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A Survey on Monitoring and Controlling Home Devices IoT

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Abstract

Home and industry automation is becoming popular due to its numerous benefits. In this paper, we present survey on Home automation. It controls home appliances by voice. This paper discusses about various home automation intelligent systems using Internet of Things (IoT) technology. Here, controlling and monitoring of home automation using smart devices placed in residential building is surveyed. This paper mainly focuses on various techniques or methodologies used for voice controlling home automation systems.

Keyword: - Access control, Home automation, Internet of Things, IoT devices, Smart home.

Introduction

Use of computing environment is being a cause for change in our lifestyle, for example kitchen, home and hall automation can create comfortable atmosphere.

The individual who are in need of external help frequently can be benefitted by automation. The controlling mechanism in automation has a basic feature of maintaining accuracy and straightforwardness of working in any kind of atmosphere.

This ease of work can be achieved through various methods like remote, sensors and robots. Physically challenged people can find difficulty in operating remote devices. Robot devices are expensive that cannot be affordable by common people. The automated controlling device with voice commands may ease the lifestyle of the physically disabled individuals.

In this paper, we have surveyed controlling devices via voice that controls home gadgets by utilizing a PC where an interface circuits is used in perspective of the microcontroller and across the Universal Serial Bus interface. This can be achieved using IOT (Internet of Things).

The primary target is to assemble a home computerization framework utilizing Speech Recognition Technologies, where physically disabled individuals can do their day by day action by giving the voice orders over microphone (phone) which is an analog signal that is later on changed over to digital signal. Further the software model fragments the voice into units of the sound which distinguishes one word from another. The units of the sound is compared with the

Commands stored in computer by the software language model, if it is, the command is translated to the digital value via program and is been transferred to the interface circuit to sway the particularized home appliance.

TRENDS IN HOME AUTOMATION

- This can be used to command industry robots. By using SR TECHNIQUE we can replace system simply such as TV remotes.

- We can replace manual effort by replacing SR robots in industry as well as in military field also.
- The chain of SR problems that have been assaulted, are explained using the resulting application tasks which ended up noticeably reasonable therefore, incorporate the following:

✓ Isolated word recognition
✓ Connected word recognition
✓ Continuous or fluent speech recognition

- ✓ Speech understanding systems
- ✓ Spontaneous conversation systems

Advantages In Home Automation Systems

- This study uses very advanced computer technology where one computer can perform dual role either by monitoring or controlling home devices at the same time based on voice command technique.
- Redesigning the framework, with a specific end goal to include any new home gadget is effectively done utilizing this framework to control home gadgets remotely through a web or advanced mobile phone.
- And adding language option to the system to be familiar with other languages such as Arabic.

Drawbacks In Home Automation Systems

- To use voice recognition system you have to speak loudly than your normal voice it may have the possibility of vocal cord injury but there is no scientific proof has been presented between the voice recognition and damage to the vocal cord.
- Constraint is that when we talk just before awakening from rest, we sound somewhat extraordinary the voice changed progressively if the previous evening we shouted a ton because of any event it befuddles the SR framework.
- Command should be noise free .So system should be isolated in a closed room.
- The user should be in a position to speak otherwise no use. Like old people who are not able to speak loudly and deaf people are out of advantage of this technology.

Related Works

The proposed method [1] to Control Home Devices via Voice Command Techniques uses the concept 0f Home devices are controlled using interface circuits based on the microcontroller and universal serial bus (USB) interface. And the methodology used in this work is Person gives a voice command to the computer via wireless microphone, the computer card converts voice command into a digital format, the programming language translates the command to digital value then it transfers the digital value to interface circuit to control the specified home device. The problem of noisy environment with the voice command due to the wireless microphone is solved using a loud speaker or by operating system software. In case to add any new home device, system up gradation is easy by using this system to control home devices remotely via an internet or smart phone, and adding language option to the system to be familiar with other languages such as Arabic.

