

AN OVERVIEW OF PROMINENT DEVELOPMENT OF SPEECH RECOGNITION IN INTERNET OF THINGS (IoT): FROM READING TO VOICE CONTROL

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Abstract: The Internet of Things (IoT) is ushering in a new computer era. Most Internet of Things (IoT) devices are employed for data collection or as sensors that connect with other devices. Many Internet of Things (IoT) smart devices, on the other hand, will use voice recognition to communicate directly with users. Various electronic devices, such as cell phones, tablets, computers and televisions as well as certain autos, already have this capability. IoT is a network of connected objects, which enables device to device interactions. With incorporating the speech recognition technology, IoT creates a new way for human – device interaction. Sensors and other devices can greatly benefit from on-board voice recognition. Endpoints may now communicate with each other and with people more effectively as a result of this. As a subset of internet of things, IoT connected devices are getting smarter and smarter with speech recognition. This paper focuses on the development of IoT with speech recognition in various applications in day – to-day life

Keywords: IoT, Sensors, Automation, Communication, Speech recognition, Healthcare.

1. INTRODUCTION

Computer science's newest emerging technology, Internet of Things (IoT), is expanding at breakneck pace in the digital era. Unobstructed Internet has been incredibly brisk and acts as a pathway for many innovations [1]. All the movement on Internet has reached a degree where every development has its own exemplary and unique idea.

In the present world, all people are able to talk to any end of the world, irrespective how long the distance is, just with the help of small and smart devices like the smartphones, tablets, desktops, and laptops because of the Internet. With more availability of computing power at less cost the electronic devices connected to the internet is also getting increased. Divination appeared two centuries back has turned towards electronics smart device as tech- savvy and these savvy gadgets starts to speak with one another.

The Internet of things (IoT) is a network of physical devices, buildings, cars, and other items that are equipped with electronics, sensors, software, actuators, and network connection that allow these objects to gather and exchange data. [2]. Objects called intelligent objects whose purpose is to interconnect all the devices and it is programmable and capable of interacting with humans. Hence IoT based speech recognition afford the user the facility to control devices through internet and also control the smart devices through their speech.

Speech recognition receives the speech through microphone, the speech is converted into text using advanced speech recognition algorithm. The text is checked with the predefined commands to control the devices.

Impact of Speech Recognition on IoT

As people's interest to use connected technology increases, the need for voice control technology increases as well. The hands-free capabilities make day-to-day life easier, and people are happy to incorporate technology into their cars, home and healthcare life. Many new innovative companies are competing to enter the market [3]. The faster they integrate the society will embrace them and take advantage of their potential.

The Internet of Things (IoT) is advancing at an astronomical rate and has spread from the industrial sector to the household in a short period of time. It appears that Speech Recognition technology will soon be a must for the next generation of networked goods, as firms explore the possibilities. It's important because it has the power to transform the way we live our daily lives, including how

we gather, listen to, analyze, and respond to information. The use of speech in IoT devices delivers a unique experience that many people like because of the machines' ability to understand and execute commands. IoT voice commands are making their way into practically every facet of our daily lives.

1. BENEFITS OF THE SPEECH RECOGNITION IN IoT

The use of speech recognition technology with the Internet of Things (IoT) is attracting the attention of a wide range of users, from companies to the general public. The Speech technology in IoT has the following benefits:

- As a result, users may focus on the content rather than on what they're typing.
- Senior managers may now issue orders from afar, making operations easier and quicker.
- As a result of its ease of use, many individuals are able to communicate without having to type.
- Errors are reduced since there is minimal human interaction.

Smart devices with Speech recognition capabilities, gives users the power to verbally convey commands. Here are a few instances of tasks that may be done out with the aid of smart gadgets :

- Using the internet.
- Texting a friend.
- The ability to operate television sets.
- Lighting up or dimming the Smart Lights.
- Changing the locks and unlocking them.
- Using a security camera to record a specific region.
- Changing the room's temperature or the vehicle's volume.
- the act of tuning in a different station
- Telling the navigation systems where you want them to take go.

With the help of IoT technologies, the technology is evolving beyond a hands-free option. By lowering the learning curve for users and building a connection with them, it is slowly but surely making its mark all over the globe. Users will be able to provide instructions at any time and from any location thanks to an IoT system's voice command analysis function. Voice-activated technologies will simplify administration and operations while also enhancing security and giving administrators greater control.

