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Mohuya Chakraborty
Shambhu Prasad Chakrabarty
Althaf Marsoof *Editors*

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Editors
Mohuya Chakraborty
Cybersecurity Centre of Excellence,
Institute of Engineering and Management
University of Engineering and Management
Kolkata, West Bengal, India

Shambhu Prasad Chakrabarty
University of Engineering and Management
Kolkata, West Bengal, India

Althaf Marsoof
Division of Business Law, College
of Business (Nanyang Business School)
Nanyang Technological University
Singapore, Singapore

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3 Conclusion

When it reduces regulatory involvement or disengages entirely, it perpetuates informal and insecure work while failing to provide adequate skill development infrastructure and employee status confirmation. These gaps have a major influence on how people adopt new technologies and manage power dynamics in the workplace. Tackling informal employment and improving skills are essential to addressing the challenges posed by AI and automation, which have the potential to address India's demographic issues and strengthen the workforce. These platform gig workers are at a disadvantage under their current contracts. Without adequate regulation and protections, workers are deprived of job security, benefits, and fair wages. The lack of oversight allows an exploitative system to thrive, leaving gig workers in precarious positions with limited opportunities for skill development or career growth. This situation emphasizes the need for stronger labor policies to ensure that technologies driving the gig economy benefit workers fairly, rather than deepening inequality [14].

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Artificial Intelligence and the Rights of Persons with Disabilities in India: Opportunities, Challenges and the Future

Pallabi Sengupta

Abstract Technological development has attempted to help improve the lives of persons with disabilities. This chapter will firstly attempt to analyze how Artificial Intelligence (AI)-enabled tools and gadgets are helping persons with different kinds of disabilities. Nowadays, people with different types of disabilities have different platforms offering them AI-based tools and applications tailored to suit their specific needs. In this context, various AI tools and gadgets suited to help persons with physical or neurological or psychiatric disabilities will be deliberated upon. Next, the chapter will explore how AI helps in realizing the various rights of persons with disabilities as enumerated under different laws on disability like the UN Convention on the Rights of Persons with Disabilities, the Rights of Persons with Disabilities Act, 2016, etc. AI has helped in realizing key fundamental rights of persons with disabilities—from the right to live with dignity to the right of non-discrimination to the freedom of movement. However, use of AI tools has sometimes posed a challenge for these people too—like the over-reliance on AI-based diagnostic tests to determine whether one is eligible for housing, or for some benefit under a disability scheme, or the use of discriminatory AI-based tests for job recruitment. In such a context, this chapter will delve into the negative impact of AI on persons with disabilities. Finally, the chapter will look into how, with more and more advancement in AI, the same can be used for the betterment of persons with disabilities.

Keywords Artificial intelligence · AI · Persons with disabilities · Impairments · Right to live with dignity · Accessibility · Discrimination · Physical disabilities · Mental disabilities · Neurological disabilities · Reasonable accommodation · Personal mobility · AI and privacy · Data bias · Ethical concerns of AI

P. Sengupta (✉)
National Law University Odisha, Cuttack, India
e-mail: pallabi.sengupta@uem.edu.in

Department of Law, IEM's International Institute of Juridical Sciences (IIIJS), University of Engineering and Management, Kolkata, India

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1 Introduction

Amid the cacophony of recent developments on Artificial Intelligence (AI), there was news that researchers of Monash University, Australia, have developed the world's first bionic eye. The "*Gennaris Bionic Vision System*" has been developed to provide AI-powered vision to people with vision impairments bringing hopes to thousands of people with disabilities that the time has come for them to no longer be kept behind solely because of their disabilities. If the clinical trials are successful, this will bring a revolutionary change in how AI influences the lives of persons with disabilities.

Persons with disabilities are often relegated as part of marginalized communities. They are generally isolated from the mainstream. Since the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) was finalized and opened for signature and ratification, 192 countries have become State Parties to the Convention making it that human rights treaty which has one of the highest ratifications. It is not that rights of persons with disabilities were not there before the UNCRPD. However, those rights were equally applicable for and protected all people under general human rights treaties. The UNCRPD, while not providing any specific new right, strengthened the existing rights of persons with disabilities and provided a streamlined forum in case such rights were violated. In 2016, recalling the contributions of the UNCRPD, India adopted the Rights of Persons with Disabilities Act (hereinafter called the "2016 Act") to realize its international obligations and incorporate the same into its domestic sphere. Over the last few years, the UN Committee on the Rights of Persons with Disabilities (the UNCRPD Committee) and national courts have attempted to give full effect to all the rights of persons with disabilities enshrined under our international and national laws and to prohibit the encroachment of these rights.

