A New Paradigm of Artificial Intelligence to Disabilities

Asifullah Samim

Student of MSc (Computer Science), University of Mysore, India
Email: *asifullahsamim.ai[at]gmail.com*

Abstract: *Many of us believe that artificial intelligence is an abstract, far - off concept that we can only witness in science fiction movies with humanoid robots and holograms. It is, nevertheless, becoming more and more rooted in our world and is reaching other professions and demographics, including those with impairments. Accessibility and inclusion have been revolutionised by artificial intelligence! The quality of life for people with impairments has significantly improved because of AI technology solutions. The present study is designed to flag up the implication of AI to differently - abled persons.*

Keywords: Disabilities, Differently Abled Person, AI, and Human Intelligence

1. Introduction

As we previously saw, smartphones can be a valuable aid for people who are visually impaired. Indeed, a lot of apps let youngsters continue to be independent. For instance, visually handicapped persons can now view their letter by placing the mail under their smartphone's camera thanks to Seeing AI. AI technology is applicable to all profiles of disabilities. For instance, persons with limited mobility can manage every aspect of their homes simply by speaking to a virtual personal assistant like Amazon Alexa. ("3 Ways AI Can Help Students with Disabilities | EDUCAUSE" n. d.) Artificial intelligence has been creating new, more straightforward methods for organising our daily activities. AI can greatly improve the mobility and participation of people with disabilities by having the potential to automate tasks that would typically require human intelligence, such as speech and voice recognition, visual perception, predictive text functionality, decision - making, and performance of a variety of other tasks. Artificial intelligence can revolutionise the lives of individuals with disabilities by making it simpler to develop interactive gadgets that promote independence and physical accessibility. Let's look at some practical AI applications in this area to see how they might be utilised to make the lives of people with disabilities better. Alexa, Google Home, and other AI - voice - assisted technologies have opened up new avenues for accessibility for those with disabilities. Due to the significant role artificial intelligence plays in communication and engagement, using this technology makes it much simpler for people with disabilities to obtain information because they only need to talk to their gadgets. ("AI for Accessibility - Microsoft AI" n. d.)

The development of text - to - speech and speech - to - text technologies benefits those with speech impairments.

Voice recognition software, such as Voiceitt, may convert a user's spoken words into clear, normalised speech that can be transmitted as audio or text. The software may also be used to facilitate face - to - face interaction with persons who have speech problems. Similar to this, Google's Parrotron is another AI technology that facilitates the understanding of persons with speech impairments. (Roca *et al.*2020)

