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Use Of Voice Assistants By The Students In Engineering Educational Institutions In Karnataka: An Exploratory Study

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ABSTRACT

The current study investigates the use of voice assistants among Karnataka engineering students. In order to get data from the respondents, the study used a questionnaire and survey method. The total population of the UG students of the six institutions was 13,388. Random Sampling Technique was used to distribute the questionnaires. A total of 374 questionnaires were distributed to UG students and out of which 366 questionnaires were received back with a response rate of 97.86 %. The results of the study include: 218 (71.47 %) respondents used Ok Google, whereas, 48 (15.74 %) respondents used Hi, Bixby of Samsung; 212 (57.92%) respondents used Voice Assistants for playing music, listening to their favorite songs, followed by 181 (49.45%) respondents used Voice Assistants for locating direction; 232 (76.07%) respondents used these Voice Assistants because of quick response, whereas, 154 (50.49%) respondents used because of its accurate search and 204 (66.89%) respondents faced errors in speech understanding, because Voice Assistants take time to get accustomed with the frequency and accent of the user.

KEYWORDS

Artificial Intelligence, Engineering Educational Institutions, Karnataka, Google, Siri, Voice Assistant Platforms, Voice Search Technology

1. INTRODUCTION

With ever growing volume of digital information available, information retrieval system has become crucial for accessing knowledge quickly and efficiently to find the information needed from diverse sources such as websites, databases, digital libraries and more. Timely and accurate information retrieval is essential for making informed decisions. Information Retrieval system helps users to locate and retrieve the most relevant and up to date information. One such development in Information Retrieval is the use of Voice Search Technology.

Increasing popularity of voice search and voice assistants has gained immense popularity in recent years. With the rise of smart speakers, smartphones, and other voice enabled devices, more people are using voice commands to interact with technology and do smart work without much efforts. Voice assistants provide a hands-free and convenient way of accessing information and performing tasks. Voice assistants offer enhanced accessibility for individuals with disabilities or those who have difficulty using traditional interface. Voice assistants can be integrated to various devices such as smart phone, smart speakers and household appliances. Voice assistants relay on natural language processing to understand user queries and provide accurate responses.

2. VOICE ASSISTANT PLATFORMS

Voice assistant platforms such as Siri, Cortana, Alexa and Assistant bring to life the once-fantastical concept of talking to computers. These apps found on specialized devices or smartphones, listen for wake-up keywords to record and understand user commands, connecting to servers for processing. As everyday consumer products, they seamlessly fit into our lives, allowing us to perform various tasks through voice commands, from getting information to controlling smart devices. Users can do everything from asking basic questions to playing music, making calls, or managing lights using voice control. In

recent years, voice assistants have gained immense popularity, with millions of devices worldwide incorporating them into households. They leverage technologies like voice recognition, speech synthesis, and Natural Language Processing (NLP) to offer services. Easy to use, they are now part of devices equipped with a microphone and speaker, known as smart speakers. These devices, like Amazon Echo Show, Echo Spot, Facebook Portal, and Google Home Hub, vary in features, some with screens and others without. Voice assistants, also known as virtual assistants or intelligent personal assistants, are software applications that use voice recognition and natural language processing to perform tasks and provide information. They are increasingly common on smartphones, smart speakers, and other devices, aiming to make our lives more convenient by offering quick access to information and services. Popular examples include Siri, Google Assistant, Alexa and Cortana.

2.1 VOICE SEARCH

The usage of voice search is become more widespread and popular. Finding information online has been transformed by voice search. Users can use technology to answer questions or just learn more about a topic by using voice search, which removes a layer of effort. Through the Automatic Speech Recognition (ASR) system, speech signals are converted into text to enable voice search capabilities. Users of smart devices can now conduct voice searches thanks to voice recognition technologies. After then, spoken words will be converted into text by the voice search system. With improved speech control, longer battery life, and higher audio quality, artificial intelligence (AI) supports personal voice assistant devices. Improvements to natural language processing keep making it possible for it to comprehend user orders and questions.