AI, in simple understanding, is based on development of modern technology that allows machines to perform a variety of functions like data analysis, problem solving, decision-making, providing creative outputs, etc. When such AI is used to help realize the rights of people with disabilities, the potential is huge. AI can be used to bring positive changes in the lives of persons with disabilities with the development of applications and products to cater to the specific needs of people with disabilities. However, ethical concerns surrounding AI and its data bias can also result in isolating and further alienating people with disabilities from the mainstream. Thus, AI should be used cautiously. This chapter will attempt to see how AI can be used for providing better quality of lives to persons with disabilities while trying to address the concerns of AI's negative effects on persons with disabilities.

2 Role of AI in Helping Persons with Disabilities

A disability might be the result of a physical impairment. It can also be because of a neurological disorder. Some people have intellectual disabilities. Other people live with psychological disabilities. This part of the chapter will delve into various impairments/disabilities of people and how different AI tools and assistive devices are helping in the daily lives of persons with disabilities.

2.1 Physical Disabilities and AI

Many disabilities have a physical basis. Most common physical impairments are because of a defect since birth or because of bodily malfunction or are the result of an injury. Common physical impairments are vision impairment (blindness and low vision), hearing impairment (deafness or hard of hearing), speech and language disability, or some kind of locomotor disability. The Right to Persons with Disabilities Act, 2016 discusses various examples of locomotor disabilities such as disabilities that are a result of cerebral palsy or muscular dystrophy or loss of sensation as a result of leprosy [1]. A person who loses a limb or the use of a limb due to any accident also becomes a victim of a physical disability.

2.1.1 AI Tools/Applications Assisting People with Physical Disabilities

Technology has advanced a lot to help people with physical disabilities. There are various AI tools that are used by such people in their daily lives. Some of these tools are discussed hereinafter:

a. **Aipoly Vision:** Developed in 2015, this application was the first of its kind. It helps recognize objects and colors for persons with vision impairments enabling them to understand their surroundings better [2].
b. **Google Lookout:** A Google tool, it uses the device camera and other sensors to describe objects nearby.
c. **Seeing AI by Microsoft:** Developed by Microsoft, this is an application that is used by people having vision impairment to identify other people and objects. This application uses the camera of the laptop to identify people and objects and describes the same to its users.
d. **Be My Eyes:** This application connects people with vision impairment with volunteers (without vision impairment) so that the latter can provide sighted assistance mainly through live video [3].
e. **RogerVoice:** Enabled with a call caption feature, people with hearing impairments use this application which helps them by converting the speech of the person they are talking to into text during the call. The users can then reply using speech or text [4].

f. **Google Live Transcribe, Ava, etc.:** Applications like Google Live Transcribe and Ava have voice-to-speech transcription features which help users with total or limited hearing impairments by making their daily conversations easy.
g. **SoundHound's ASR:** SoundHound's Automatic Speech Recognition (ASR) helps a person with stuttering issue or any speech impairment to better communicate with others by transcribing words more accurately [5]. It has helped many persons with speech impairments compete better in the business world.
h. **Amazon Echo and Voiceitt:** Amazon's Tap to Alexa feature can be used by people with speech impairments to make calls without speech [6]. The speech recognition application, Voiceitt also helps people with atypical speech communicate by translating non-standard speech to clear speech [7].
i. **Smart Highways:** Smart highways or AI-enabled intelligent highways are a blend of physical infrastructure like solar panels or sensors with AI and big data [8]. Persons with mobility impairments can use these AI-enabled highways to navigate better as they receive real-time traffic updates.
j. **Autonomous Wheelchairs:** Designed in an innovative way, these wheelchairs can be operated by people without arms or legs or those who have paralysis in their limbs (including quadriplegia). These are aimed to be powered wheelchairs with environmental sensors. On-board real-time AI helps a person with physical disability move these wheelchairs in any direction he/she wishes [9].
k. **Wheelmap:** An online map to locate wheelchair accessible places, Wheelmap helps persons with physical disabilities to better navigate in public places especially in crowded places [10].

The above-mentioned are some of the AI applications and gadgets that are helpful for persons with physical disabilities in navigating through their day-to-day lives.

