Mobile based application to aid the visually challenged to learn

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Abstract:
Education provides knowledge and skills to the population, as well as shapes the personality of youth of a nation. Vision is fundamental to the learning process and is the primary basis upon which most traditional educational strategies are based. A visually challenged child will typically learn about the world in a different way from a child without a visual impairment. He/ She may not be able to rely on her sight to obtain information. These visually impaired students must have specialized services, books and materials in appropriate media as well as specialized equipment and technology to assure equal access to the specialized curriculum. Audio books are helpful for readers with limited/no vision and also, readers having certain physical and learning disabilities. Presently, it was found from the local blind schools that readers who are available at that time, come and read for the blind students. And the rest of the time, they just recall what they have listened to from the scribes. The students cannot learn as and when they want. They have to wait for the time when the scribes are available. We have built an innovative solution to help the visually impaired children to learn very easily by using voice navigation to choose the required   audio books. This solution will eliminate the visually challenged from relying on readers to read and learn.
Keywords: Visually-challenged, ReactNative, Voice navigation

I. INTRODUCTION

Education is fundamental, for the development of the individual as well as for the welfare of the society. Education is not only about studies. It is also about how one develops his/her ideas and imaginations and grows up into a unique human.Visual impairment makes it difficult to use the learning facilities which other people have access to. Visually challenged people can't directly read the information on a web page. People with extremely poor vision also have difficulty in reading small fonts, interpreting icons and perceiving the colors used by many sites. Learners with visual disabilities encounter several challenges. Teachers found it difficult to plan for these learners according to their academic needs. Learners with visual impairments lack support from educational stakeholders and hence withdrew when placed in an inclusive setting. Visually impaired learners are most likely to succeed in educational systems provided they have proper access to reading materials.We found that the visually challenged students require special assistance for learning. They do all other routine work like walking to school, eating etc. by

themselves. But, when it comes to learning, they have to rely on others. It would be meaningless if one has access to all kinds of facilities except proper access to education.

II. OBJECTIVE

- To ensure easy access of audio books
- To reduce the dependency on others to read and learn
- To eliminate the need of readers during study hours
- To reduce the challenges the visually challenged people face during learning
- To ensure usability to users with no much technical knowledge.

III. TECHNOLOGY

- ReactNative
- Node.js
- Firebase
- Version Control System

IV. DESIGN OF PROPOSED SYSTEM

A. Existing System

We extrapolated that visual impairment affected the students' academic performance. The special educational needs of the visually impaired include computer application, Braille writing materials, mobility issues, funding, scribe availability and some physical infrastructural facilities. Most blind students used a combination of methods, including readers, tape-recorded books and lectures and, sometimes, Braille materials to learn. The challenges faced by them are as follows. All the study materials are not available in Braille. Also, a majority of them preferred the scribes. The availability of scribes was again a major problem. Either way, the process of reading and studying required more time for a blind student than for a sighted student. To access any kind of information on the computer, they usetwo kinds of keyboards, Braille keyboard and the typical QWERTY. To use QWERTY, they have to memorize so many shortcuts to perform regular commands or to interact with the interface. Not so many people with visual impairment can read/type Braille. And about the audio books, it was foundthat it was not easy to access the audio books which were uploaded by certain communities/organizations online. The students could not afford to get the required audio books. Even if they could download the audio books, they needed an electronic device which could support the required audio file. The visually impaired children were finding it difficult to learn and use alternative technologies.

B. Proposed System Design

We have proposed a prototype with which the user could access audio books easily without having to know any kind of technology to access it. There are no prerequisites for the user in order to use the prototype. The user interface is very simple and easily understandable. Voicecommands entered as input by the user is used to navigate and choose the audio books in the prototype. Gestures like single tap, double tap and long press are used, thereby ensuring simplicity. The visually challenged user need not rely on anybody to access the audio books in this prototype. External help by normal people is not required to learn. We had given this prototype to the visually impaired students for testing. Based on their feedback, we have incorporated a few other features too. If the user has read a book half way and has exited in between, when he logs in the next time, he can choose to either read from the beginning or resume from where he has stopped previously. This will prevent the need of him to always start from the beginning.We also have a web application on the other side where any person who wishes to contribute audio books to the prototype can do so. The uploaded audio books can be viewed by the admin. The admin checks the books as to whether it is relevant and that it does not have any flaw. If the admin approves the uploaded book, it will be loaded into the prototype. There is also a provision to store information about which admin has approved the upload. Any bug or fault encountered by the user

while listening to the audio book can be reported easily by simply double tapping the screen. These reports will be displayed on the admin's screen. The book will be then looked upon and corrected by the admin. Further actions will be chosen by the admin. Duplications in the reports are eliminated.This solution could solve a lot of existing problems. It integrates audio books, which are considered an invaluable tool for visually challenged students, with smart phones whose usage is familiar to the visually challenged. Audio books have proven to be one of the most essential medium for accessing information not only to the visually impaired but also for people with print disabilities who include people with blindness, poor vision and certain other learning disabilities. The audio books are also preferred by people who lose their sight later in life and are unable to learn Braille as quickly. The audio books are highly preferred over Braille books because Braille books can go up to several volumes per book. Audio books are not bulky. Their popularity has further increased with advancement in technology, and one can read and carry a whole lot of books in a mobile phone. According to our research, we didn't find any existing prototype similar to this and hence, we find this innovative.