This proposes [2] a solution to disrupted Activities of Daily Living (ADL) experimental data collection by developing a prototyping system of a flexible voice controlled wearable devices. And methodology used is Development includes surface mounted components, inkjet printing, a Raspberry Pi, voice recognition Software, Lily Pad Arduino, and X Bee modules. This paper gives the glance of concept proof for a voice-controlled flexible wearable device that can be interacted wirelessly with Smart Home Hub in a consistent manner. Here the main benefits to users can include increased independence and improved quality of life.

This paper [3] presents Method of testing the implementation of voice control over operating and technical functions of smart home. And they used fallowing method in this work

* Voice recognition

* ANFIS (Adaptive neuro fuzzy inference system)

* NET framework

The work [4] on a GSM based wireless home automation system is proposed and deployed which executes its function of controlling and monitoring appliances remotely. By using Automation, mobile, control, GSM (Global System for Mobile Communication), Interactive Voice Response System (IVRS), wireless network, SMS (Short Messaging Service).The paper distributes the design and implementation of GSM based real time automation system. It also explains about the Interactive Voice Response System (IVRS) designing integrated with Voice IC circuitry which is the unique feature of the framework. Hence an IVRS based system facilitates user to interact with the system and it enables the user to control loads remotely.

This presents [5], development of a Wireless Sensor Network based smart home system for elderly people to help them ease their work and provide them safe, sound and secure living. In this paper, sensors like temperature sensor, LPG sensor, and Contact sensor are proposed to be deployed for fire detection, gas leakage detection and determination of whether any door is closed or open. In case of any emergency, an alert message will be generated, a SMS will be sent to the caretaker using GSM modem to take action in prior.

Table -1: Comparison of Related Work

Paper Title	Concept	Methods Used	Advantages
Multi-communication Wireless System For Smart Households (2013) [6]	A Multi-Standard Wireless System to control and monitor smart building. This paper has been targeted to point out the main issues about commonly used numerous home electronic systems, which ahead's to system complexity.	The refined system is armed with microcontrollers employing RF modules for ZigBee PRO or ANT+networks.	The advantage of multi-communication is given by its ability of communication with a wide range of portable devices and smart sensors. Wireless communication modules to transfer data between the measurements on their portable device.
Modern Smart Device-based Concept Of Sensoric Network (2013) [7]	Sensorial framework, which is dealing with the current aspects of technology, sociology and usability in daily life usage of ever-present mobile devices with sensors, and arising computed and energy power.	Remote sensors	For instance, the user is located at a home environment, and the applications associated with the mobile device, such as home controlling or leisure, have higher priority. The applications and content are so predictable that we could talk about Artificial User Interface as an improvement of device usability.
A Location-aware Home Appliance Control System (2014) [8]	The concept of home networking become clear and applicable through smart phones and more and more manufacturers start to concern the field of networking home appliance.	Location Based Service, Smart Phone	The integration of smart phones with consumption electronic products has received increasing attention from telecommunication industry, content provider and end-point consumers, becoming an important issue for research for consumption electronic application.
Design And Implementation Of Smart Home Control Systems Based On Wireless Sensor Networks And Power Line Communications (2014) [9]	The energy conservation of lighting systems relative to those without smart control was evaluated.	Wireless sensor networks (WSNs) and power line Communications (PLCs) are used in this work to implement a smart home control network.	The goals are to reduce the impact of wireless interference on a smart home control network and unnecessary energy consumption of a smart home.
Integrated Wireless Technologies For Smart Home Application (2010) [10]	The main objective in tele-assistence is to provide smart monitors and sensors that will alert the user and/or their care provider (doctor, nurse, family member, neighbour, friend, etc.) of accidents or illness and to diagnostic them.	Remote control and monitoring application.	-Appliance monitoring and control -Safety and security -Tele health care -Energy metering -Environmental control -Information access -Smart space for kids

