

Web Accessibility to E-Commerce for Blind Users

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Abstract: *This paper addresses the challenges faced by individuals with visual impairments when shopping online and proposes a solution to make ecommerce platforms more accessible for them. In India, most non-governmental websites are not accessible to visually impaired individuals, which limits their autonomy and requires them to seek assistance from others. To address this issue, we propose an ecommerce application that utilizes speech recognition technology to search for products. The proposed system architecture includes the use of the Web Speech API for speech recognition and a web interface that provides audio instructions for navigation. This approach offers visually impaired individuals a more convenient and flexible way to access ecommerce platforms, thereby promoting their independence and inclusivity in society. The proposed system aims to make ecommerce accessible to all individuals, regardless of their capabilities, social status, or purchasing power.*

Keywords: Visually impaired, Voice recognition, Web Speech API, Accessibility

I. INTRODUCTION

In India, none of the non-government websites are accessible to the visually impaired people. All these circumstances affect the autonomy of a visually impaired individual. The shortness of tools such as audio features, detailed description and linear navigation forces a visually impaired person to take assistance from someone and makes it significantly difficult for them to shop online. This is the most frequent reason that they do not prefer to shop online. It has appeared as a salient need for all kinds of groups in society to have proper access to the World Wide Web. Therefore, it is important to make the World Wide Web accessible for every person despite of his or her capabilities, social status, purchasing power, etc.

According to the World Health Organization (WHO) there are around 1.3 billion people in the world that are visually impaired out of which 36 million are blind.[1] Since most websites are not visually impaired friendly a lot of these people need constant assistance while shopping online. In 2016, the government of India took initiative to make 100 government websites visually impaired friendly but none of them achieved the goal successfully. One potential community that can be discriminated with regards to accessing the web is visually impaired due to the strong trend of web sites and applications towards visual utilization. Our society includes a group of people who do not have proper vision or people who are blind. In recent years there has been great emphasis on the need for making the web approachable to visually impaired people. It resulted in generating significant enforcement on web content providers. This work is concentrated on an accessible E-commerce website that helps a visually impaired or a blind person to shop and order products online, the paper focuses on different tools, techniques and methods used by developers in recent years, problems faced by visually impaired in prevailing technology, and solutions for the same.

Due to the E-Commerce revolution, more and more people are shifting online to fulfill their day-to-day needs. Online sales are booming, and with these the society is habituated with ordering things online from various online e-commerce stores like Amazon, Flipkart, Zomato, and many more.

Thus, The Proposed Web Application aims to provide a Web Interface for Physically Challenged People. The system uses voice as an input of Blind people, that allows them to interact with the system. All kinds of instructions will be provided to them in the form of audio, they need to hear and follow the instructions



II. LITERATURE SURVEY

Table 1: Comparison of different technologies

Paper Name	Publication	Technology Used	Advantages	Disadvantages	FutureScope
A New Approach of e-Commerce Web Design For Accessibility based on Game Accessibility in Chinese Market [2]	IJACSA 2021	AI-based voice Assistant using Python, Color Blind Mode using Munsell Color System In CSS.	Colorblind Mode, Voice Assistance Based on Cognitive Assistance	Better UI including advertisement is needed, The provided system can now only work for the buyers, but not the businessmen who also have this kind of situation.	Improvement In UI and controls, Adding options for visually impaired Sellers and Improving the testing process with real users.
Visually Impaired Friendly E-commerce website [3]	ICEECCOT 2019	The website is developed using ASP.NET, C# with its database stored in SQL server.	Includes Colorblind mode, Recommendation Algorithm, Processes voice input and instructs users for each step, The website also has separate admin login where admin can manage products.	The usability study is conducted with only 4 blind users from Mumbai, India. Based on their inputs the effectiveness and efficiency of the Audimart website is calculated. The website has only a linear navigation.	In the future the website can also be converted to A mobile application which can help user navigate with the help of gestures.
Virtual assistant for the visually impaired [4]	IEEE 2020	The built-in modules of text to speech (pyttsx3) and speech to text (speech recognition library by Google) in python	Results showed that the software was able to run on the three most popular sites: Google, Gmail and Wikipedia. The software al provides a summary of the text using machine learning	Web pages are Partially accessible. Some parts are usable for the visually impaired, while others are not, The accessibility of some web pages regressed due to updates on the web site.	To expand The support For various Different languages, To provide Support for More websites.
Conceptual Interactive Search Engine Interface for Visually Impaired Web Users [5]	2018 IEEE	FCA algorithm Eclipse IDE for Java version Oxygen	Preprocessing the data of 20 search results with Natural Language Processing (NLP) by removing the stop words, stemming to convert words into the root, finally to tokenize the joint title and snippet into words for the indexing.	If the user did not find his target information on this webpage, (Ctrl + W) can be used to close this tab and return to the last list of results to continue his searching activity	New opportunity for extending the scope of the proposed solution can be applied by summarizing the webpage content with the concept that was selected by the user as parameterized input to make a summary of