2.2 Intellectual/Neurological Disabilities and AI

A limitation in intellectual/neurological functioning like learning, reasoning, or problem solving is called an intellectual/neurological disability [1]. A common example of one having an intellectual disability is a person being on the autism spectrum. Typically diagnosed in a child within the first three years of his/her life, autism may affect a person's ability to understand the world around him/her, the concept of relationships and how to relate to others, and what is accepted as "normal" behavior [1]. Learning disabilities like dyslexia, dyspraxia, aphasia [11], dysgraphia [12], etc. are also included under intellectual disabilities where a person has difficulties in thinking, learning, reading, writing, spelling, memorizing, communicating [12], etc. Sometimes, a person's physical coordination is also affected in such cases [13].

Fig. 1 Steps for training a machine learning model to diagnose neurological disorders [16]

2.2.1 Use of AI in Diagnosing Neurological Disability

AI is based on machine learning where the model is trained on data sets, and the model is able to complete tasks automatically without human interference. The task is to predict results. Deep learning is a specialized form of machine learning. Both models (conventional machine learning and deep learning) are used to diagnose various neurological disabilities like autism [14], dyslexia, attention deficiency hyperactivity disorder (ADHD) [15], etc. In order for AI to help diagnose any neurological disability, the models are fed with "*images obtained from magnetic resonance imaging (MRI), computerized tomography (CT), electroencephalogram (EEG) signals or positron emission tomography (PET) scans*" [16].

Figure 1 demonstrates the series of steps that are necessary for training a machine learning model to provide a diagnosis. First, there is the input of images or signals; next, preprocessing of the input occurs in order to clear the data; after that, extraction of features takes place, followed by the ranking of the features in order to find the most prominent features (selection). The last step is classification (diagnosis) into "normal" or "abnormal". While deep learning models carry out all the steps automatically, in conventional machine learning only the first two steps are carried out automatically, while feature extraction, selection, and classification can only be done manually.

2.2.2 AI Tools/Gadgets Used to Assist People (Children) with Neurological Disabilities

Children with neurological disabilities often need specific supporting tools to learn or even think efficiently. If the same is not provided the child will get isolated. If the same support is provided within the mainstream, it helps the child reach his/her fullest possible potential. In this context, some of the AI tools and gadgets that are specifically there in today's market for helping children with different neurological disabilities like autism, dyslexia, or ADHD are discussed hereinafter:

a. **Kaspar Robot:** A humanoid with human-like features and body, Kaspar robot is an assistive technology that helps enhance the social interaction skills of children with autism [17].
b. **LIFEisGAME Application:** This digital application is used to teach students on the autism spectrum facial emotions [18].

c. **Kiwi Robot:** An assistive technology, Kiwi robot is intended to provide personalized care and help improve the social and calculation (mathematical) skills of children having autism [19].
d. **Emotify:** Another digital application, Emotify, as the name suggests, helps children having autism understand and express feelings and learn behavioral norms [20].
e. **Squizzy Software:** Using Scrum technology, this software is valuable for cognitive development of children having autism [21].
f. **NAO Robot:** Social robots like NAO help build eye contact, better pronunciation skills, and concentration among children having autism [22].
g. **Dyslexi.co:** Claiming to be the first of its kind, this accessibility tool helps children having dyslexia learn grammar and spelling. It helps these children to also learn effective and inclusive communication skills [23].
h. **Dyslexia.ai:** Using Phonics, this application helps people with dyslexia learn reading and spelling at their own paces [24].
i. **DytectiveU:** Another digital application, DytectiveU helps children with dyslexia learn reading and writing skills [25].
j. **Dragon Naturallyspeaking:** Speech recognition software like Dragon Naturallyspeaking are helpful for children with ADHD as they encourage children to speak more efficiently resulting in better reading and spelling skills also [26].
k. **WatchMinder:** This gadget (watch) has been helpful as a memory aid for children having ADHD. Equipped with auditory and vibrating alarm features, this watch is extremely useful for children setting them reminders from time to time to focus on their work [27, 28].
l. **Kar Robot:** This assistive technology helps children with ADHD improve their cognitive abilities [29].

The above-mentioned are some of the AI applications and gadgets that are helpful for children with neurological disabilities in learning skills that they otherwise find difficult to learn.

