# Artificial Intelligence Powered Tools for People who are Blind Users in Libraries – An Overview to Guide Special Users by the Librarians

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**Abstract-** Blind people access information through a variety of assistive technologies, such as screen readers, Braille displays, and audiobooks. Braille displays are devices that convert text into Braille, a system of raised dots that can be read by touch. Screen readers are software programs that read text on a computer or mobile device aloud, allowing blind users to access websites, documents, and other digital content. Blind people can use search engines (e.g., Google) to find information using screen reader software that works with search engines. Some screen readers also have built-in support for Google search, allowing users to perform a search and navigate the results directly within the screen reader software. Since electricity, artificial intelligence (AI) has been one of the most revolutionary technologies (Ng, 2018). The world as we know it was changed by electricity, which also enabled advancements in other sectors including manufacturing, transportation, and healthcare. In a similar vein, industry, healthcare, education, and finance have all benefited from AI and machine learning (ML) solutions. Information has always been guarded by libraries. Misinformation has become rife as AI takes over and libraries are unwilling to adapt. To find basic answers, users rely on voice assistants such as Google Assistant, Amazon Alexa, and Apple Siri. The user has few options because these private systems are created and maintained by massive technology companies, and the AI models they employ are opaque. This paper explained about library services to the visually impaired users, AI in libraries, various AI tools/apps for blind users and how to be used etc.

**Keywords-** AI, Google, Chat GPT, libraries, librarians, visually impaired, blind users. Function Virtualization.

## I. INTRODUCTION

The high-level commitment is required on part of libraries to ensure access to full range of their services and facilities to their user community irrespective of their differential abilities. The libraries have recognized their role in providing information resources to one and all. Assistive services and technologies that are now available in the market place facilitate them to accommodate requirements of individuals with disabilities. It is usually easy for a librarian to identify individuals with disabilities who need assistance. Users with disabilities will visit the library only it is open to the public and well-trained staff is available to help to find the desired information. When a person arrives in the library on a wheel chair or using a white cane, the library personnel could make out, what type of assistance he might need in order to access information resources in the library. When a person who is blind uses speech output technology within a library but

cannot access certain resources because of their inaccessible design. Library staff can observe patron's difficulty and make themselves available to read screen content.

Access to information is major problem for the disables in India. The visually 2 impaired in India, till today, depend on two primary sources for their information, i.e. I) Braille Books; and ii) Talking book service. However, by delivering information to their desktop, ICT has now contributed to closing the digital gap between the sighted and the blind. People with a variety of disabilities can make extensive use of ICT and its tools due to their high degree of flexibility. The same information that is now accessible to regular users is now also available to those with various disabilities. It is clear that those who are computer literate can advance their education and feel more empowered than those who are not. However, even with all these technologies, the especially abled users are facing problems in accessing information because of the fact that libraries are not equipped with such technologies and library staff are either not aware of such technologies or are not trained to use them. This module deals with such assistive services and technologies and their use.

## II. LIBRARY SERVICES TO THE BLIND USERS / VISUALLY IMPAIRED PEOPLES

To address the information and library needs of their visually impaired patrons, libraries and information centers worldwide have created specific information services. Among them are:

### 1. Braille Books
Raised dots are used to represent letters in the Braille writing and reading system, which is read by touch. Books in braille are suitable for those with hearing and vision impairments.

### 2. Electronic Texts
These text files are from a computer. A visually impaired user can use a computer to load an electronic text, read it using screen magnifying software, print it out in large print and read it on paper, use a screen reader to have the text read aloud by the computer, or read it using a braille bar that is attached to the computer. Libraries are also utilizing ICT advancements to improve visually impaired patrons' access to information. With the advent of a wide range of ICTs, also known as adaptive or assistive technologies, blind individuals can now have equal access to information in electronic databases and the internet, just like sighted people. Among these cutting-edge technologies are:

**Large Printed Materials:** These are publications designed to be used by those who are partially blind or visually impaired.

**Screen Magnifier:** This is a software that allows text or graphics on computer screen to be magnified up to sixteen times the original.

**Screen Reader:** A software that reads out the content of a document to the reader.

**Talking Books:** These are aural adaptations of books that can be stored as e-books online, on CDROM, DVD, or on cassettes. Most visually handicapped people prefer talking books.