					the highlighted webpage related to this concept.
EYE ASSISTANT Using mobile application to help the visually impaired [6]	2019 IEEE	Tensorflow machine learning API	The app doesn't need any photograph to detect the object. The application can run on the device without any remote server.	Currently the data in our app is limited to CIFAR 10 data set where there are 600 images of 10 objects, which we have trained	In future, we intend to add voice command so that fully blind people will be able to use the app easily.
Electronic Commerce: a great opportunity for the Blind 2 [7]	ISTI-CNR	Electronic Commerce: a great opportunity for the Blind 2 [7]	Allows ease of use for non-technical users, integrates google docs.	screen reader makes it difficult to interact with websites that have complex layout and dynamic content, Lack of interface overview, 64% had navigation problems while 45% thought they did not received adequate information in both search and product evaluation phases; only 8 users of 22 felt that the economic transaction was not secure	Reduce usability problems and offer more control of online transactions.
Ecommerce based online shopping for visually impaired people using speech recognition [8]	IJDR 2018	Speech recognition algorithm i.e. Deep Learning algorithm, The clustering of data can be carried out using K-mean Algorithm using Python	Allows signup, merchant-side controls	It requires to specify the number of clusters (k) in advance. It cannot handle noisy data and outliers.	Improvement in Global, local feature are Used for identification and multilevel clustering.

III. METHODOLOGY

"Web Accessibility to E-Commerce for Blind Users" is the name of the suggested solution. The major goal of this objective-based programme is to make it possible for persons with disabilities, especially those who are visually impaired, to access the ecommerce platforms that are currently the most popular for online product purchases. To avoid or reduce the different practical challenges that the visually impaired individuals encounter, we are building an e-commerce application that uses speech recognition. In our proposed system, we use speech recognition to search for products. Web Speech API can be used to carry out this speech recognition.



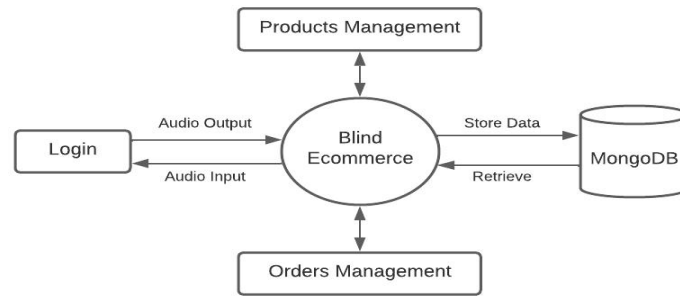


Fig1: Proposed System Architecture

For persons who are blind or visually handicapped, this way of access or using speech recognition software rather than using a keyboard gives them an extra advantage and increases their flexibility when using the application. A user must be a registered user of the website in order to search for any product. The system should recognize this input acoustic voice signal and converts this signal i.e. speech input signal into character string. The user communicates with the system using audio input. The speech recognition algorithm has to process the acoustic waves to transform into character string for further operation. Once the input speech signal are converted into character string the resultant character string are analyzed. According to the resultant character string analysis. The item of interest or searched item is selected from database to display as the searched result. After the required searched item are display on screen with an audio based voice command will elaborate the visually impaired peoples the product that display on a screen.

IV. SYSTEM IMPLEMENTATION

Fig 2 is a Login page where you can select modes ie.(Blind or Normal) and enter username and password to login.