2.3 Psychiatric Disabilities and AI

Mental illness or psychological disorders can impact mood, perception, or even memory. They can severely impair one's judgment, behavior, or capacity to recognize reality or the ability to meet the ordinary demands of life [1]. Common psychiatric disabilities include schizophrenia, bipolar disorder, identity disorder, panic disorder, depression, severe anxiety, phobia, obsessive compulsive disorder (OCD), and post-traumatic stress disorder (PTSD). Technological development and AI in the recent years have attempted to help people with chronic mental disabilities and debilitating conditions. Some of those developments are discussed in the following sub-part of the chapter. Before that, the scope of AI in the diagnosis of mental illnesses is deliberated upon.

2.3.1 Use of AI in Diagnosing Mental Disability

Unlike the positive and oftentimes revolutionary applications of AI in the physical healthcare system especially physical healthcare diagnostics, mental health care has been quite slow in adopting AI [30, 31]. Mental healthcare professionals often rely on a more hands on approach preferring to build relationships with their patients while directly interacting with the individuals (which AI obviously cannot do). Treatment also is generally more individual-centric as no two people may have similar mental issues or the reasons and circumstances for such issues. Hence, even mental health clinical data is very qualitative and individual-centric.

This does not mean that there has been no role played by AI in the mental healthcare domain. AI definitely has a huge role in the diagnosis of mental illness. Over the years, machine learning and deep learning have both been utilized to predict depression [32], probability of suicide [33], chances of developing bipolar disorder [34], etc. Thus, AI has had some success in the pre-diagnosis screening of potential risks for severe mental illnesses. However, the biggest challenge in this area is the limitation pertaining to clinical validation. Finally, the overall issue remains that diagnosis of mental illness cannot be an automated process because of the large subjectivity involved in such cases.

2.3.2 Use of AI in Supporting and Assisting People with Mental Disability

In the recent past, during the COVID-19 pandemic era, people all over the world had to practice social distancing which resulted in a feeling of isolation. This led to various mental health problems cropping up among the general masses. In such a situation, it was technology that helped bridge the physical gap among people. Various AI-enabled platforms and tools have proved their efficacy in helping people to maintain their sanity and lead better lives. Some of the recently developed AI-enabled tools, gadgets, and applications that provide mental healthcare solutions and are there to help people with mental disabilities are discussed hereinafter:

a. **Woebot:** Developed in 2017, Woebot was the first therapy chatbot that offers "*structured, manualized Cognitive Behavioral Therapy for people experiencing depression, anxiety* etc." [35]. Other platforms like Ellie, Wysa, or AI-Therapist also offer similar services.
b. **MoodKit and eMoods:** Based also on *Cognitive Behavioral Therapy*, MoodKit offers a variety of services helping people to manage their moods and improve their overall mental well-being, including addressing depression and anxiety issues [36]. On the other hand, eMoods is used to help an individual track his/her mood and provide treatment simultaneously in case of bipolar disorders [37].
c. **Sanvello and Calm:** While the Sanvello application uses *Cognitive Behavioral Therapy* to relieve stress and decrease anxiety and panic attacks [38], the Calm

application achieves the same by providing meditation techniques and relaxation therapies [39].

d. **Talkspace and BetterHelp:** Talkspace and BetterHelp are online therapy platforms that match persons with mental disorders with licensed therapists [40, 41] so that the patients can seek professional help at the earliest**.**

The above-mentioned are some of the AI applications and tools that are helpful for people with psychiatric disabilities in getting online therapeutic solutions and managing their symptoms better.

3 When AI Helps Realize the Rights of Persons with Disabilities

The next part of the chapter includes a detailed analysis of a few of the rights enumerated under the international and national legal frameworks for persons with disabilities. Here, there will be a deliberation of how the above-mentioned AI-enabled tools/gadgets/platforms/programs help in better guaranteeing the rights of persons with disabilities.

3.1 Right to Accessibility

Both the UNCRPD and the 2016 Act discuss the right to accessibility of persons with disabilities. Article 9 of the UNCRPD mentions that States shall take appropriate measures to ensure that persons with disabilities have access "*to physical environment, to transportation, and to information and communication*" on an equal basis with others (persons without disabilities). A similar right is also provided under Section 40 of the 2016 Act. Section 41 of the Act further talks about providing "*accessible roads*" and "*personal mobility assistance*" for persons with disabilities (especially those with physical disabilities). In this context, technological development has been the biggest support in ensuring better realization of this right to accessibility for persons with disabilities. People with physical disabilities especially in cases of paralysis or the loss of limbs can use Automated Wheelchairs. Navigating in busy public spaces has become so much easier for persons with disabilities now that they have access to Smart Highways and Wheelmaps. Many of these applications are free to download and use, making them affordable. However, sometimes, accessibility can become a concern for poor people (having a physical disability) as they may not be able to afford the latest AI-enabled gadgets (like automated wheelchairs) in the market.