**Talking Newspapers:** Audio recordings of news articles in the dailies.

**Voice Recognition Software:** Such as JAWS talking software (Convert computer into a talking PC) this allows the user to input data into the computer by voice.

Any library cannot anticipate the demands of every single user or choose, install, and maintain one or more of the most widely used assistive software applications. Consequently, a study identifies five software options that libraries can use to offer services to users who are blind or visually impaired. These options include Freedom Scientific's "JAWS for Windows," Window-Eyes, a portable screen-reading program, Zoom Text, a magnifier/reader, and Zoom Text keyboard, Dragon Naturally Speaking, a speech-to-text engine that enables users to dictate into Windows-compatible applications like Microsoft Word and Outlook, and Text Aloud, a text-

to-speech (TTS) program. A long-term plan for accommodating library users with impairments should be adopted by the staff (McHale, 2007).

The Duxbury Braille Translator (DBT), a well-known Braille translation program for Microsoft Windows; Cake Talking, a computer music and sound creation program compatible with SONAR; Doc Reader, a talking word processor; and Reading Bar, a multilingual text-to-speech toolbar for Internet Explorer that can translate Web pages, are a few other significant software programs available for library patrons who are blind or visually impaired. "Connect Out loud" is a program that enables visually impaired people to use the Freedom Scientific word processor to create documents, send and receive emails, and browse the Internet. Kurzweil 1000 is another text reading program that can read printed and electronic texts that have been scanned into a computer. The user also has the ability to edit, save, sign, or print text. A calendar application, dictionary, thesaurus, and spell checker are all included in the package (Sunrich and Green, 2006).

## III. HOW CAN AI BE USED IN LIBRARIES?

Artificial intelligence (AI) is the intelligence of machines or software, as opposed to the intelligence of humans or animals. It is a field of study in computer science which develops and studies intelligent machines. Such machines may be called AIs. AI technology is widely used throughout industry, government, and science. Some high-profile applications are: advanced web search engines (e.g., Google Search), recommendation systems (used by YouTube, Amazon, and Netflix), understanding human speech (such as Google Assistant, Siri, and Alexa), self-driving cars (e.g., Waymo), generative and creative tools (Chat GPT and AI art), and superhuman play and analysis in strategy games (such as chess and Go).

### 1. AI powered Patron Assistance
Library digital services contain an amalgam of third-party e-media collections and software solutions, which we try to present as a unified library experience. While libraries have experimented (and continue to experiment) with using AI-powered chat bots ourselves, many of our vendors are increasingly rolling out sophisticated, patron-facing solutions. For example, library digital content distributor Overdrive now employs AI-assisted support to answer patron service FAQs. In the near future, such vendor provided chat bots will become both increasingly commonplace and capable. Between these offerings, and the development of library-administered AI services that are likely to follow, an umbrella of 24/7 patron assistance options should continue to expand.

### 2. Chat GPT as a Brainstorming/Troubleshooting Tool
AI bot Chat GPT has many staff-facing applications within a library setting. Some library staff may fall into the role of an accidental web-designer; Chat GPT can provide simple code from a text prompt, as well as troubleshoot existing sections of code. Posing a question to AI may generate a list of suggestions and arguments that are often a good starting point for tackling day-to-day problems. Chat GPT can also be an excellent antidote to writer's block, generating a starting point for a report that you can refine. Finally, while it may come as a shock, library managers may on occasion find themselves having to compose fairly rote memos! Chat GPT can rather effectively turn a few bullet points into a functional staff memo/email which can be lightly edited to match the tone and specific characteristics of your organization.

### 3. Impacting Collections and Collection Development
AI-powered collection development tools will soon find their way into libraries. These tools can offer deeper, more powerful insights into materials, utilizing the full text of titles in the creation of lexile scores and the performance of diversity audits. Looking to audiobooks, the comparatively low cost of AI narration is likely to increase the number of titles published annually–a situation that is both concerning for narrators while potentially beneficial to overall collection accessibility.

### 4. Library Programs and Services
As with any emerging technology, the library has an important role in navigating disruption within our

communities. Libraries can offer lecture-style programs helping patrons to understand the basic concepts of AI, its common uses, and the ethical debates surrounding the technology. We can also provide hands-on opportunities to utilize AI image generators, chat bots (such as Chat GPT), and even to train an artificial intelligence using Google's Teachable Machine. Libraries have long taught media literacy. The rise of AI is both a challenge and an opportunity in this regard. As critical consumers (and referrers) of information, library staff must familiarize themselves with the new tools of the trade, which now includes discerning deep fakes and identifying AI-generated textual content (particularly important in school/academic settings). As these skills are learned and put to use in reference services, they must also be taught to our users. As students engage with AI-powered chat bots capable of writing reports, librarians (and educators more generally) will need to determine how to coexist with such tools in a learning environment.