2. APPLICATIONS OF SPEECH RECOGNITION IN IoT

New ideas like the Internet of Things and Speech Recognition are reshaping the corporate landscape and raising customer expectations like never previously. With the advent of voice command technology, corporate processes have undergone a radical transformation. [1]. The changes can be felt very significantly and more upgrades can be expected every day. IoT voice controls entered almost every aspect of life. Here are some industries getting an IoT voice control makeover:

- Home Automation
- Automobiles
- Health care
- Internet and Troubleshooting solutions

Home Automation

The Internet of Things is expanding its reach beyond smart gadgets and devices. The most important among all the evolving trends is home automation. For having better lifestyles, people are now demanding smart and secure homes. The people have started experiencing homes where in they are controlling their home appliances just by talking to them through voice commands. The television can be turned on just with your voice, voice - activated microwaves, and many more will be unimaginable revolutions can be expected in the forthcoming years.

Automobiles

The automobile industry is another industry that is undergoing a fast transformation with the new technology. Most of the car manufacturing companies have started incorporating the voice recognition software and other communication systems which will make the lives easier and smarter because people will be controlling the electronic devices of their cars and enjoy the best

advantages with the voice-enabled commands[2]. The users can even manage the air conditioning temperature and their music playlists just by talking to them.

Internet & troubleshooting solutions

Most of the search engines now are moving on to voice commands and this is the sector where voice recognition has come with the best benefits. Nearly all users are expected to switch to speech recognition technology by 2020, making the older, more traditional methods obsolete. The users will be using their voice to access the even the sensitive information.

Healthcare

The Healthcare industry can elevate their treatment procedures and medicines with the latest technologic developments. The hospitals can become more dependent on voice recognition methods and perform better surgeries. The tremendous speed of the speech to text feature will be more helpful the doctors to manage the medical records avoiding the tiresome paperworks. This saves a lot of their precious time and also offers even more precise and accurate results [5]. The important patient information like their present condition, diagnosis, recovery, and others can be quickly analyzed by the voice commands of the doctors rather than typed or written clinical notes.

2. CHALLENGES FACED DURING IoT DEVELOPMENT FOR SPEECH RECOGNITION

The growth of the Internet of Things has been significantly impacted by the advent of speech recognition. Even so, it is still at an initial phase of development. As far as Speech recognition goes, there are countless options for advancement. Consumer expectations for speech recognition devices have risen, yet IoT development still confronts obstacles in integrating voice commands into everyday life.. The following is a list of some of the difficulties faced by developers.:

- i. Speech recognition features are mostly designed using simple and standard instructions, utilizing simple languages for simple jobs, which is why most of the functions are so limited. As an illustration, while driving, you can call someone by simply saying their name from your contact list, and you can also answer a call using your voice. But, when it comes to calling a number that is not saved in the contact list, the voice recognition does not work. Sometime, the voice commands also make mistakes, when there are many users talking at the same time [3]. It doesn't accommodate for the user's shifting pitch or tone.
- Only in locations where there are few distractions may voice commands be used to their full potential. Using it in tiny places, such as conference rooms and meeting rooms, is quite beneficial. The audio output is exceptionally clear because these places are small and confined. But, they perform less efficiently in open spaces, since there are more distortions of voice. Mostly, in such circumstances, the software does not recognize commands correctly or it confuses with the commands. When the input devices are located distant from the user, the same is true. The user's proximity to the microphone has a significant impact on the Speech command's output. [5] The command may not be successfully understood as long as the microphone is placed distant from the user. Noise cancelling microphones, for example, are among the most costly options available to customers.
- ii. Voice instructions are still limited to the creators' ideas. Internet of Things is endlessly huge, but the developer's creativity is still constrained [2]. The Internet of Things (IoT) is still in its infancy, and many developers are working on new and inventive ways to combine speech with IoT.
 - iii. Text-to-speech functionality is a huge plus for many people. It reduces the amount of paperwork and makes it easy to document things online. However, the text-to-speech conversion accuracy rate is alarming. Errors detected by the program require constant intervention from the user. The program frequently fails to recognize the context of what is being spoken [4]. Misunderstanding is to blame for these blunders, which are of a more basic kind.
 - iv. Speech recognition software, on the other hand, might be expensive at times. It may appear that it makes things simpler. Recognition can be more efficient if it doesn't require human interaction to correct errors. This makes it counterproductive.

CONCLUSION

The disparity between the speed at which individuals think and the time they take to reply is plainly obvious. IoT-powered voice recognition technology will eliminate this gap, creating a more efficient environment for performing activities and exchanging information.

Speech recognition difficulties are not a shortcoming of speech recognition technology. Over time, these snags in the technology will be addressed. IoT will help overcome the current constraints of voice recognition and the Internet of Things, and the technological gap that exists between the two will serve as a trampoline for even more advanced services in the coming. There are many advantages of combining these technologies. It is robust and has the ability to run multiple tasks at a time. The idea behind this technology is of great benefit for humans. It will become fully functional and can be controlled through the wireless system.

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