3. LITERATURE REVIEW

As stated by Vasilache et al. (2004), the demand for effortless and seamless interactions between humans and machines is on the rise. One of the most popular and promising technologies that help achieve this is voice recognition applications. Schalkwyk et al., (2010) have conducted a research study to evaluate the effectiveness of voice search technology compared to typing technology. The study sample consisted of 1.3 million queries. The study findings have indicated that 34.6% of users preferred to use the spoken environment when making their queries. The study offers valuable insights into the increasing trend of voice search and its impact on mobile technology. Catherine Park noted that the effects of voice search on SEO remain somewhat unclear given the limited amount of available data and research. Nevertheless, SEO professionals can examine specific parameters to better understand the influence of voice search on SEO and adapt their strategies accordingly (Park, 2018). According to a study conducted by Mindshare in 2017, a vast majority of smartphone users (about 60%) expressed their interest in adopting voice search technology for all their activities, as long as it delivers responses that resemble human speech. This highlights the growing popularity and potential of voice technology among consumers which could have a significant impact on the way brands interact with their customers (Voice Today, 2018).

Wei and Landay (2018) enlighten the readers the distinct categories of voice assistants available in the market along with the varied functions that these assistants can perform. However, due to the sensitive nature of information that voice assistants handle, it is imperative to strengthen the privacy and security measures before using them for tasks that require confidentiality. During a conversation, Rebecca brought up Brent Csutoras' views on the future of voice optimization. Csutoras emphasized the importance of this technology and advised people to pay close attention to it. However, the author has also the expressed concern that some individuals may feel pressured to get on board with the trend, fearing they will be left behind if they don't. In other words, the author has warned against adopting voice optimization merely for the sake of keeping up with the latest trend (Sentance, 2018).”

According to a webinar conducted by Think Tank in 2018, the voice-based assistant 'OK Google' has an impressive accuracy rate of 95% in understanding the English language. The study has also highlighted that the universities across the globe are experimenting with 'Echo Dots' to provide students with alerts on their class schedules and tuition fee payments. The increasing adoption of voice search technology by various stakeholders indicates its growing importance in facilitating information search. The academic institutions are taking note of this trend and are starting similar projects to provide their students with a more convenient experience (Baker, 2018). According to the Voice Report 2019 survey, an increasing number of people, specifically 72% are using voice search to access digital personal assistants (Bingads, 2019). This suggests that there is a growing trend towards the use of voice search technology, which is becoming increasingly popular due to its ease and convenience. Furthermore, a market research-based study has emphasized the significance of virtual assistants in the consumer market. The study indicates that Virtual Assistants are playing a central role in the market, and are increasingly mediating market interactions (Mari, 2019). This implies that virtual assistants are becoming an integral part of the consumer market, and are playing a vital role in shaping consumer behaviour and market trends.

The study conducted by Subhash et al. (2020) has brought an application that is a game-changer in comparison to previous assistants. It is a straightforward yet powerful tool that has proven to be quite beneficial for human life. In the business world, this application is frequently utilized, particularly in labs where personnel are required to wear bodysuits and gloves for safety, making writing difficult. However, these specialists can quickly obtain any information they require using the voice assistant, which makes their work simpler and more effective. Only the most basic components have been included in the study, including a location search, a YouTube song or video search, a Google phrase search, and the most recent news. A comprehensive review of recent studies on voice search interaction was conducted by Xing et al. (2020). Their primary objective was to gain a better understanding of how users perform and perceive voice searches. The authors concluded their review by suggesting potential directions for future research on voice search interaction. Kumar et al. (2020) proposed a voice recognition system that utilizes Raspberry Pi technology instead of costly computers. Upon receiving the message, the USB speaker will be able to locate the desired books, making it a convenient standalone device for libraries. By implementing

automation in this process, it greatly minimizes the amount of time and effort lost, while also maintaining a high level of user engagement. The system can lead users directly to the book's location through the speaker, providing a stress-free and hassle-free experience. Some of the most well-known AI assistants are Siri by Apple, Google Assistant and Alexa by Amazon.