Having access to information on an equal basis with persons without disabilities has also become easier for persons with disabilities as they can now use various AI-enabled tools and applications as discussed earlier (under Part 2 of this chapter).

A person with vision impairment can use Aipoly Vision, or the Google Lookout feature or the Seeing AI software and identify their surroundings with the aid of AI. People with hearing impairments can use RogerVoice or Google Live Transcribe to communicate better with the rest of the world in real time from any part of the globe. Access to immediate medical support and therapy has become easier for persons with psychiatric disabilities as they now have recourse to platforms like Woebot, Talkspace, BetterHelp, etc.

In the famous matter of *Szilvia Nyusti and Péter Takács v Hungary* [decided by the UN Committee on the Rights of Persons with Disabilities (hereinafter referred to as the UNCRPD Committee)] [42], two Hungarian nationals had approached the national courts and finally the Committee to seek remedy for the violation of their right to accessibility. Nyutsi and Takács were persons with vision impairment who had become customers of the OTP bank (a private bank) in Hungary. However, they were unable to operate the ATMs of the said bank by themselves despite paying for the same services equally as other customers (persons without disabilities) as the OTP bank's ATMs in their locality were not technologically advanced and did not support voice assistance or have braille feature. After getting no remedy in the domestic courts, when the matter was taken before the UNCRPD Committee, the Committee opined that the State of Hungary was liable for failing to prevent the discrimination that took place when these two individuals with vision impairment were unable to access the banking services at par with other customers because of the barriers that were posed as the ATMs of OTP bank did not have modern technologically advanced features. This was a clear violation of their right to accessibility. Today, with more AI-enabled gadgets and features, accessibility is one right that is being realized more and more for persons with disabilities every day.

3.2 Right to Live with Dignity and Right to Live Independently

Article 21 of the Constitution of India upholds the fundamental right of every individual to live his/life with utmost dignity. Article 10 of the UNCRPD ensures the same for all persons with disabilities on an equal basis with others. Article 19 of the said Convention also guarantees the right to live independently and within a community. All the advancements in technology have helped to ensure the proper realization of this right. With automated wheelchairs, persons having mobility issues can navigate the wheelchairs themselves without having to rely on others to move their wheelchairs. This also ensures Freedom of Movement, another fundamental right guaranteed under Article 19 of the Constitution. The AI-enabled tools discussed hereinbefore that support a person with vision impairment or hearing loss or speech impediment have further helped realize this right of independent living for persons with such physical disabilities. Article 19 (a) of the UNCRPD talks about providing

the opportunity to persons with disabilities to "*choose their own place of residence*" without being forced to live in any "*particular living arrangement.*" Further, Article 19 (b) talks about providing personal assistance necessary to ensure inclusion within community life. AI-empowered tools which act as an artificial eye or ear for these persons with disabilities have helped them from feeling excluded and secluded from community living. With the help of platforms like Woebot, Talkspace, BetterHelp, etc., no longer are persons with psychiatric disabilities forced to submit to substitute decision-making (some well-wisher deciding on their behalf). Persons with mental disabilities are now in charge of their own therapy with easy access to supported decision-making (provided by AI-enabled mental healthcare applications and websites) that they can refer to or seek help from whenever needed.

In the matter of *Jeeja Ghosh v Union of India* decided in 2016, the apex court ruled in favor of Ms. Ghosh when she claimed that her fundamental right to live with dignity and her right to equality had been violated by the treatment meted out to her by the airline, SpiceJet, and the airport authorities [43]. Ms. Ghosh who has cerebral palsy was flying to Goa to attend an International Conference where she had been invited as a distinguished resource person. However, before the flight could take off from Kolkata airport, Ms. Ghosh was forcibly deboarded from the plane on account of her disability as the pilot had insisted on such removal. The main contention of SpiceJet had been that Ms. Ghosh being aware of her physical ailment should have had a companion and asked for assistance. She was seen as a flight risk. Ms. Ghosh who won the case said that she had felt like a criminal when she was forcefully removed from the plane. She said that for months she suffered from the trauma of the treatment that was meted out to her by the flight and airport authorities.