### 5. Marketing and Design Tools

Possessing limited marketing budgets, libraries often struggle with securing quality stock images and graphics. With the rise of automated image theft software, the use of graphics sourced from an internet search can be risky, even when the content purports to be copyright free! AI-generated images can provide a good on-demand option, and are especially useful when your need is an esoteric one! Canva's Text-to-Image Generator is an add-on to software already popular with libraries, while Craiyon, Midjourney, and other options exist. Even as text-to-image generators evolve, work is rapidly progressing on AI-generated video options.

## IV. AI POWERED TOOLS FOR BLIND USERS

The advent of the digital age has profoundly changed the lives of the visually impaired community, making life more convenient. Deep learning, as a promising technology, is also expected to improve the lives of visually impaired people. Not everyone has experienced the digital revolution in the same way. Individuals who are blind or visually handicapped have been left behind in a world where

the next big invention is predicted to show up on mobile phone screens. To make their lives easier, several creative ventures are attempting to take advantage of the promise of emerging technologies. These are some examples of AI technology powered tools for the blind and visually impaired, librarians must aware these platforms to guide them for life long learning.

### 1. Be My AI

Be My Eyes is a groundbreaking app that connects blind users with sighted volunteers through live video calls. This service allows users to capture images or videos of objects or text, which can be read to them by the volunteer. It's a valuable tool for accessing information, although users should be aware of its limitations. Be My AI, a collaboration between Be My Eyes and Chat GPT, enhances this service by allowing users to submit images to AI for accurate descriptions, expanding its utility. Users can now receive detailed information about various objects or documents. The potential for this AI-driven tool is staggering and has been dubbed "the picture that tells a thousand words."

### 2. How to Use Be My AI

Using Be My AI in your everyday life is quick and simple. Once you have access, open the Be My Eyes app and click on the Be My AI tab, and take a picture. Be My AI will give you a detailed description of the picture, and you can chat and ask further questions with Be My AI through the app to get all the information you need. And don't worry - if Be My AI can't answer your question, if you want to check its results, or if you just need a little more assistance than Be My AI can provide, you still can easily reach one of our wonderful volunteers, just like before. Be My AI provides all the accessibility benefits that some of the most advanced technology on the planet has to offer, with Be My Eyes always still there to provide the comfort, and the humanity, of our volunteers.

### 3. Call Annie: A Free Chat GPT Alternative

Call Annie is another free app that utilizes Chat GPT in hands-free mode, providing an alternative to Chat GPT's paid subscription for having conversations with AI. Call Annie is a mobile application that allows

you to connect and talk to an AI generated avatar. The app seems to be gaining popularity among people for its ability to respond to real-life conversations through an AI generated avatar. The AI generated avatar can also learn from previous conversations and adapt to the user's preferences, making the interaction more personalized and engaging. Additionally, Annie has been praised for its potential in assisting individuals with social anxiety or communication difficulties. Call Annie's capacity to reply to conversations using AI algorithms is one of its most distinctive features. The AI-created avatar is meant to appear human, with the ability to learn from past interactions and adjust its behavior accordingly. Because of this adaptability, the discourse is more interesting and personalized for each user.

## 4. How Call Annie Works?

Call Annie uses AI to make the conversation look life like. The development of artificial intelligence has been remarkable, especially in the field of neural networks. Algorithms developed for machine learning are meant to mimic the way the human brain works, so that computers may acquire knowledge by analyzing data and seeing patterns. Due to their shown ability to perform at or near human levels across a variety of tasks modeled on neural networks, some have hypothesized that AI systems are capable of imitating human consciousness. If you're familiar with Chat GPT, the rest will sound fairly familiar. Chat GPT is also used as the backend for this application.

## 5. Chat GPT: Conversational AI

Chat GPT is another fantastic AI tool. It enables text and voice conversations with AI, and a subscription to Chat GPT 4.0 provides advanced features, including a hands-free mode. With this technology, blind individuals can engage in natural conversations with an AI assistant that can provide information, answer questions, and assist with various tasks. Speech based assistive system for visually impaired and blind people to interact with Chat GPT. The system employs automatic speech recognition (ASR), text-to-speech (TTS), and a Telegram bot to enable a natural interface for Chat GPT for people with visual disabilities.