As Maurya et al. (2021) note the development of Artificial Intelligence (AI) and speech technology is leading to increasingly natural voice-controlled digital assistants that are becoming more ingrained in our daily lives. These assistants are evolving to handle more complex tasks and are on track to become even more human-like in their interactions. For example, Amazon's wall clock can already tell the time and set a timer through its pre-enabled Amazon Alexa integration. Chinnadurai et al. (2021) have proposed a more efficient way of using web browsing, known as voice browsing, to assist visually impaired individuals. These individuals often face difficulties when trying to use touch screens, keypads, and the internet to input data, resulting in practical obstacles to internet access. By using this browser, users can save time and effort by automatically translating spoken words into text. Furthermore, speech recognition technology can make all text content on the web accessible to individuals with different connections. However, there is a room for improvement in speech technology's precision, accuracy, and pronunciation. Bajpai and Sharda (2021) have explored the use of app-based systems to create a search gateway for library collections, considering the popularity of smartphones and smart devices. To further improve the input and output of library searches, voice-enabled OPACs should be considered. This innovative approach could integrate voice search or speech recognition-based technologies like "OK Google" and "Hey Alexa" into Web-OPAC, appealing to tech-savvy youth. As the search technology industry shifts its focus from text to speech, libraries must adapt to meet market demands and support their patrons. Shortly, libraries may introduce the "Hello User" or "Hello Library" voice search feature within the OPAC. Gaikwad et al. (2022) presented a suitable methodology for creating such an assistant. This technique can be applied to develop an automated library management system that is powered by an intelligent voice assistant.

In recent times, libraries have been focusing on implementing new technologies to enhance their services. The introduction of voice search technology has proven to be particularly beneficial for library professionals, as it has been widely accepted and preferred by digital users. With voice search becoming increasingly popular in day-to-day life, libraries have a unique opportunity to incorporate this technology into their services and provide a more efficient and personalized experience for their patrons. By utilizing speech or voice search technology, libraries can offer a more intuitive and user-friendly search experience, enabling patrons to easily locate and access the resources they need.

4. NEED FOR THE STUDY

In recent years, advancements in science and technology have reshaped the way people access information. Instead of relying on library visits to solve problems, individuals now turn to search engines and artificial intelligence voice assistants for quick answers, contributing to an improved lifestyle. The field of voice assistant technology has witnessed significant progress over the past 60 years. Initially, employing three robust acoustic models, these assistants have evolved to achieve an impressive 95% accuracy rate, comparable to human stenographers. The speech-to-text feature has gained popularity, allowing users to effortlessly send messages and take notes on the go. The introduction of Amazon's smart speakers has further expanded the landscape of voice interaction. These devices seamlessly connect smartphone apps with everyday furnishings, offering a wider range of voice-controlled interactions and establishing a prominent presence in the market.

Voice assistants like Siri, Cortana, Alexa and Assistant embody the once-fantastical idea of conversing with computers. These applications, residing on purpose-built devices or smartphones, await wake-up keywords to record and interpret user commands, connecting to specialized servers for processing. As consumer-level products, they have seamlessly integrated into everyday life, enabling users to perform tasks ranging from informational inquiries to smart device control via voice commands. Users can use voice control for anything from simple informational queries to music playback, phone calls, and light on/off switching. Looking into the importance of Voice Search Technology and also its usage by a greater number of tech savvy users, the authors have undertaken the present study.

5. OBJECTIVES OF THE STUDY

The main aim of this study is to explore the use of Voice Assistants by the students of Engineering Educational Institutions in Karnataka. The specific objectives of the study are to:

- know the awareness of Voice Assistants by the students of Engineering Educational institutions;
- determine the purposes of using Voice Assistants by the students;
- study the major activities carried out by the students of Engineering Educational Institutions;
- identify the problems faced while using Voice Assistants by the students; and
- enlist the challenges posed by Voice Assistants.

6. METHODOLOGY

The authors have adopted the survey method and questionnaire tool to collect the data from the respondents. The total population of the UG students of the six institutions was 13,388. Random Sampling Technique was used to distribute the questionnaires. The Cochran formula was used to calculate the number of samples to be drawn. The sample drawn out of the total population was 374. A total of 374 questionnaires were distributed to UG students. Initially online questionnaire was prepared using Google form was sent to the respondents. Personal visit to these institutions by the authors yielded a huge percentage of response. All the UG students were approached in the library, canteen and even hostels too. A total of 366

questionnaires were received back with a response rate of 97.86 %. The data collected then was fed into MS-Excel and calculated for frequency tables.