The Supreme Court, while upholding the violation of Ms. Ghosh's fundamental right to live with dignity, her right to equal treatment (with other passengers), and her right to independence, mentioned in this case that the flight and airport authorities had acted in a "callous manner" without any "sensitivity" and "positive attitude". When society acts in such a manner it results in isolation. Persons with disabilities were never treated as self-reliant people who could be useful members who could contribute to the development of the country despite their limitations [43]. With AI-enabled applications bringing persons with disabilities at par with those without disabilities, it is now a more equal world. Persons with disabilities can now participate equally in mainstream activities. The Supreme Court had observed in the Jeeja Ghosh matter that "*to most disabled persons, the society they live in is a closed door which has been locked and the key to which has been thrown away by the others*" [43]. With more technological advancements, this is no longer the case or rather it can be said that a key (through the positive intervention of AI-enabled tools) has been located or even specially made for these persons with disabilities.

3.3 Right to Equality, Universal Design, and Reasonable Accommodation

Article 14 of the Constitution of India guarantees the fundamental right to equality and non-discrimination. Disability often becomes a ground for discrimination, even unintentional discrimination as was seen in the matter of Jeeja Ghosh also. Article 5 of the UNCRPD prohibits discrimination on the ground of disability. Section 3 of the 2016 Act further states that no person shall be deprived of their liberty on the discriminatory ground of disability. Both the international instrument and the national legislation also talk about providing "universal design" and "reasonable accommodation." Universal design means "*the design of products, environments, programmes and services to be usable by all people to the greatest extent possible*" [44, 45], and "reasonable accommodation" means "*necessary and appropriate modification and adjustments, without imposing a disproportionate or undue burden in a particular case, to ensure to persons with disabilities the enjoyment or exercise of rights equally with others*" [44, 46]. These rights of persons with disabilities envisaged under the UNCRPD and the 2016 Act, are fulfilled by AI-enhanced gadgets and features like Automated Wheelchairs and Wheelmaps as they provide universal design and reasonable accommodation for these persons whenever necessary.

3.4 Right to Education (Including Inclusive Education)

Article 7 of the UNCRPD incorporates the concept of "intersectionality" and talks about ensuring various rights of children with disabilities. State Parties have the duty to ensure fulfilment of all human rights of children having disabilities on an equal basis with other children. Aim of education is to provide a child the platform to develop to his/her fullest potential [47]. Quality education helps a person develop academically and intellectually as well as in a holistic manner. Both Article 24 (2) of the UNCRPD as well as Section 16 of the 2016 Act incorporates the concept of inclusive education. It is no longer considered best for a child with disability to study in an exclusive educational institution specially catering to other children with "similar needs". Earlier such schools like "school for the blind", "school for the hearing impaired", etc. were preferred. However, it is now encouraged that children with different needs (including different disabilities) get the opportunity to study in mainstream educational institutions. This puts a stop to isolation, allowing children with disabilities the companionship of every other child. The laws (both international and national) provide for "reasonable accommodation" whenever necessary to cater to the requirement of individual need of a child with any specific disability [48]. Such individualized support is guaranteed through the use of AI-assisted tools like Kaspar Robots, Emotify, Kiwi Robots, Squizzy, Dyslexi.co. Dyslexia.ai, etc., which help children with disabilities to read, write, learn, think, and do any other activities

that other children of their age do, however at their own pace, but without losing the companionship of their peers.

3.5 Right to Personal Mobility and Assistive Technology

Apart from the right to accessibility, perhaps the one specific right of persons with disabilities that has been most ensured through the advancement of technology is the right to personal mobility. Article 20 of the UNCRPD makes it a duty of State Parties to take effective measures to look into the mass production of mobility aids and assistive technologies. With various companies and brands bringing in different AI-enabled products to assist persons with disabilities, these people now have several options to choose from in terms of the product/software they want to use or feel the most comfortable using. In fact, persons with disabilities are seen as a robust community of customers by these brands, which specifically devote their time, effort, research, and development potentials to produce better quality products for this customer base (the persons with disabilities). Many of the applications that were discussed earlier under Part 2 of this chapter are free to use (at least have free versions) that support the basic needs of persons with vision/hearing/speech impairment or intellectual or psychiatric disabilities. This makes them affordable. However, not all are free of cost. Automated wheelchairs or WatchMinders are gadgets that people with disabilities have to purchase, and, hence, not all people (especially poor people) are able to get benefit of their latest modifications.

