google Assistant Personal Voice

Assistant using machine learning and thereby customizing this to meet the new needs of users.

Hem Kamdar et al. [5] implemented various ways in which people can automate their homes. The proposed system is built by using the Arduino microcontroller and voice recognition module. based on the voice input Arduino gives commands to various connected devices. this system provides a cost-effective and a robust home automation system.

Norhafizah bt Aripin et al. [6] presented a review on an Android-based voice-controlled home automation system. In this paper voice inputs are captured by android and sent to Arduino Uno. Bluetooth module in Arduino Uno receives the signals and processed the input signals to control electrical appliances.

Eleonora Nan et al. [7] implemented and designed one solution to enable voice control within the existing home automation system. An online voice recognition engine is combined with the existing home automation system. Response time and accuracy are measured and it is confirmed that practically this system can perform well.

3. SYSTEM ANALYSIS

3.1 Problem Statement

Nowadays, Home automation is only available in a few defined languages (English). Our proposed system helps us to make home automation available in more native and convenient languages for the users.

3.2 Proposed System Feature

1. Python provides a large standard library which includes areas like internet protocols, string operations, web services tools and operating system interfaces. Many high use programming tasks have already been scripted into the standard library which reduces the length of code to be written significantly.

2. Python has clean object-oriented design, provides enhanced process control capabilities, and possesses strong integration and text processing capabilities and its own unit testing framework, all of which contribute to the increase in its speed and productivity. Python is considered a viable option for building complex multi-protocol network applications.

3. The Arduino software runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.

4. Arduino boards are relatively inexpensive compared to other microcontroller platforms.

4. SYSTEM DESIGN AND IMPLEMENTATION

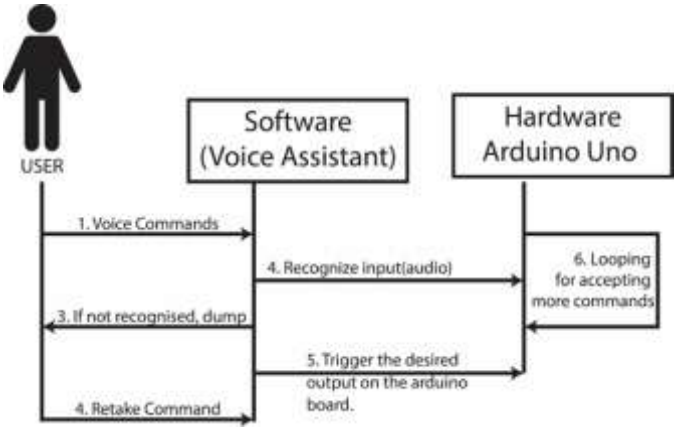

Figure 1: Proposed Model Of Home Automation System.

The proposed model of the home automation system is as shown in the above figure 1. The model consists of a microphone to accept commands from the user. It also consists of an Arduino Uno which is an interface between the hardware components like Home lights, fans, Air-conditioner, etc. The model also consists of Voice assistant as a front-end software which is used to understand the command given by the user. Our Python-based Voice assistant uses google text-to-speech API to understand all the words spoken by the user, and based on certain conditions that satisfy being a command the voice assistant sends responses to the Arduino Uno.

4.1 Proposed Home Automation

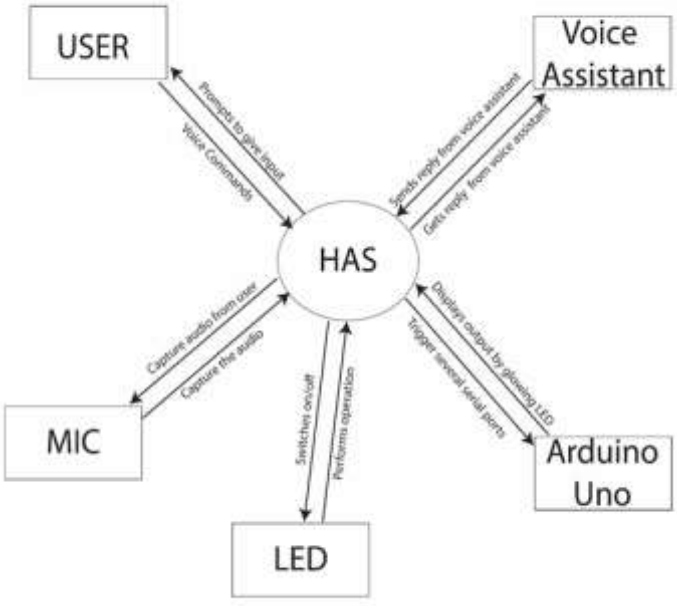

Figure 2: DFD Diagram Level 0

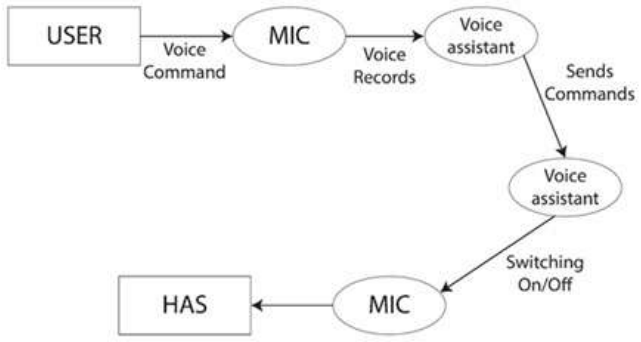

Figure 3: DFD Diagram Level 1

4.2 Proposed System Functions

The proposed home automation system has the capabilities to control the following components in users home:

1. Lights
2. Fans
3. A/C-Air-conditioner
4. Other Electronic components

The proposed system can perform the following commands:

1. Turn Light On/Off
2. Turn Fan On/Off
3. On/Off Different appliances

4.3 Implementation Setup

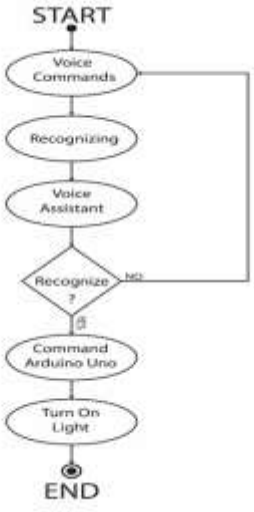

Figure 4: Flow Chart of Steps taken by the System.

As the system is started, our voice assistant is on running in the background listening for available voice commands; once the user gives a command, based on the conditions provided to the voice assistant, the voice assistant gives the necessary output. This output is sent to the Arduino Uno board which is connected to the system. Based on the input received the Arduino Uno then performs the desired task.

5. CONCLUSION

Our proposed system Home Automation in Hindi language Voice commands can be implemented using dedicated hardware i.e. Arduino Uno and using voice recognition module thus makes the system more cost-efficient and robust. The system can work on various connected devices like light, fan, AC, etc. This system provides a basic system of Home Automation which can be easily implemented and used effectively. Also this system allows users to make decisions and to regulate the home appliances with the help of voice assistants, thus making one's life comfortable and at the same time remotely accessible via voice commands.

6. FUTURE SCOPE

Using this system as a framework, the system can be expanded to home security. Home security is important these days so it can be combined with this system to give more advanced features. Also in the home automation system another feature like modulating according to the moods of a user. More advancement can be done by enabling a system to work on various languages of rural areas. Further modifications are possible like operating on various tones or accents from different regions that mean it should be able to perform operations on various voice tones and accents.

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