7. ANALYSIS AND INTERPRETATION OF THE DATA

7.1 Institution wise distribution of Questionnaires

The primary data was collected with a help of a structured questionnaire. The total population of all the students of these Engineering and Technology Institutions was 13,388. One of the authors personally visited to these Institutions and distributed the questionnaires to 374 respondents. Out of 374 questionnaires distributed, 366 duly filled in questionnaires were received back with a response rate of 97.86 %. The data then collected was fed into computer and analyzed using frequency tables. The institution wise distribution of questionnaires is presented in table 1.

Table 1: Institution wise distribution of Questionnaires and responses received

Sl. No.	Name of Institute	Total Population of students	% of population to be considered	Questionnaires distributed	Questionnaires received
1	Shri Dharmasthala Manjunateshwara College of Engineering and Technology, Dharwad	2800	20.91	78	78
2	Indian Institute of Technology (IIT), Dharwad	751	5.60	21	21
3	Jain College of Engineering and Technology, Hubballi	1200	8.96	34	34
4	B. V. Bhoomaraddi College of Engineering and Technology, Hubballi	5650	42.20	158	150
5	KLE Institute of Technology, Hubballi	2037	15.21	57	57
6	AGM College of Engineering and Technology, Hubballi	950	7.09	26	26
	Total	13,388	100	374	366 (97.86%)

7.2 Department wise distribution of Questionnaires

A total of 12 departments were found in these institutions. Out of 366 respondents studied, 90 (24.59%) of the respondents belonged to the Department of Computer Science. The Department of Computer Science was found in all the Institutions, hence, the result. 62 (16.93%) respondents were from Mechanical stream, whereas, 61 (16.67%) respondents were from Electronics & Communication discipline and 60 (16.39%) respondents belong to Civil department. The response was meager from the Departments like Electrics & Electronics, Architecture, Information Science, Robotics, Bio-technology, Chemical Engineering and other disciplines and is presented in the table 2.

Table 2: Department wise distribution of Questionnaires

Name of the Department	No. of Respondents	Percentage (%)
Computer Science	**90**	**24.59**
Mechanical	**62**	**16.93**
Electronics & Communication	**61**	**16.67**
Civil	**60**	**16.39**
Electrics & Electronics	**29**	**7.92**
Architecture	**21**	**5.74**
Information science	**19**	**5.19**
Robotics	**7**	**1.91**
Bio – Technology	**7**	**1.91**
Chemical Engineering	**5**	**1.37**
Artificial Intelligence	**5**	**1.37**
Aeronautics	**0**	**0**
Total	**366**	**100**

7.3 Purposes of using Mobile (s)

A multiple-choice question was posed to the UG students on the purposes of using the mobiles they use. It is evident from the study that social media chat was the major purpose of using mobile (like Whatsapp, Instagram, Wechat, Snapchat, Tiktok etc.), whereas, 272 (74.32%) respondents used mobile for checking and sending mails to their friends / peers, 270 (73.77%) respondents used mobile for using social media platforms and setting reminders and alarms respectively. The other purposes like Torch, listening to music, sharing photos and videos, watch movies, use maps, play games were given less importance compared to other main purposes. The least importance was given to the option managing to-do lists and tasks. The details are presented in table 3.

Table 3: Purposes of using Mobile (s)

Purposes	No. of Respondents	Percentage (%)
Messages	274	74.86
Check and send mail	272	74.32
Social Media Platforms	270	73.77
Setting reminders and alarms	270	73.77
Torch	263	71.86
Listening to music	262	71.58
Sharing photos and videos	261	71.31
Watch movies	254	69.4
Use maps	253	69.13
Play games	251	68.58
Call / Receive	249	68.03
Online reservation	248	67.76

Online Shopping / Transactions	248	67.76
Weather and news updates	238	65.03
Scanning documents	232	63.39
Monitoring health and fitness	208	56.83
Managing to-do lists and tasks	119	32.51

7.4 Awareness about Voice Assistants

Gone are the days when people type the text for sending messages / mails etc. Later while, for shorter period people have used sticks to type then shifted to touch screens. The present tech savvy users mostly prefer Voice Assistants for all the activities they do in mobile. A declarative question was asked to the respondents about their awareness on Voice Assistants they use the most in their mobile. An overwhelming response, i.e. 305 (83.33%) was received from the Engineering students that they are aware of Voice Assistants and only 61 (16.67%) respondents were unaware of it.