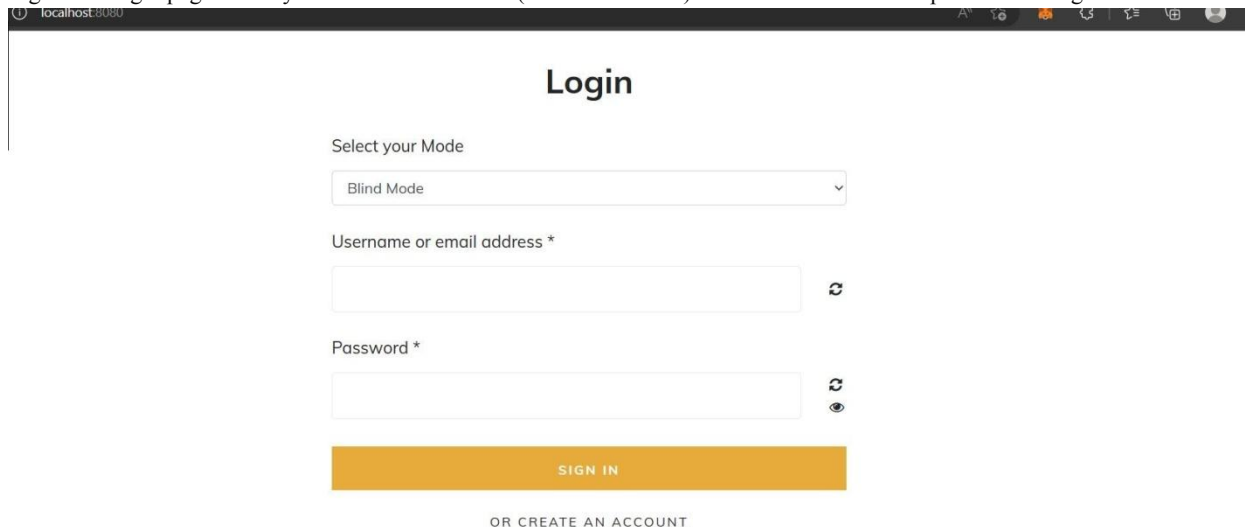


Fig. 2. Login page

Fig 3 is the Registration Page where new User can register to our website

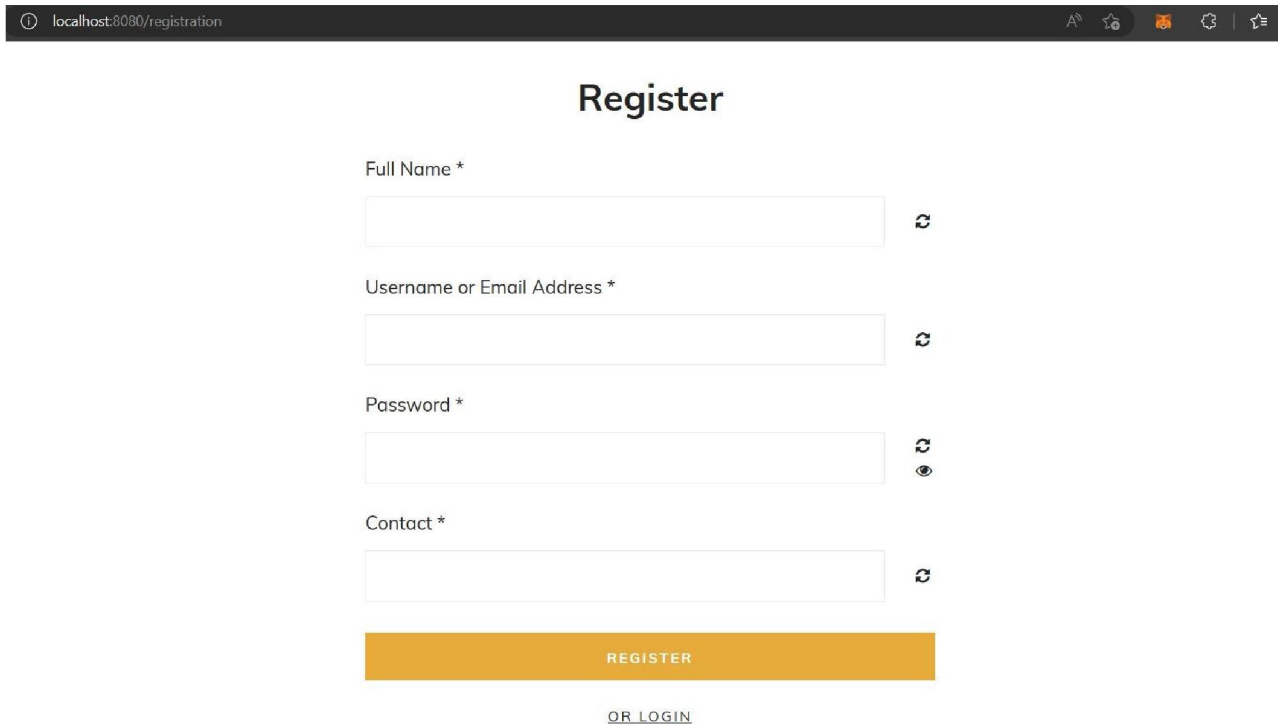


Fig. 3. Registration page