V. APPLICATION

We have chosen react-native for developing the mobile application because the same code can be used for deployment on iOS as well as on Android. React-native is modular and has an intuitive interface, thereby making it easier to create updates. To be specific, we have used react-native-navigation for navigating inside the prototype. It manages the presentation and transition between multiple screens. react-native-voice has been used for getting the voice commands as input. react-native-sound has certain features such as volume control, pausing, playing, setting time, etc.. We have used it for playing and pausing the audio book . We have used react-native-text to speech for telling the instructions. The user can resume from where he/she had paused previously. To store the last stopped

session, we have used asynchronous storage. The audio books have been stored in a firebase database. From the database, only the audio books which have been requested by the user at that particular instance will be loaded into the prototype. This prevents the storage size of the prototype from being very large.We also have a web application on the other side so that any person who wishes to contribute audio books can do so. We have used React to build it as it simple and also makes it easy to declare user-interfaces in self-contained independent components. Its virtual-Dom makes it faster. The user interface has been developed using materialize CSS and materialize UI. We have used Google authentication to authorize the administrators. The admins can view and manage the uploads and reports. Duplications in reports are removed by using the same push id in both the original and report databases.
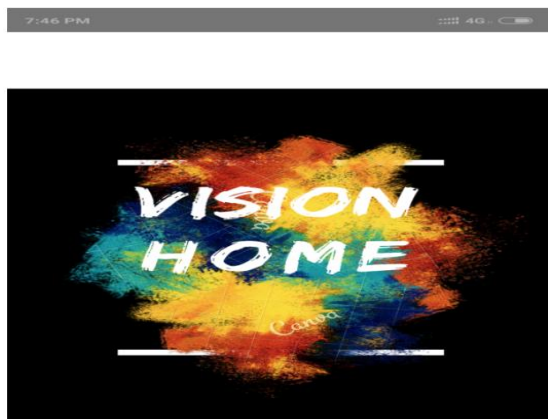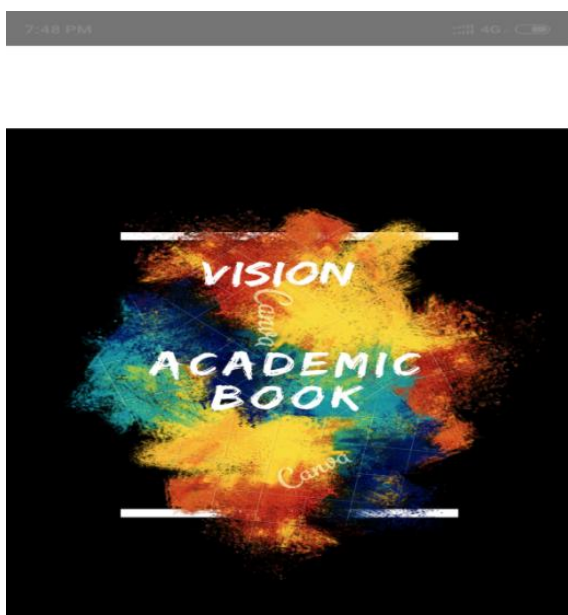
A. Figures
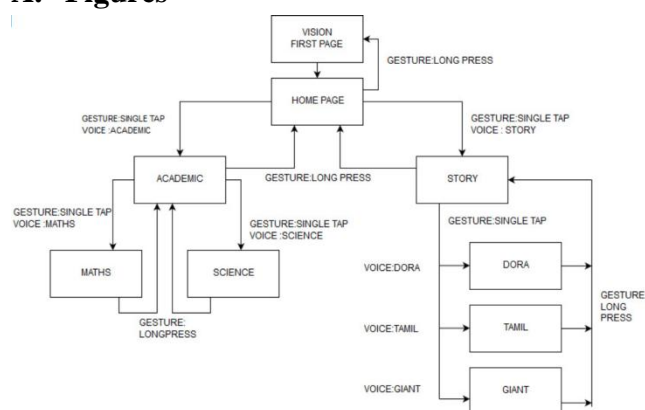
Flow chart of entire application

Welcome page

Home page displayed on single tap

Academic book page displayed on choosing academics

Story book page displayed on choosing story

Play/Pause displayed on single tap to play/pause

VI. IMPLEMENTATION OF PROPOSED SYSTEM

A. Our Approach

- Heuristic Approach.
- Displaying pages dynamically based on user's choice.
- Voice recognition and simple gestures is used for selecting the required books and categories.
- Enabling the user to play/pause/resume from the last read book.
- Guides the user as instructions are read out to them by the application.

VII. RESULT AND DISCUSSION

1) Encourages visually challenged to learn independently.
2) Simplifies the process of reading and learning.
3) Eliminates the need of readers.
4) Saves a lot of time and energy.
5) Increases the productivity of visually challenged learners.
6) No special hardware/equipment is needed.
7) The prototype has been tested by visually challenged learners in the local community.

VIII. CONCLUSION

This system will considerably increase the quality of learning experience of the visually challenged learners. This prototype is autonomous and doesn't require any external help from others to use it.

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