6. SYSTEM DESIGN

6.1 Flow Chart

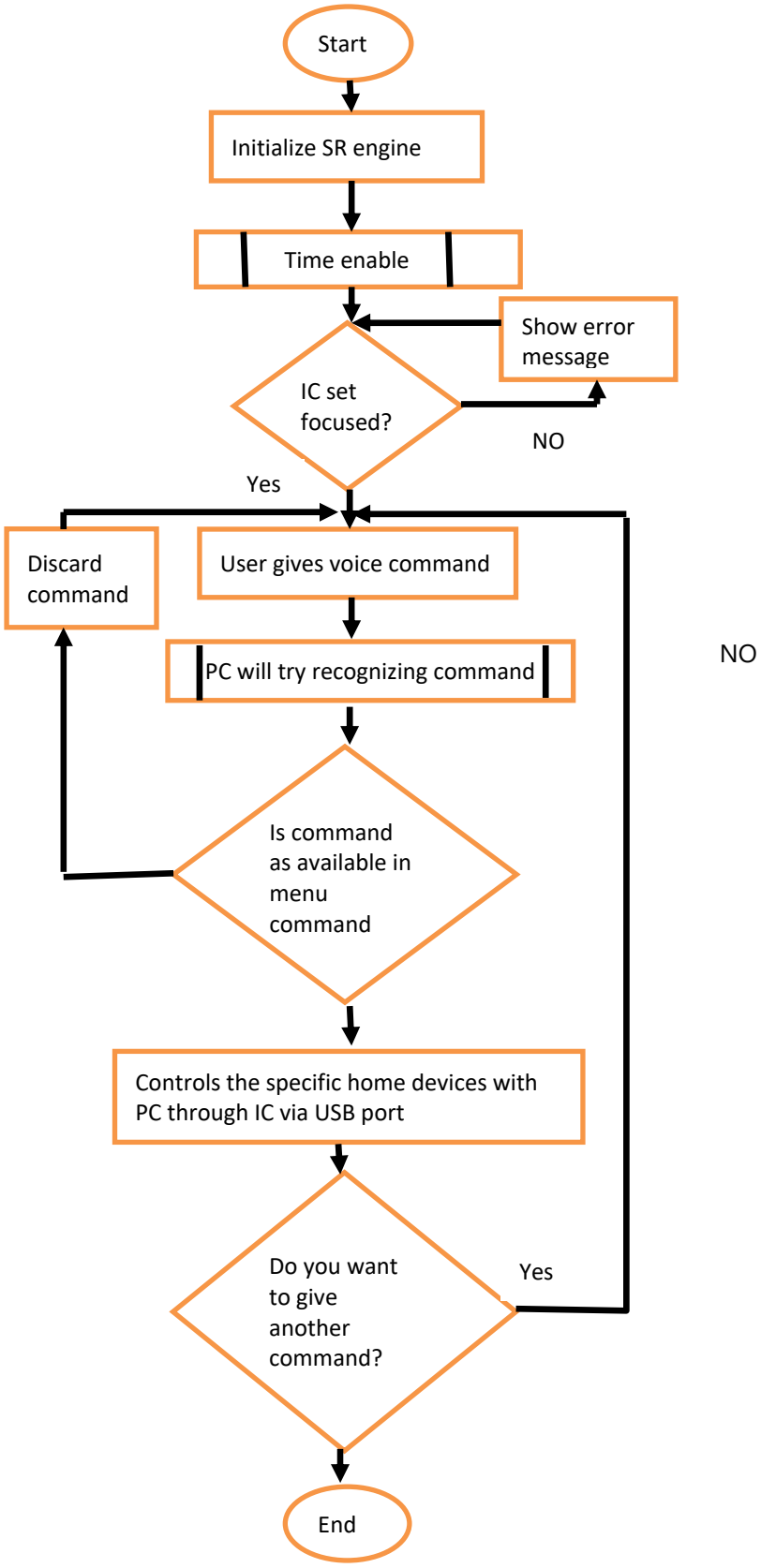

Figure.1 Flow Chart

Working Rule of Sr System

- It works based on speech recognition techniques and has three main steps recognition, processing and control.