Table 4: Awareness about Voice Assistants

Awareness about Voice Assistants	No. of Respondents	Percentage (%)
Yes	305	83.33
No	61	16.67
Total	366	100

7.5 Use of Voice Assistant Platforms

A declarative question was asked to the respondents on the use of popular Voice Assistant platforms. Majority, i.e. 218 (71.47 %) respondents used Ok Google, whereas, 48 (15.74 %) respondents used Hi, Bixby of Samsung, followed by 39 (12.79%) respondents used Hey Siri of Apple platform. The other Voice Assistant Platforms like Hey Alexa of Amazon and Hey Cortana of Microsoft have not used by the respondents.

Table 5: Use of Voice Assistant Platforms

Use of Voice Assistants Platforms	No. of Respondents	Percentage (%)
Google - OK,	218	71.47
Samsung – Hi, Bixby	48	15.74
Apple – Hey Siri	39	12.79
Amazon – Hey, Alexa	0	0
Microsoft – Hey, Cortana	0	0
Total	305	100

7.6 Major activities with Voice Assistants

A multiple-choice question was asked to the respondents about the major activities they do using Voice Assistants. The data is presented in the table 6. The study reveals that 212 (57.92%) respondents used Voice Assistant for playing music, listening to their favorite songs, followed by 181 (49.45%) respondents used Voice Assistants for locating direction, whereas, 137 (37.43%) respondents for calling or texting purpose. The other activities like Scheduling reminders, browsing the internet for getting information, weather information and checking and sending emails were other less preferred activities done by the respondents.

Table 6: Major activities with Voice Assistants

Major Activities	No. of Respondents	Percentage (%)
Playing music, listening to favourite songs	212	69.51
Location	181	59.34
For calling or texting friends / peers / family members	137	44.92
Scheduling Reminders	118	38.69
Browsing the internet for getting information	114	37.38

Weather information	102	33.34
Checking and sending e-mails	59	19.34

7.7 Purposes of using Voice Assistants

A multiple choice question was asked to the respondents about the purposes of using Voice Assistants. The study reveals that 232 (76.07%) respondents have used these Voice Assistants because of quick response, whereas, 154 (50.49%) respondents used because of its accurate search, followed by 141 (46.23%) respondents have used Voice Assistants have because of its interactive in nature, 131 (42.95%) respondents have used it since it is fast and saves time of the user, 124 (40.66%) respondents said it is helpful to differently abled persons. The other purposes like "It turns voice into text and helps to get relevant information" (119), helps illiterate persons (117) and other options were given less importance. The data is presented in table 7.

Table 7: Purposes of using Voice Assistants

Purposes	**No. of Respondents**	**Percentage (%)**
Quick response	232	76.07
Accurate search	154	50.49
Voice Assistance is interactive	141	46.23
Voice Assistance is faster and saves time of the user	131	42.95
Helpful to differently abled persons	124	40.66
It turns voice into text and helps to get relevant information	119	39.02
Helps illiterate persons	117	38.36
Voice Assistance helps to drive traffic	80	26.23
Enhance accessibility for everyone	76	24.92
Voice Assistance is multilingual	74	24.26
Reach multiple users at once	63	20.66

7.8 Problems faced while using Voice Assistants

Though Voice Assistants have good number of advantages but still the respondents have encountered with some problems. It is evident from the table 8 that 204 (66.89%) respondents have faced errors in speech understanding, because Voice Assistants take time to get accustomed with the frequency and accent of the user, followed by 121 (39.67%) respondents faced problem of unclear pronunciation, lack of awareness about how to use Voice Assistants is another problem faced by 104 (34.1%) respondents. The other problems like Slang, unusual accent, fear of invasion of privacy, lack of trust in technology and ambiguous expressions were given less importance.

