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Amazon Alexa Based Home Automation

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ABSTRACT

For most of the time having a real conversion with a computer has seemed something that was really far away, until now. Alexa voice service (AVS) is one such technologies wich helps to achieve this goal with Iot of flexibility. Alexa isn't yet as smart and functional as other personalvoice assistants like Apple's Siri and Google's now, but it hears you better, it isn't trapped inside a phone, or inside some platforms. In this project, a hands free Alexa voice service prototype is build on Particle photon. This project is further extended by adding skills to alexa about our college using Alexa skill kit. For example users can simply talk to their Alexa-enabled products to play music, answer questions, get news and local information, control smart homes products and many more.

Keywords: Amazon Echo, Alexa, automation, Internet of Things (IoT).

I. INTRODUCTION

The idea of human machine interacting using voice led to research in Speech technology. Automatic speech recognition uses the process and related technology for converting speech signals into a sequence of words or other linguistic units by means of an algorithm implemented as a program.

Today, there are many device or software and technologies available for smart working or smart operation which has doing very easily without any hard work. Just like a Ok Google, it is already present in a smart phone; which is doing maximum task in smart phone only giving a command. For example," Ok Google_call to anand"; it will activate to hear as Ok Google and search on contact as name of anand in alphabetically and then it will call to anand. Some other technologies is there to perform a smart task in home or office, e.g. Google Now,Microsoft's Office Assistant, Cortana, Apple's Siri, Google Now, Blackberry's Assistant and many more.

Amazon alexa is one of the smartest device among them. Amazon Alexa Echo dot is a small device which has voice-enabled wireless speaker developed by amazon lab 126. Amazon alexa is available in two model or size. One of them 9.25 inch (23.5 cm) tall cylindrical hand-free-speaker with seven- piece microphone array. This device can be connects to the voice controlled intelligent personal assistant service Alexa, which wake up or activate responds to the name "Alexa". This device is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic and other real time information. It can also control several smart devices using itself as a home automation hub. Home automation is a very expensive luxury that a lot of people in India and other countries cannot afford. The objective of our product is to provide a cheap and inexpensive way to control nonsmart devices using the power of voice. Amazon Echo is a smart speaker that has been developed by the Amazon company that can be used to play music, listen to the news and control a lot of smart devices. We use the Amazon echo to develop a skill (app) that will communicate with our raspberry pi as well as any Iot device like particle photon, particle electron to control our devices. We use the Publisher-Subscriber design pattern to communicate between the Amazon Echo and the Particle photon. The Amazon echo runs a Node.js program and the Particle photon runs with arduino program to communicate with each other and control the devices.

This device built on Particle photon connects to the voice controlled intelligent personal assistant service Alexa, which responds to the word "Alexa". Alexa Voice Service (AVS) isAmazon's intelligence voice

recognition and natural language understanding sevice. AVS includes a full range of features, including smart home control, streaming music content, news, timers, and more, and it can be added to any connected device that has a microphone and speaker. This device is capableof voice interaction, music playback on mobile , making to do lists, providing weather information, providing news, etc. This device also has access to skill which adds to the abilities of Alexapi. Examples of skills include the abilities to play music, answer general questions, order a pizza, get an Uber, and more. Skills are continuously being added to increase the capabilities available to the user.

Figure 1. Amazon Alexa

This project aims at the building a smart voice enabled device based on Alexa Voice service using Paricle Photon. It demonstrates how to access and test AVS using our Java sample apps, a Node.js server, and a third-party wake word engine. Alexa voice service is Amazon's intelligent voice recognition and natural language understanding service that allows to voice enable any connect device. Alexa, the voice service provide capabilities to interact with the device in a more intuitive way. This Alexa-enabled device also provides a platform for experimenting with the current service and adding new skill to it. In the default mode the device continuously listens to all speech, monitoring for the wake word to be spoken, which is primarily set up as "Alexa". It requires a wireless internet connection in order to work. Its voice recognition capability is based on Amazon Web Services. Amazon Web Services (AVS) is a secure cloud service platform , offering compute power, database storage, content delivery and other functionality to help businesses scale and grow. The device performs well with a 'good' Internet connection which minimizes processing time due to minimal communication round trips, streamable responses and geo-distributed service endpoints. While the Alexa app is free, an amazon account is required, and setup is not possible without one.

II. LITERATURE SURVEY

In today's growing world the technologies are evolving to make life easier, to make life better. One such new tech is human-machine interaction using voice. Many intelligent Voice assistants are available today:

A popular application from Apple called Siri [1]. Siri is a computer game program that works as an intelligent personal assistant and knowledge navigator, part of Apple Inc.'s iOS, watch OS, macOS, and tvOS operating systems. The feature uses a natural language user interface to answer questions make recommendations, and perform actions by delegating requests to a set of Web services. The software, both in its original version and as an iOS feature, adapts to the user's individual language usage and individual searches (preferences) with continuing use, and returns results that are individualized. Siri was originally introduced as an iOS application available in the App Store by Siri.Inc.' which was acquired by Apple on April 28,2010. Siri,Inc had announced that their software would be available for BlackBerry and for phones running Android, but all development effort for non-Apple platforms were cancelled after the acquisition by Apple. There are several accent and gender combinations for the voice of Siri. This application is very interesting, easy going and convenient, with wide real world usage and large developing potential.