* Recognition-A voice command from the user is recognized and translated to a digital value.
* Processing - The digital value is transferred to the interface circuit via USB cable in order to control the specified home device.
* Control-The simplest method is using ON and OFF control type. This method was chosen because it was very suitable to control home devices like light, fan, air conditioner, TV, radio and other devices in home.

In figure.1, Firstly user gives voice command, and then wireless microphone receives voice command and converts voice command into an electrical signal. This command is recognised by the SR engine.

Secondly the receiver station receives electrical signal, and then passes the electrical signal of voice command to the PCs.

Thirdly the PCs processing the electrical signal of voice command using speech recognition. Here the voice is compared with the existing commands in menu if it doesn't match, it discards the command.

Fourthly PCs sends a value corresponding to the voice command to interface circuit via the USB cable.

Finally, the interface circuit (Microcontroller) covert the command in order to control specified home device.

Proposed Framework

Problem in existing system is if the voice command is not recognized properly, it won't work. To overcome this demerit the solution would be:

In this work we build a framework such that if the framework gets bolted by false command or by multiple commands in such conditions it will request for the unique code to unlock the system.
* The unique code will be provided during the system installation.
* If the client is visually challenged, the code is given through vocal command and if client is hard of hearing the code ought to be written. Both of the above characterized technique is applicable for ordinary client separately.

Conclusions

This review is about a coordinated framework between Artificial Intelligence and computer interfacing techniques.
It mainly focuses on various **home automation techniques.** As surveyed, use of voice command technique, one computer can monitor or control home devices, as the ability of the voice to interact with the people is the best existing communication. The current system is enhanced by adding a new concept of unique code, which assists in unlocking the system. As a whole, the structure is utilised by any sort of man.

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References

[1]. Samah A. F. Manssor, Abdalla A. Osman and Sally D. Awadalkareem (2015). Controlling Home Devices for Handicapped People via Voice Command Techniques/International Conference on Computing, Control, Networking, Electronics and Embedded Systems Engineering, 375-378.

[2]. Adriana Wilde, IEEE(S), Olivia Ojuroye and Russel Torah (2015), Prototyping A Voice controlled Smart Home Hub Wirelessly Integrated With A Wearable Device/ Ninth International Conference on Sensing Technology, 71-75.

[3]. Jan Vanus, Marek Smolon, Radek Martinek, Jiri Koziorek, Jan Zidek and Petr Bilik, (2015), Testing Of The Voice Communication In Smart Home Care/ Human-centric Computing and Information Sciences, 1-22.

[4]. Afshan Mulla, Jaypal Baviskary, Jeet Desaiz Chandrashekhar Beralx and Anagha Jadhav, (2015), GSM Based Interactive Voice Response System For Wireless Load Control And Monitoring/ International Conference on Communication Information & Computing Technology (ICCICT), 1-6.

[5]. Rasika S. Ransing, Manita Rajput (2015), Smart Home for Elderly Care, based on Wireless Sensor Network/ International Conference on Nascent Technologies in the Engineering Field, 1-5.

[6]. Libor Majer, Jozef Mihálov, Viera Stopjaková, Juraj Brenkuš, Gábor Gyepes, Matej Uram (2013). Multi-communication Wireless System For Smart Households/ 21st Telecommunications forum TELFOR , 272-275.

[7]. Mahmoud A, Al-Qutayri and S. Jeedella (2010). Integrated Wireless Technologies For Smart Home Application/ published under CC BY-NC-SA 3.0license, Chapter 2.

[8]. Rung-Shiang Cheng, Chia-Peng Lin, Jiun-Yu Jhou (2014). A Location-Aware Home Appliance Control System/ Tenth International Conference on Intelligent Information Hiding and Multimedia Signal Processing, 666-669.

[9]. Mingfu Li, Hung-Ju Lin (2014). Design and Implementation of Smart Home Control Systems Based on Wireless Sensor Networks and
Power Line Communications /IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, 1-12.

[10]. Miroslav Behan and Ondrej Krejcar (2013). Modern smart device-based concept of sensoric networks / EURASIP Journal on Wireless Communications and Networking, 1-13.

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