Artificial Intelligence and Human Relations
AI technological advancements have also made it possible to create solutions that make it simpler for those who have hearing impairments to live their lives. GnoSys, dubbed "Google Translate for the Deaf and Mute, " is one of the top suppliers of such AI - powered tools. The AI - based tool instantaneously translates hand motions or sign language into text and audio using neural networks and computer vision. Google's DeepMind has also developed a system that accurately decodes whole phrases using algorithms for lip - reading. The algorithm was trained by watching more than 5000 hours of various TV shows and parsing 118.000 sentences. A system that can understand human speech in noisy, varied lighting situations found in public places has been developed as a result of the research. (Wald 2021) People with poor vision may also be given possibilities by artificial intelligence that will change their lives. AI can interpret the context of items in pictures and describe them to people using image recognition technologies. A wonderful example of a computer vision platform like this is Microsoft's Seeing AI, which describes the world to visually impaired people by reading documents, describing how they look, and identifying faces and emotions. (*See figure - 1)*
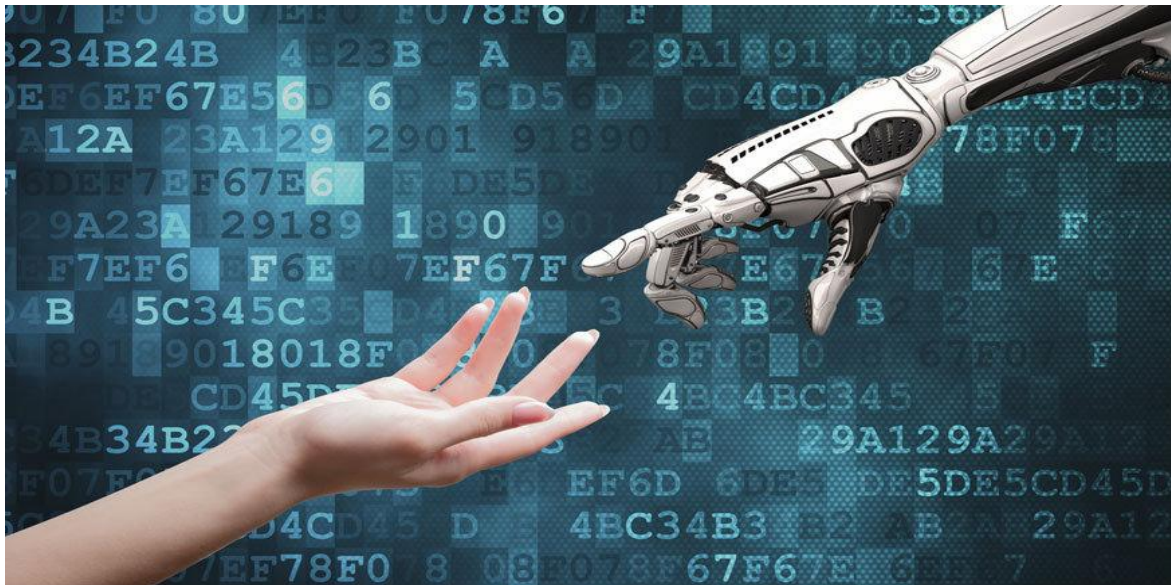
Figure I

Another ground - breaking AI - based tool for blind and visually impaired persons, OrCam, rapidly transmits visual information in response to voice commands. The gadget can detect people, distinguish between different products, identify colours, and read aloud text from books, newspapers, smartphone screens, or any other printed or digital surface. It gives blind people unprecedented levels of independence by enabling them to perform many tasks on their own. ("AI for Social Good" n. d.)

What accessibility - related things can AI do?

Those with restricted mobility might really benefit from smart home technologies. They can virtually control every element of their home, from turning on and off the lights, adjusting the thermostat, turning off the stove, and playing music, using simple voice commands that enable them to explain what they need and request the information they are seeking. People with impairments can benefit greatly from AI - assisted smart home technology, which can help them move around the house more easily and enable more independent living. (Lillywhite & Wolbring 2021) Artificial intelligence (AI) is the term used to describe intelligent computers or algorithms capable of carrying out cognitive tasks typically created by humans. This encompasses a range of technological solutions that imitate people and employ logic, such as chess playing and equation solving. One of the technologies that makes up AI is machine learning, which allows algorithms to learn and develop as they are exposed to more data in order to predict the demands of customers. In order to deliver more individualised search results and recommendations, Google, for instance, employs machine learning. Its algorithms gather information about what Internet users searched for and liked on social media. For instance, the Amazon Alexa app is a great resource for individuals with disabilities since it allows voice interaction, sets alarms and reminders, plays music, creates to - do lists, and provides real - time information. A smart doorbell that allows users to see who is at the door through a monitoring screen and open or unlock the door may be especially useful for people with mobility issues. (Roca *et al.* 2020)

Through a variety of methods, it can remove accessibility obstacles:

- Image recognition software for those who are visually impaired,
- Facial recognition for visually impaired people,
- Lip - reading recognition for hearing - impaired individuals,
- Text summary for those who have mental disabilities,
- Real - time captioning or translations for non - speakers of the language or those with hearing impairments.

For those who are blind or visually impaired:

- VoiceOver is a screen reader that is built in into iPhones. VoiceOver employs AI to describe app icons, the battery level, and even partially photos in addition to its primary application of voicing any email or text message.
- TalkBack is the Android equivalent of VoiceOver. It allows people to use their smartphones entirely.
- Siri is the virtual assistant on iPhones. Users only need to clearly state their desire thanks to voice control, which may be anything from conducting a Google search to dictating a text message to a friend. Siri makes it simple for those who are visually impaired to communicate with others.
- Microsoft invented the virtual assistant Cortana, which is available on Windows. It enables users who are blind or have vision loss to navigate independently.