Table 8: Problems faced while using Voice Assistants

Problems	**No. of Respondents**	**Percentage (%)**
Errors in speech understanding	204	66.89
Unclear Pponunciation	121	39.67
Lack of awareness about how to use Voice Assistants	104	34.1
Slang	97	31.8
Unusual accent	91	29.84
Fear of invasion of privacy	68	22.3
Lack of trust in technology	61	20
Ambiguous expressions	51	16.72

7.9 Challenges posed by the Voice Assistants

Voice Assistants have given opportunities to make the best use of technology. At the same time, they have posed challenges to one who uses it. It is clear from the table 9 that errors in speech understanding (203, 66.56%) is the major challenge posed

by the Voice Assistants, Privacy concern (139, 45.57%), language support and regional accent and Voice is still finding its feet are the other challenges posed by the Voice Assistants.

Table 9: Challenges posed by the Voice Assistants

Challenges	No. of Respondents	Percentage (%)
Misunderstandings / Errors in speech understanding	203	66.56
Privacy concern	139	45.57
Language support and regional accents	136	44.59
Voice is still finding its feet	89	29.18

8. DISCUSSIONS

Before the invention of internet, libraries were regarded as the knowledge centers where in accessing information or reading materials was not that difficult. For all kinds of their queries, they depended and relied on libraries. In traditional search users input their query by typing keywords, whereas, voice search involves using voice commands or queries spoken into device or virtual assistants. Information retrieval is intended to support people who are actively seeking or searching for information, as in Internet searching. Systems for retrieving information are essential for enabling quick and easy access to pertinent data. These systems use a variety of methods, whether in online or traditional systems, to index, arrange, and retrieve data in response to user requests and specifications. Having precise speech recognition is a crucial element contributing to voice assistants' triumph. By enhancing accuracy, voice assistants can effectively comprehend and execute user instructions, resulting in smoother and less exasperating interactions. It is particularly significant because it makes voice assistants available to a broader range of users, including those with disabilities, ultimately promoting inclusivity. A superior recognition system improves the overall user experience, resulting in greater adoption and satisfaction with voice assistant technology. As technology advances, providing users greater control over their privacy within voice assistant ecosystems becomes increasingly essential. A transparent system that allows users to manage and delete their data is one effective way to achieve this. Additionally, expanding language support to cater to various accents and languages is vital, ensuring a more comprehensive and accessible experience for users from diverse linguistic backgrounds. Ultimately, developing voice assistant responses that improve user engagement and comprehension across global audiences is crucial for delivering a positive user experience.

To make the most of voice assistants, users need to have access to user manuals and tutorials that are both comprehensive and concise. Such guides are intended to help users understand the full range of functions and commands available to them, which can help them to use their voice assistants more effectively. Another crucial aspect of voice assistant technology is its ability to understand different accents and pronunciations. By improving the system's ability to adapt to diverse speech patterns, voice assistants can become more user-friendly and inclusive, which can help expand access to a broader range of users. Voice assistants have evolved beyond their initial purpose of answering basic queries. They are now equipped with diverse features that enable ordering food, booking rides, and controlling smart homes. It has been made possible owing to their advanced ability to intelligently anticipate and respond to the user's current context, location, and preferences. This sophisticated technology rapidly transforms how individuals interact with devices and appliances, enabling them to accomplish tasks quickly and efficiently. It is imperative to allocate resources towards additional research and development to augment the capabilities of this technology to guarantee its perpetual refinement and enhancement.

9. TOWARDS THE IMPLEMENTATION OF VOICE SEARCH ASSISTANTS IN LIBRARIES

As we move towards the future, libraries must keep up with changing user needs by adopting new technologies such as voice search. Voice search will revolutionize how libraries operate, providing users with a more intuitive and efficient way to find books and other resources. With voice search, library patrons can search for books, authors, genres, and other resources simply by speaking their search queries aloud. This technology will not only make searching for information more accessible and user-friendly for visually impaired users but will also enhance the overall user experience. As libraries integrate voice search technology into their operations, they will stay at the forefront of innovation and demonstrate their commitment to providing the best possible service to their users in the digital age. The future of libraries is exciting, and the integration of voice search technology will undoubtedly play a significant role in shaping it.