Thus, as proved from the above-mentioned points, many of the rights envisaged for persons with disabilities as enumerated under the UNCRPD and the 2016 Act have been more fully realized with the positive use of various AI-based innovations.

3.6 International Law on Use of AI

The United Nations Educational, Scientific and Cultural Organization (UNESCO) at the 41st session of its General Conference at Paris gave the Recommendation on the Ethics of AI, 2021. According to the said Recommendation of 2021, no human being shall be harmed by the use of AI systems [49]. Protection of persons with disability and guarantee of inclusiveness are under the special focus of the Recommendation [50]. Recommendation 28 emphasizes on ensuring fairness and non-discrimination while relying on AI tools and applications. The Recommendation further mentions that AI technologies should be available and accessible to all [51]. If implemented systematically by different nations, including India, this law can help better realize the rights of persons with disabilities when using AI tools and applications.

4 Challenges Faced by People with Disabilities Because of AI

The previous part of the chapter discussed the positive aspects of AI innovations in guaranteeing different rights of persons with disabilities. However, many a time AI has hindered the fulfilment of many rights of persons with disabilities. In the era of technology, the challenges that overuse (without exercising proper caution) of AI poses on persons with disabilities are discussed hereinafter.

4.1 Violation of the Right to Privacy and Confidentiality

According to the Supreme Court of India, the right to privacy is "intrinsic to life and personal liberty" and is "inherently protected" under Article 21 of the Constitution of India. However, with persons with disabilities, ensuring their right to privacy generally becomes a huge concern. Even during their day-to-day lives well-meaning family members often encroach upon this right of persons with disabilities, albeit unintentionally, while taking care of them. Persons with severe disabilities who require more support have almost no privacy guaranteed to them. When persons with disabilities use AI-enabled applications that help them function at par with others, these applications often ask their users to give access to different features in their phones/devices and the users have no choice but to accept to do so in order to download/use these applications. Further, a lot of times, these applications ask for a full disclosure of the disability status of the users in order to serve their customers better, thereby again encroaching upon the privacy of the individuals with any disability. AI often requires access to massive amount of private data in order to function effectively specifically those information relating to health and behavioral pattern. Because of the sensitive nature of their data, it is the persons with disabilities who are at the greatest risk of data privacy breaches. Further, a person with disability because of the very nature of his/her disability (say, complete vision impairment) might be more prone to mistakenly allowing unauthorized access to some sensitive information. In such cases there is an even greater risk of their data being stolen or misused [52]. In this context, the Recommendation on the Ethics of AI, 2021, should be stringently followed, especially Recommendation 32, which mentions that data for AI systems should be "collected, used, and shared" in such a way that they ensure no violation of privacy of any individual [53].

4.2 Discriminatory Algorithms and Impact of Data Bias

As discussed earlier, AI relies on machine learning, and machine learning models are trained on data sets. This data is provided by humans. If incorrect data or insufficient

data is provided, the end result will be incorrect as the AI then relies on an algorithm, i.e., a basic set of parameters and guidelines to predict the outcome. Many a time, vulnerable communities like persons with disabilities are under-represented while the machines are trained, meaning that no or lesser number of data are provided about these communities during training. Thus, when predicting outcomes often the machine/AI does not see such people as the suitable candidates. This generally has a negative impact in cases of applications by persons with disabilities for housing, social security, or even health insurance, as their chances of rejection are higher than that of persons without disabilities. This data bias can ultimately result in further exclusion and re-marginalization of persons with disabilities. This is why the ultimate decision-making should be by humans, and human responsibility and accountability need to be ensured [54].

4.3 Violation of Equality of Opportunity

As discussed under the above point of data bias, because of this reason the machine learning model may ignore a person with disability during the recruitment process if the decision of the machine is not supervised and screened manually. Further, a lot of times, AI-enabled interviews like chatbots conducting the interviews might be inaccessible for a person with a particular disability. Again, an online test for job recruitment using many AI features might be inaccessible for a person with specific disabilities as that test has not been created or checked keeping particular disabilities in mind [55]. This results in a loss of opportunity for persons with disabilities in job applications, etc., despite being equally qualified as those people without any disability.

4.4 Violation of the Access to Healthcare Services

As discussed under the data bias point, when automated AI decisions are relied upon to decide who can access healthcare services or who are eligible for health insurance, persons with disabilities become the victims as they are often denied the benefits as they are not seen by the machines as ideal candidates. Often this leads to further perpetration of discriminatory practices.