Fig 4 is the Home page

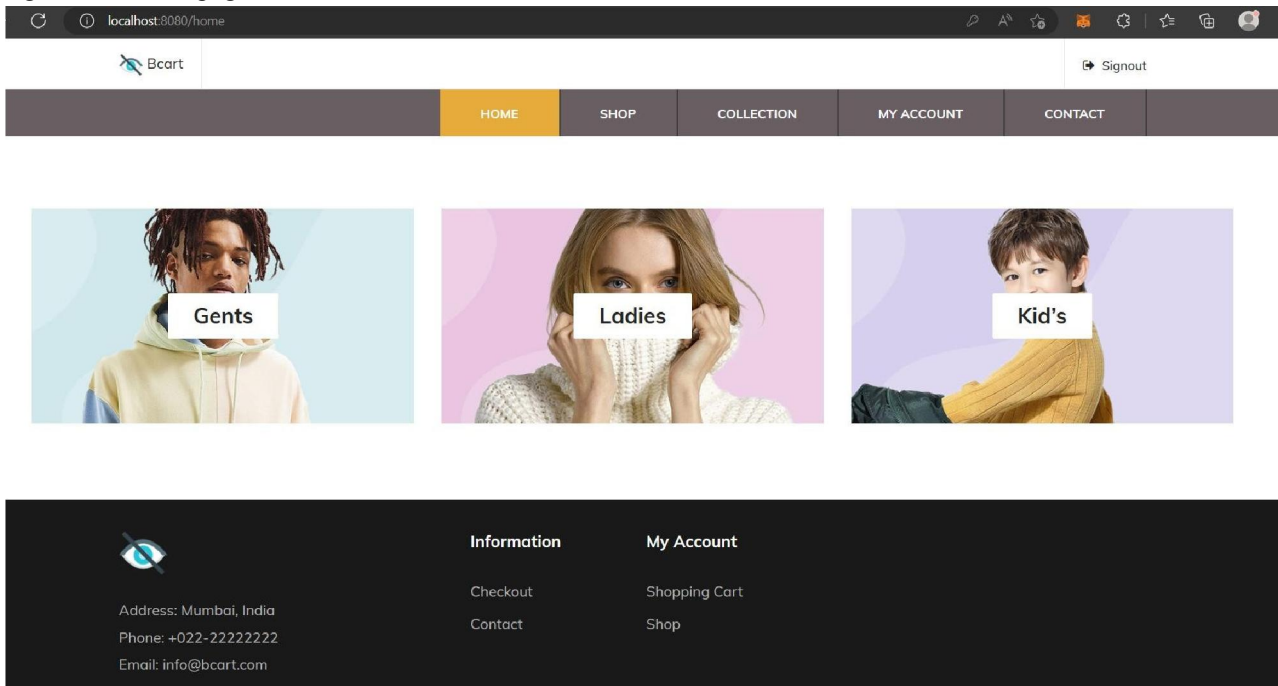


Fig 4: Home Page

Fig 5 is the Shopping page where user can search and shop by applying various filters such as Colour, Item name, Size etc