Some of the popular voice assistant tools that could be considered for implementation in libraries

Alexa: AI assistants like Alexa have broad potential to enhance accessibility and revolutionized how patrons engage with library services. In addition to answering the queries, Alexa can also read audio books though limited to audible and delivering the customized news updates from range of sources and even helpful in reminding the library events offering the patrons and the library staff seamless way to manage their library related activities.

Google Cloud Speech-to-Text and Dialogflow: Dialogflow is like a smart tool that Google made. It's good at understanding how people talk it facilitates patrons in engaging in casual conversation, Moreover the plat form offers pre constructed templates, serving as a structural frame works for developers in the library science domain to build upon for the projects.

Microsoft Azure Speech Services and Azure Bot Service: Microsoft also has a suite of cloud services named Azure Microsoft Azure offers Speech Services for speech recognition and the Bot Service for building conversational agents. As a part of Azure's Cognitive Services they provide an API for speech recognition called Speech to Text. it is claimed to use breakthrough speech technology powered by decades of research (Alibegović et al., 2020).

IBM Watson Assistant: IBM tools offer a range of tools under the IBM discovery services. These tools function like advanced reference materials for librarians. They include Machine Learning Algorithms, Speech-To-Text and Text-To-Speech Modules, Artificial Intelligence (AI) Services, Cloud Functions for coding integration, Webhooks for online connectivity, and more. When they are combined with Watson Assistant, these services empower librarians to create interactive virtual assistants, or chatbots that simulate real conversations (Patil et al., 2021).

Open-Source Options (e.g., Mycroft AI): Open-source voice assistant platforms like Mycroft AI offer flexibility and customization. Speech to text (STT) is the part of Mycroft that translates spoken words into text. That text is then used by intent parsers, and then by Skills **(Mejía et al., 2023).**

Cisco Webex Assistant: Cisco Webex Assistant is designed for business collaboration, but it can be adapted for library use. Cisco WebEx used for small online meetings with video conferencing and screen sharing. Users can add specialized functionality for webinars, training, or remote technical support. You may need global online meetings with integrated audio that can be joined via telepresence and multiple video systems. Or you might want personal video meeting rooms. Cisco WebEx is all that. WebEx can be used on most devices and platforms **(Mishra et al., 2017).**

10. CONCLUSION

The widespread adoption of Voice Assistants like Google Assistant Siri, Cortana and Bixby has contributed to the popularity of Voice Search. This voice enabled devices are integrated into various smart speakers, smartphones. It is fast, convenient and allows for multitasking. The study indicates a high level of awareness (83.33%) and adoption of voice assistants among the engineering students. This suggests that voice assistants have gained significant popularity and recognition in the society. Voice assistants are primarily used by engineering students for playing music, locating directions and calling / texting. These activities demonstrate that the use of voice assistants provides convenience in daily tasks and entertainment. The respondents appreciate the quick response, accurate search capabilities, and interactive nature of voice assistants. However, features such as turning voice into text and assisting illiterate individuals are given less importance.

Voice assistants may be developed to support a wider range of activities. Anticipating user needs and offering active assistance can further enhance the functionality of voice assistants. While engineering students display a high level of awareness and adoption of voice assistants, there are areas that can be improved to enhance their usability and address challenges. Overall, the study indicates a positive response rate, widespread awareness, and usage of Voice Assistants among the Engineering students. However, there are challenges that are need to be addressed, and the discussion made in this paper provides valuable insights for improving Voice Assistant technology. The findings can be used to enhance user experiences and guide further research and development in the field of Voice Assistants.

11. REFERENCES

[1] Alibegović, B., Prljača, N., Kimmel, M., & Schultalbers, M. (2020, December). Speech recognition system for a service robot-a performance evaluation. In *2020 16th International Conference on Control, Automation, Robotics and Vision (ICARCV)* (pp. 1171-1176). IEEE.