For those who are hard of hearing or deaf:

- Ava is an app that uses artificial intelligence to instantly transcribe a group of people's discussion. Punctuation, the speaker's name, and any relevant words from the user's lexicon are all added by the program's algorithm. a simple approach for hearing - impaired individuals to participate and follow a discussion among numerous people without lip - reading.
- RogerVoice is a group conversation tool that instantly transcribes conversations in 90 different languages. It operates in a similar manner to Ava. (Figure - 2)
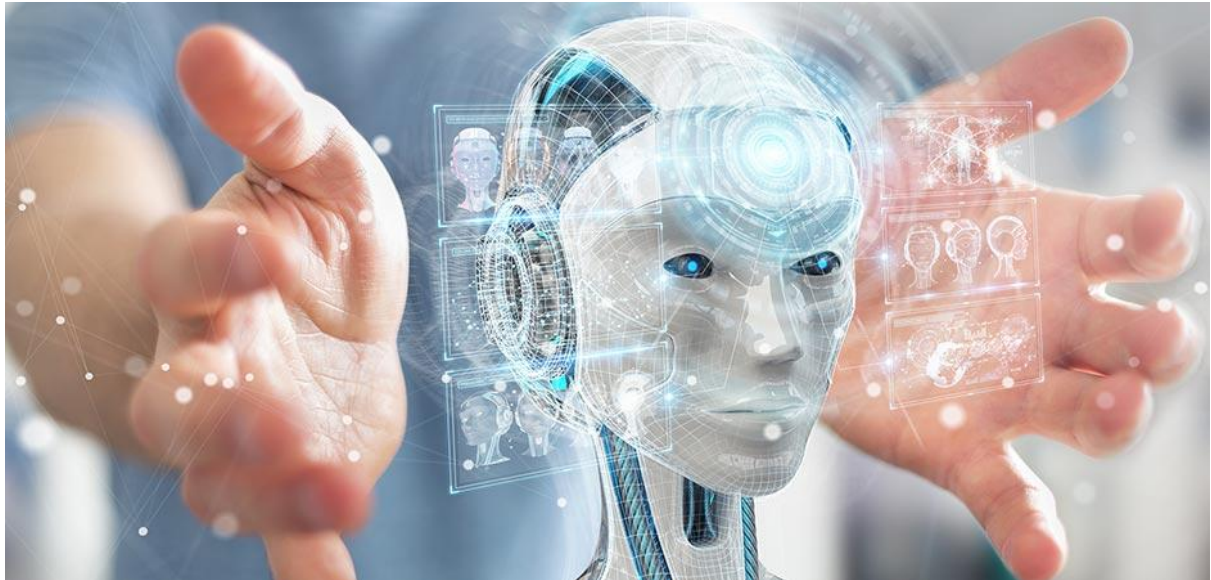
Figure II

For those who have physical limitations:
Voice - activated smartphone use using virtual assistants like Siri, Google Assistant, and Google Voice Access for those with limited mobility For persons with less dexterity, Google Voice Access was built specifically.

- IFTTT is a software that links other apps so that people with limited manual dexterity may easily use all the features of their smartphones.

It combines with the apps to automatically carry out actions like reading an email out loud and tweeting. While creating an accessible website can be challenging, AI technology has the potential to change the game. Machine learning allows for the scanning and analysis of a site's design. Then, it can increase its accessibility in a variety of ways:

- AI - powered facial recognition to replace

- CAPTCHAs, which can be challenging for those with vision impairments to find;
- A keyboard navigation improvement for users with physical limitations using the "Tab" button,
- A voice - recognition or speech - recognition system, such as Project Euphonia from Google, that enables persons with speech difficulties to utilise the Internet by using sounds and gestures,
- Content with audio descriptions for those who are blind,
- Online video captions and translations for those who struggle with hearing, such as Microsoft Translator,
- For those who are blind or visually impaired, graphic components like typefaces, colours, and spacing should be adjusted.
- An integrated database of slang, idioms, and phrases that are typically used by people with mental disabilities. (See figure 3)