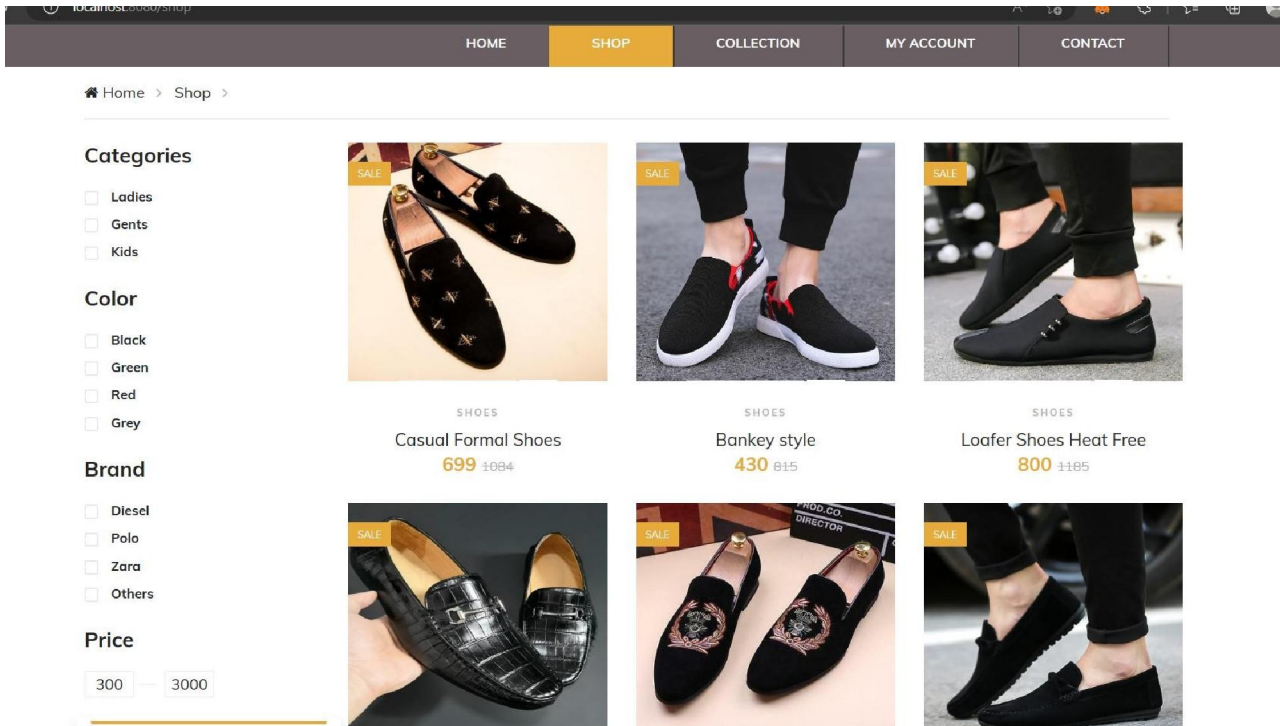


Fig 5: Shop Page

Fig 6 is the Checkout page which contains the billing details and the information about the product and place the orders.