[2] Artefacto. (2016, December). *Arte Facto* . Retrieved from We are Artefacto. We design and build digital products and services for libraries and the cultural sector: https://www.artefacto.org.uk/alexa-libraries/

[3] Bajpai, M. K., & Sharda, P. (2021, January 31). Speech Recognition Technology for OPAC Service: An Innovative Idea for Indian Libraries. Journal of Indian Library Association, 57 (1), 56-66.

[4] Baker, L. (2018). *5 Voice Search Optimization Strategies to Get Ahead*. SEJ Search Engine Journal. https:// www.searchenginejournal.com/voice-search- optimization-strategies/261115/#close.

[5] *Bingads_2019_voicereport.pdf*. (2019). Retrieved May 26, 2020, from https:// advertiseonbing-blob.azureedge.net/blob/bingads/media/insight/whitepapers /2019/04%20apr/voice-report/bingads_2019_ voicereport.pdf

[6] Chinnadurai, S., Fazal, M. & Suseendran, S. (2021). Voice Based Search Engine for Visually Impaired People's. *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, *4*(2).

[7] Mari, A. (2019). Understanding shopping- related voice assistants and their effect on brands. 11.

[8] Maurya, R., Koutikkar, P., Gulekar, S., & Shetty, G. (2021). Evolution of Voice Assistant. *International Research Journal of Engineering and Technology (IRJET), 8*(4).

[9] Mejía, R. H., Villegas, F. J. I., & Wences, C. P. (2023). Voice communication module for automotive instrument panel indicators based on virtual assistant open-source solution-Mycroft AI. *Revista de Ciencias Tecnológicas (RECIT)*, *6*(4), e-328, 1-13.

[10] Mishra, A. S., Umre, S. K., & Gupta, P. K. (2017). ICT Based Distance e-Learning tools for offering Library Services and Distance Education. *International Journal of Library and Information Studies*, 7 (2), 43-49.

[11] Nirmal Kumar, S, Prathinan, K., Suresh, G., & Prema, P. (2020). Smart Voice Assistant for Library System. *International Research Journal of Multidisciplinary Technovation*, 31–37. https://doi.org/10.34256/irjmt2045

[12] Park, C. (2018, May 30). *Impact of Voice Search on SEO in 2018*. Majestic Blog. https://blog.majestic.com/case-studies/impact-of-voice-search-on-seo-in-2018/

[13] Patil, J., Shewale, A., Bhushan, E., Fernandes, A., & Khartadkar, R. (2021). A voice based assistant using Google dialogflow and machine learning. *International Journal of Scientific Research in Science and Technology*, *8*(3), 06-17.

[14] Schalkwyk, J., Beeferman, D., Beaufays, F., Byrne, B., Chelba, C., Cohen, M., ... & Strope, B. (2010). "Your word is my command": Google search by voice: A case study. Advances in Speech Recognition: Mobile Environments, Call Centers and Clinics, 61-90.

[15] Sentance, R. (2018, July 26). Econsultancy. https://econsultancy.com/the-future-of-voice-search-2020-and-beyond/

[16] Subhash, S., Srivatsa, P. N., S Siddesh, A Ullas, & B Santhosh. (2020). Artificial Intelligence-based Voice Assistant. *2020 Fourth World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4)*. https://doi.org/10.1109/worlds450073.2020.9210344

[17] Vasilache, M., Iso-Sipila, J. & Viikki, O. (2004). *On a practical design of a low complexity speech recognition engine*. https://doi.org/10.1109/icassp.2004.1327060

[18] Voice Today (2018). Speak Easy: A consumer trends and insight report on voice technology and its impact on brands. https:/ /www.mindshareworld.com/sites/default/ files/Speakeasy.pdf

[19] Wei, Z., & Landay, J. A. (2018). Evaluating Speech-Based Smart Devices Using New Usability Heuristics. *IEEE Pervasive Computing*, *17*(2), 84–96. https://doi.org/10.1109/mprv.2018.022511249

[20] Xing, Z., Yuan, X., Wu, D., Huang, Y., & Mostafa, J. (2020). Understanding voice search Behavior: Review and Synthesis of research. In *Lecture Notes in Computer Science* (pp. 305–320). https://doi.org/10.1007/978-3-030-60117-1_23