Google Home [2] is a smart speaker developed by Google as part of its "Made By Google" product line. The product stands as a rival to Amazon Echo in the smart speaker industry.

Amazon Echo [3] (shortened and referred to as Echo) is a smart speaker developed by Amazon.com. The device consists of a 9.25 inch (23.5 cm) tall cylinder speaker a seven-piece microphone array. The device connects to the voice –controlled intelligent personal assistant service Alexa, which responds to the name "Alexa". This 'wake word' can be changed by the user to "Amazon", "Echo" or "Computer". The device is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic and other real time information.It can also control several smart devices using itself as a home automation hub.

Comparing Amazon Alexa with other devices.

Parameter	Alexa	Siri	Google
Travel	Clear response but complicated	Too much information	Perfect response
Email	Clear response	Perfect answer	Perfect response
Massaging	Clear response	Clear response	Clear response
Sports	Perfect response	Perfect response	
Music	Perfect response	Clear response but complicated	Clear response but complicated
Weather	Clear response	Clear response	Perfect response

Table 1. Comparision Amazon Alexa with other devices.

This comparision shows that ability of each devices to provide a information with clearity. Let take example, if we travelling to Shimla (H.P.) it provide all information about direction, distance, tourist place, accommodation, restaurant, temples, rivers, location history, etc. It is a very helpful for us to guiding to giving with updated data. If we send to massage or email to any friend without typing or using keyboard of smart phone, Alexa is a best option to send any massage. For example,

I: Alexa, send to massage to Anand Gupta. Alexa : What a massage?

I: I want to visit a Dubai.

Alexa send this massage to Anand Gupta on in mobile or in email. This is very smart personal intelligent assistant to doing any task in Home as well as Office.

III. METHODOLOGY

The Particle application is really simple, just read temperature and humidity from a DHT22 sensor. Also it has two functions to control two LEDs Red and Green. The firmware exposes three functions.

gettmp returns temperature, *gethmd* returns humidity and controls the LEDS attached to D2 and D6. On the Amazon Echo side, we have to use Alexa Skill Set to interact with it. For this I have created one Alexa Skill Set. Following are some of the interactions possible:

User: Alexa, ask particle, what is the temperature?

Alexa: *Temperature is 30 degree. Same as:*

User: *Alexa ask particle, what is the humidity*

Alexa: *Humidity is 76%.*

User: *Alexa, tell particle to turn on red light*

Alexa: *OK, red light turned on.*

User: *Alexa, tell particle to turn off red light*

Alexa: *OK, red light turned off.*

User: *Alexa, tell particle to turn on green light*

Alexa: *OK, green light turned on.*

User: *Alexa, tell particle to turn off green light*

Alexa: *OK, green light turned off.*

User: *Alexa, tell particle to turn on AC*

Alexa: *OK, AC turned on.*

User: *Alexa, tell particle to turn off AC*

Alexa: *OK, AC turned off.*

Similarly we can implement any applience in home as well as office using this Alexa based with any IOt device

IV. CONCLUSION

Amazon echo is a voice assistant device and provide a way to communicate with it via voice and can provide different services like food delivery, request Taxi, weather, news, wikipedia, traffic, music, any smart home automation / IOt device. So it can be used almost anywhere like in home as well as office.

On focussing on technology and automation to reduce importance of the servant in home as well as inindustries. Whatever any task of home, we do that task to order to amazon alexa. Just example, Alexa turn on the light, it will turn on the light; alexa book the cenema ticket at corner seat,it will book the ticket, etc. This project control some home apliance in our own demand or order.This project is responsible for change the life of human being is faster,
safe and luxurious.

Advantage

Amazon Alexa advantage can be found in certain categories:

1. It has a specialty to Far-field voice recognition.
2. It is able to interact Omni-direction sound.
3. Companion with Android, iOS,
4. DesktopsAlexa device has Bluetooth Enabled.
5. Echo can be extended with custom skills.

Disadvantage

Alexa Disadvantage can be found in certain categories:
1. Sound quality - directly comparing the echo's sound quality compared with other high quality speakers falls short, that being said the frictionless use of voice makes an improved experience.
2.Complex tasks - Alexa currently cannot process complex commands such as `Alexa play U2 and order me an Uber` it lacks the ability to handle multiple commands or complex context based skills
3.Cost - There is a prohibitive cost factor of selling a $150-$180/unit

Application:

1. Asking general question to get information.
2. Making to do list for shopping purpose.
3. Play game with Alexa.
4. Playing music on mobile or controlling other mobile functions.
5. Control home appliances like light and thermostat etc.

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