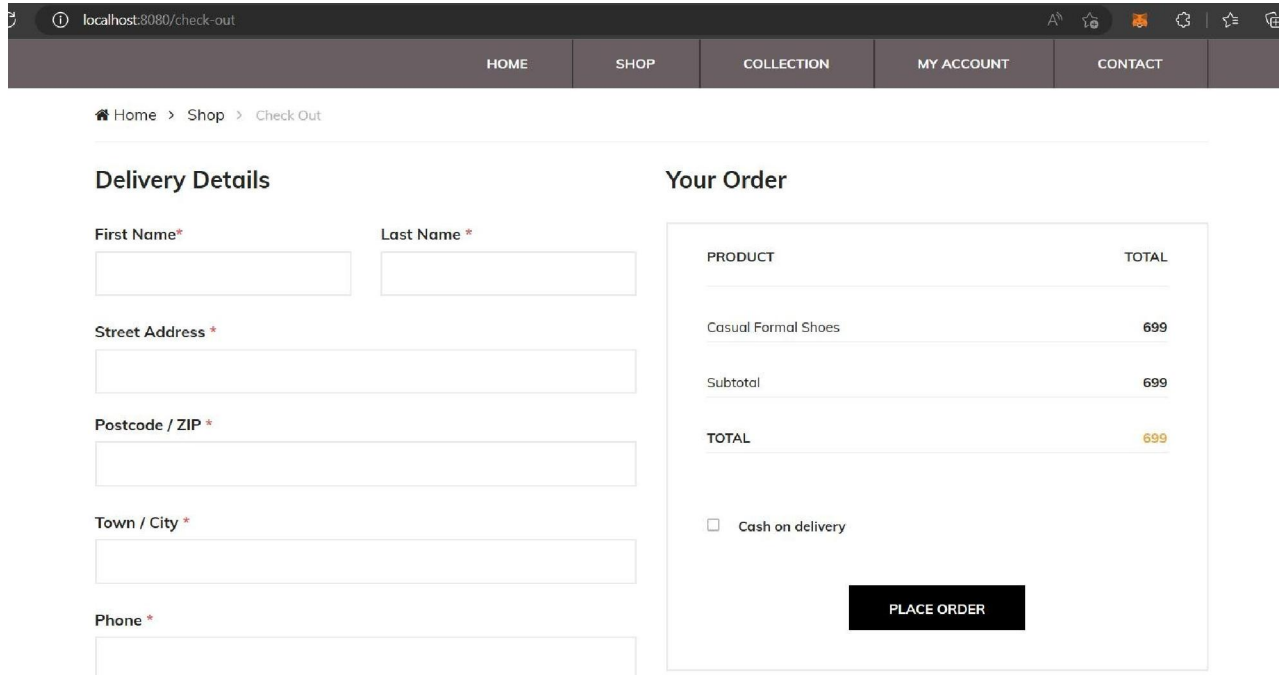


Fig 6: Checkout Page

V. FUTURE SCOPE

There are opportunities to integrate the outcomes while some of the offered approach and its tool support it[9]. The system can be upgraded to include the essential improvements in how the voice synthesis algorithm is executed. The framework can be strengthened to support people who suffer from additional blindness-related illnesses, such as psychic blindness, note blindness, object blindness, and others.

VI. CONCLUSION

There are many different segments available for online stores, which are affected by constant evolutions. Several studies will be conducted using an online store that is accessible to those who are blind or visually impaired. It is common knowledge, e-commerce websites are growing in popularity over time[10]. According to a recent survey, E-commerce website usage in 2020 was 18% higher than in 2019[11]. E-commerce websites offer a reliable platform for sellers to sell their goods to loyal clients anywhere in the world without any fuss. To meet the new challenges and requirements of the market, the business owners need to think and make better decisions. we are developing a system for visual impaired people so that they can do online shopping. The system accept speech, converts it into text format and display the desired result. This will help blind people to lead an independent life. In other approaches, typical deep learning algorithms, including deep neural networks (DNN), and deep belief networks (DBN) have been implemented for speech recognition, Global, local feature are used for identification and multilevel clustering is used to increase the accuracy of system. Also The Performance evaluation of the assistive can validate the resulting performance of the system. The main focus was on the visually impaired people who can not use the E-commerce website on their own. Many researchers are working on that to bring visually impaired people into the world of E-commerce[12].

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REFERENCES

- [1]. <https://thesai.org/Publications/ViewPaper?Volume=12&Issue=8&Code=IJACSA&SerialNo=1>
- [2]. Chand, Mallika & Mulchandani, Shreya & Mirkar, Sulalah. (2019). Visually Impaired Friendly E-commerce website. 191-196. 10.1109/ICEECCOT46775.2019.9114617.
- [3]. V. Iyer, K. Shah, S. Sheth and K. Devadkar, "Virtual assistant for the visually impaired," 2020 5th International Conference on Communication and Electronics Systems (ICES), 2020, pp. 1057-1062, doi: 10.1109/ICES48766.2020.9137874.
- [4]. Aqle, D. Al-Thani and A. Jaoua, "Conceptual Interactive Search Engine Interface for Visually Impaired Web Users," 2018 IEEE/ACS 15th International Conference on Computer Systems and Applications (AICCSA), 2018, pp. 1-6, doi: 10.1109/AICCSA.2018.8612874.
- [5]. M. A. Khan Shishir, S. Rashid Fahim, F. M. Habib and T. Farah, "Eye Assistant : Using mobile application to help the visually impaired," 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT), 2019, pp. 1-4, doi: 10.1109/ICASERT.2019.8934448.
- [6]. Buzzi, Maria Claudia & Buzzi, Marina & Leporini, Barbara & Senette, Caterina. (2018). Electronic Commerce: a great opportunity for the Blind.
- [7]. <https://www.journalijdr.com/sites/default/files/issue-pdf/9843.pdf>.
- [8]. Chand, Mallika & Mulchandani, Shreya & Mirkar, Sulalah. (2019). Visually Impaired Friendly E-commerce website. 191-196. 10.1109/ICEECCOT46775.2019.9114617.
- [9]. Kunal Mohadikar and Rahul Nawkhare. 2017. "Ecommerce Based Online Shopping for Visually Impaired People using Speech Recognition.", International Journal of Development Research, 7, (08), 14581-14584.

- [10]. Development of an E-commerce Website Accessible to Blind and Visually Impaired People" by J. de Barros and R. Almeida: <https://link.springer.com/chapter/10.1007/978-3-319-20681-3>
- [11]. Statista. (2021). E-commerce usage increase due to the coronavirus (COVID-19) pandemic worldwide in 2020, by region. Retrieved from <https://www.statista.com/statistics/1121442/covid-19-impact-on-global-e-commerce-by-region/>
- [12]. Liu, Guanhong & Ding, Xianghua & Yu, Chun & Gao, Lan & Chi, Xingyu & Shi, Yuanchun. (2019). "I Bought This for Me to Look More Ordinary": A Study of Blind People Doing On