## 6. Envision Glasses: Wearable AI for Enhanced Vision

Envision Glasses is a wearable assistive device that empowers people who are blind or have low vision to access everyday visual information for themselves. Because it isn't just information. It's knowledge, independence and possibility. Envision Glasses, featuring Google Glass and Chat GPT integration, present a new era of wearable AI. This wearable device, equipped with a camera, can identify objects, read text, and offer valuable information through voice commands. It's a promising innovation that enhances independence for those who are blind or visually impaired. Users can simply invoke voice commands to identify and gather information about their surroundings, enhancing their independence and understanding of the environment. This technology is a game-changer, particularly for those who have lost their sight later in life and need assistance navigating their surroundings. Envision Glasses are built on the enterprise edition of Google Glass. (Yes, Google Glass is still alive.)  Google unveiled these smart glasses back in 2013, then touting them as a way for users to take calls, send texts, snap pictures, and look at maps, among other things, right from the headset. But after a limited -- and unsuccessful -- release, they never hit store shelves.  A few years later, Google started working on an enterprise edition of the glasses, which is what Envision is built on. Their wearable design makes them ideal for capturing and relaying information as a user would see it.

## 7. JAWS 2024 Beta: Face In View Feature

JAWS 2024 Beta introduces the Face In View feature, which reads a user's appearance and positioning from the camera feed in real-time. In an era of remote work and video meetings, this feature ensures that users present themselves effectively, highlighting the relevance of AI in today's communication landscape.

## 8. Kibo XS Device

The device—Kibo XS—enables people to listen, translate, and digitize hard copies of printed and handwritten documents, in real time. Kibo XS uses artificial intelligence (AI) and machine learning (ML) to scan printed content and make it available in

various formats for the visually impaired, in about 60 global languages. Visually impaired persons generally miss out on education and employment opportunities due to the lack of content they can access on their own. They massively rely on Braille and audiobooks, but very less content has been available, thus far, in both the aforementioned formats. The team tapped into the DISQ network for resources and mentorship to co-create efficient solutions. To address the challenge of content inaccessibility for the blind, the team set-up an assistive technology company called Trestle Labs, under which an Android application called Kibo was developed to help people access content on-the-go. The app, using artificial intelligence (AI) and machine learning (ML) technologies, offers audio-based access to printed, handwritten, and digital documents in 12 file formats, in addition to a repository of one million accessible books to search, download, and listen to. While the app also offers a capture-to-read feature, visually impaired individuals could find it difficult to capture photographs using their phone. Similarly, extensive research of educational and work-related documents also may be strenuous on the app. In order to cater to such scenarios, Trestle Labs, conceptualised and incubated at DISQ, also created a physical multilingual scanning and reading device with the same name— Kibo XS—that enables people to listen, translate, and digitize hard copies of printed and handwritten documents, across 60 global languages, including 12 Indian languages, in real-time.

## 9. OKO AI Copilot for the Blind

OKO AI Copilot for the Blind is an AI-driven app that recognizes pedestrian walk and don't walk signals. By using the rear-facing camera of a smartphone, it replicates the chirping sounds heard at crosswalks, indicating when it's safe to cross, enhancing safety and mobility for individuals who are blind. Thomas Domville introduces us to an iOS app called "OKO - AI copilot for the blind." Designed specifically for the visually impaired, OKO uses advanced artificial intelligence and machine learning algorithms to assist in navigating intersections. OKO's pedestrian traffic light function provides users with haptic and audio feedback, similar to a physical APS system, to identify the current state of the pedestrian traffic light.

## 10. Seeing AI: Enhanced Visual Recognition

Seeing AI is an app that provides a variety of features, including the ability to recognize multiple-page documents, describe images, and assist users in diverse scenarios. The app's continuous improvements make it a valuable resource for the visually impaired. Seeing AI is an artificial intelligence application developed by Microsoft for iOS. Seeing AI uses the device camera to identify people and objects, and then the app audibly describes those objects for people with visual impairment. Seeing AI is primarily used to describe short text, documents, products, people, currency scenery, colors, handwriting and light. The app can scan a barcode to describe a product and uses sounds to assist the user in focusing on the barcode. When the app describes people, it attempts to estimate the person's age, gender, and emotional status. Additionally, in a test run by German journalists in December 2019, Seeing AI apparently used some sort of Facial recognition system to identify people on photographs by name.  Some functions are performed on the device, however more complex functions such as describing a scene or recognizing handwriting require an Internet connection.