4.5 Lack of Transparency

Recommendation 37 of the Recommendation on the Ethics of AI, 2021, categorically mentions that transparency needs to be ensured at every stage of use of AI tools. However, an AI's inner workings and training data are often protected by Intellectual

Property Laws, thereby making it very difficult to figure out whether machine bias is taking place. This phenomenon is popularly called the "black box" of the AI.

4.6 Technological Divide

As earlier looked at, many of the AI applications found nowadays for the benefit of persons with disabilities allow free access (at least have free versions) to its customers. However, some of the gadgets like WatchMinders or Automated Wheelchairs can be costly. Affordability then becomes a key issue. Often lack of equal access to the latest technologies (over the globe as more developed countries have better access) or insufficient digital literacy can widen the existing gap. Sometimes, such AI-enabled gadgets are not disability friendly. Many a time, AI software not designed specifically keeping the needs of persons with disabilities in mind can lead to further inequalities.

4.7 Re-Marginalization

According to the United Nations Special Rapporteur, AI algorithms are known to discriminate against individuals with "*facial differences or asymmetry, speech impairment, different gestures, communication styles,* etc." Many a time, a person who has a limb missing have a different body shape and posture. People with vision impairments do not understand hand signals. People with hearing impairments cannot respond to verbal warnings. People with intellectual disabilities act and communicate differently. In all such cases, the apprehension of the Special Rapporteur is valid as the AI algorithms do not know how to behave and, hence, discriminate against the persons with disabilities in these scenarios, leading to instances of further marginalization perpetrated by the very AI systems that were supposed to aid them [56].

4.8 Ethical Concerns

Ethical concerns in the interplay of technology and disability can be several. Firstly, ensuring fair technology access for persons with disabilities can be a challenge. The other concern is that of the risk of over-reliance on AI. This can lead to reduction in human interaction. The need of the hour is to continuously monitor that developments in technology and AI correspond with the core values of human rights (and disability rights) and that AI does not actively or unintentionally harm the ones it was supposed to benefit. Applying the core values and principles mentioned under the Recommendation on the Ethics of AI, 2021, is a must in this regard.

5 Conclusion with Recommendations

Imagine a world where there were no innovations—no AI supported tools, gadgets, or platforms were there to ease the lives of persons with disabilities. Then, such people would forever be dependent on others (people without disabilities). When AI was not there, persons with physical disabilities would have to rely on another individual to discover the world. Today, they can be live independent lives with the help of efficient tools like Google Lookout or Automated Wheelchairs. Children having autism were never seen as ones who could learn everything by themselves. Their parents and educators deemed them "hopeless". That is no longer the case as these children with the help of AI can learn most things that other children do. With applications like eMoods, Moodkit, and Calm, people with mental issues can get the help they need at a much lesser expense, that too from the sanctity of their homes, a lot of times. However, one must be conscious of the pitfalls of over-reliance on AI and try to incorporate the use of AI in such a way that it gives the best effect to persons with disabilities.

General and Specific Recommendations:

Keeping the above-mentioned deliberations in mind, the following suggestions may be looked at:

- At the international level, discussions on AI should be included in the UN Disability Inclusion Strategy.
- The States (including India) need to ensure that AI is not allowed to negatively impact persons with disabilities, encroach upon their privacy, or result in violation of their opportunities. The States also need to encourage reasonable changes to be made to AI applications and programs to guarantee that people with disability are treated at par with others.
- There should be ethical impact assessment conducted by the Governments to figure out the risks for and concerns of persons with disabilities when it comes to use of AI tools and applications. There should be constant monitoring and risk prevention strategies need to be developed to ensure that persons with disabilities are not further marginalized because of over-reliance on AI tools and applications in day-to-day life.
- The private sector should ensure transparency whenever they use AI and should actively guarantee that the data set that is used to train their models is diverse. Companies building and using AI tools and gadgets should ensure due diligence and mechanisms to decrease oversight.
- There should be data governance strategies developed for continuous evaluation of the quality of training data for AI systems. There should be data security, and privacy of persons with disabilities should be respected, protected, and promoted.
- There should be more policy debates on the engagement of AI in different human rights issues.
- More and more AI developers who have lived experience of disability should be encouraged to build applications for persons with disabilities.

All of these would in effect help make the lives of persons with disabilities smoother. AI then will be a true ally for persons with disabilities, rather than being another hurdle for them to overcome.

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