Figure III

People with impairments can live more easily because to smart home appliances including smart lights, smart curtains, smart garage openers, and smart thermostats. Smart lighting can be used to remotely turn on and off lights as well as regulate the amount of light in the house. Using a phone app, smart curtain technology enables automatic curtain opening and closing. Homeowners may use their smartphones to monitor their garage door from anywhere thanks to smart garage openers. Furthermore, smart thermostats have a number of functions that enable you to control your home's temperature remotely and maintain a pleasant level at all times**.** (" (PDF) Imagining Artificial Intelligence Applications with People with Visual Disabilities using Tactile Ideation" n. d.)

How does artificial intelligence function in terms of accessibility?

People with restricted physical mobility can benefit from AI technology. In order to support social inclusion for disabled people, Microsoft's AI for Accessibility programme makes advantage of artificial intelligence's potential to create solutions to a variety of physical and mental obstacles that handicapped people encounter at work and in daily life. The goal of Microsoft's programme is to promote the productivity and independence of persons with disabilities in their daily lives, work, and communication. (See Figure - 4)

Figure IV

Self - driving cars with AI technology and other autonomous modes of transportation provide disabled people who are housebound unprecedented freedom of movement. Autonomous vehicles created by Google's Waymo, Uber, Lyft, Drive AI, and other companies using AI could end such people's physical isolation and encourage a more sociable lifestyle. Disabled persons can leave the house, navigate their neighbourhoods, engage with others, and even find employment by using driverless automobiles. Autonomous vehicles may make independent mobility easier and boost accessibility that is tailored to the requirements and abilities of each user after they have been fully incorporated into society.

One of the most popular GPS apps worldwide is Google Maps. Wheelchair users or those with visual impairments can plan their trip in advance and view their route and the best mode of transportation to utilise based on their individual profiles. Wheelchair users can find ramps and elevators around the city by using the "wheelchair accessible" option. Additionally, the "accessible places" function helps them by providing more details about the layout of various locations, including entrances, parking spaces, restrooms, and sitting configurations. People who are blind can use this function to pinpoint the exact location of a building entry.

Moovit is a fantastic software for users of public transit. When audio announcements are not engaged, as can be the case on a bus, it gives real - time traffic information and seems to be beneficial for those who are blind.

Wheelmap catalogues and maps all publicly accessible establishments (cafés, stores, and restaurants). Soundscape is an app that uses audio 3D technology to describe the environment to the blind. They can quickly become aware of nearby attractions and intersections. It's really convenient to take in the city.

The first indoor wayfinding app for disabled people is called Evelity. They can effortlessly manoeuvre through intricate and crowded spaces like subway networks, colleges and universities, commercial centres, and stadiums, regardless of their profile. Evelity provides detailed directions and functions like a GPS. It is specifically designed to meet the demands and profile of each user:

- Users who are blind or visually challenged can configure it to work with VoiceOver and TalkBack screen readers so they can hear instructions.
- Users who are hard of hearing can use text descriptions and icons.
- Those in wheelchairs and those with limited mobility gain from streamlined routes.

Regardless of the nature of their disability, self - driving automobiles, also known as autonomous or driverless cars, promise a new solution for the mobility of individuals with disabilities.

2. Conclusion

When a person needs to use a car to travel around, they don't need to call a friend or reserve service. To travel to the desired location, self - driving cars use AI, sensors, cameras, radars, and other technologies. By using Google Maps and Google Street View, their algorithms gather all the required information about their surroundings, such as traffic signals, curbs, people, etc. Self - driving automobile technology is being tested or developed by numerous auto firms.

People with disabilities stand to benefit significantly from AI - powered solutions, which will help them with daily tasks and provide them with the chance to learn new skills. Accessibility, social inclusion, and independent living are made feasible for impaired individuals thanks to AI technology in ways that would otherwise be challenging or impossible. As AI develops further, it might make it possible to find more cutting - edge and creative ways to handle the

most difficult problems that disabled people encounter and promote their inclusion.

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