## 11. VizLens: Reading Complex Interfaces

VizLens tackles a unique problem by providing assistance with understanding complex interfaces such as control panels. By taking a picture of the interface and running a finger across the screen, users can hear what each button represents. It's an innovative solution for interpreting complex layouts and designs. VizLens is an accessible mobile application for iOS and a supporting backend. VizLens users capture a photo of an inaccessible interface and send it to multiple crowd workers, who work in parallel to quickly label and describe elements of the interface to make subsequent computer vision easier. The VizLens application helps users recapture the interface in the field of the camera, and uses computer vision to match new camera input to previously obtained crowd-labeled reference images to recognize and inform the user of the control he intends to use by providing

feedback and guidance. The VizLens application helps users recapture the interface in the field of the camera, and uses computer vision to interactively describe the part of the interface beneath their finger (updating 8 times per second).

## V. CONCLUSION

Nonetheless, access to information in the digital world is cumbersome for the blind and visually impaired. For instance, many websites and documents are not designed to be accessible to screen readers. Moreover, interacting with technology (smartphones, tablets, and computers) can make it difficult to access information. Often, blind people must rely on the help of others to access information, which limits their independence and autonomy and has a negative effect on their psychological well-being. Libraries and librarians must adapt and welcome the AI revolution in order to increase accessibility and prioritize human needs for conversational systems and AI. Numerous websites currently employ chat bots to answer user inquiries, provide guidance, and direct users to pertinent content. Conversational systems can be implemented in libraries and museums to improve accessibility and assist visitors with their questions. AI technologies have revolutionized the way people interact with the world, offering the opportunity for increased accessibility, independence, and improved quality of life. With the continuous evolution of AI, the future holds even more promise for the visually impaired, where technology opens doors to new opportunities and experiences. These communal spaces, where users may engage with knowledge in a private and safe manner, could be established with the assistance of libraries and librarians. Since AI is here to stay, libraries should include it into their operations as soon as possible.

## REFERENCES

1. Kuzdeuov, Askat; Nurgaliyev, Shakhizat; Varol, Hüseyin Atakan (2023): ChatGPT for Visually Impaired and Blind. TechRxiv. Preprint. https://doi.org/10.36227/techrxiv.22047080.v1
2. Rayini, Junaid (2017). "Library and Information Services to the Visually Impaired Persons". Library Philosophy and Practice (e-journal). 1510. http://digitalcommons.unl.edu/libphilprac/1510
3. Sunrich, M. and Green, R. (2006), "Assistive technologies for library patrons with visual disabilities", Journal of Access Services, Vol.4, no.1/2, pp.29-40, doi:10.1300/J204v04n01_02
4. McHale, N. (2007), "Some current assistive technology software options for libraries", Colorado Libraries, Vol.33, no.4, pp.25-28.
5. Hussain, A. (2023), "Use of artificial intelligence in the library services: prospects and challenges", Library Hi Tech News, Vol. 40 No. 2, pp. 15-17. https://doi.org/10.1108/LHTN-11-2022-0125.
6. Johnson, B. (n.d.). FEATURE – Libraries in the Age of Artificial Intelligence. Retrieved March 13, 2021, from https:// www .in fotoday. com/cilmag/jan18/Johnson–Libraries-in-the-Age-of-Artificial-Intelligence.shtml
7. Ng, A. (2018). AI is the new electricity. O'Reilly Media.
8. https://en.wikipedia.org/wiki/Seeing_AI
9. https://curioussteve.com /ai/call-annie-ai-app/
10. https://www.cnet.com/tech/mobile/envision-glasses-for-the-blind-can-read-documents-scan-faces-and-help-navigate/
11. https://lhblind.org/ai-powered-tools-for-people-who-are-blind/
12. https://www.bemyeyes.com/blog/introducing-be-my-ai
13. http://www.guoanhong.com/papers/UIST16VizLens.pdf
14. https://thedigitallibrarian.com/2023/01/23/artificial-intelligence-in-the-library/
15. https://ischool.sjsu.edu/ciri-blog/future-ai-libraries