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PHOENIX -THE BLIND LEARNING APPLICATION

Nayana N Nair
Student, Dept.CSE, ASIET, Kalady, Kerala
nayananair108@gmail.com
Rugmani Sethuraman
Student, Dept. CSE, ASIET, Kalady, Kerala
rugmanisethuraman@gmail.com
Prof.Raghi R.Menon
Assistant Professor, Dept.CSE. ASIET, Kalady, Kerala
raghi.cs@adishankara.ac.in

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Abstract: In this proposed work, "Phoenix" the blind app, a learning solution for visually impaired people which makes smart phones also blind friendly. As per our society is concerned, there are many learning solutions for the especially abled citizens, and in case of blinds there are little efforts introduced. Those small efforts taken to provide learning platforms or solutions for visually impaired people require the help of another person. Since blinds are the users of this application, the app concentrates on voice recognition, speech to text conversion and finger touch sense concepts which makes the application easier for the users. As the application runs on the background and it can be opened using speech, it makes the users to be independent. This application enhances the learning via providing audio tutorials on different subjects which can be learned theoretically. The users can communicate with the application through speech. With rapid growth of wireless communication, the need for voice recognition techniques has increased greatly. In the application, controls are provided via voice and touch mechanism.

Keywords: Application; learning; phoenix; blind security

I. INTRODUCTION

The development of multimedia, communication techniques, in the recent years, caused complete replacement of traditional cellular phones by new modernised Smartphone [4]. Which made, making phone calls no longer their main function, large-touch screen Smartphone became more like portable computers, which offer different capabilities like taking pictures with high resolution, filming with a mini-camera, to using the Internet. Smartphone having such features, like a built-in microprocessor, have not become smart enough for the usage of blinds; they do not meet the expectations of blind people because of their limited ability to use them. Latest Smartphone have only a few real buttons (felt by touch) to control volume, lock the screen, switch on and off the phone, so for accessing the other menu or features of the phone we depend on the graphical interface displayed on the touch screen [2]. As the evolution of mobile phones did not turn as a favour for the blind, the older models (with pushbuttons) are still being used by the blind that, unfortunately, miss the wide capabilities the modern telephones offer.

With development in modern technologies, mobile devices have grown in such a way that Cell phones have become a necessity in everyone's life [1]. Many of us use cell phones for learning purposes. But for a visually impaired person this is challenging! Braille is a system of raised dots that people can feel with their fingers and that represent letters and words.

This will be helpful for their basic education on alphabets. But for them to gain more knowledge on a particular subject they need to be dependent on someone. So as a helping hand for blind, utilising their capabilities like speech, simple finger touch and finger movements we have developed an app.

"PHOENIX" is an android application which helps blinds to learn different courses through audio tutorials. The main aim of the application is to make it blind friendly. The visually impaired person will be able learn his or her favourite courses, theoretically through this app using audio tutorials. The application runs in the background as a service which allows the user to open the app through voice command. Except for some initial settings such as logging and permission settings, the user might not require the help of a second person. The application constraints that the user should have the basic education on languages which he prefers. The applications communicate with the user through voice instructions and the user is able to navigate to use features in the app using voice commands and touch mechanism. The user is able to navigate to use the features in the app using voice commands and touch mechanisms.

II. LITERATURE SURVEY

Mostly, visually impaired people use different technologies like electronic devices with sensors, etc. to make decisions that help them to do their tasks in day to day life [1]. One of the most important and challenging tasks in developing such technologies is to create a user interface that is appropriate for the sensorimotor capabilities of blind users, both in terms of providing input and interpreting output feedback.

TABLE I- Existing Applications

Application name	Authors	Platform	Purpose
Be My Eyes	RuchaDoiphode, MayuriGanore, AshwiniGarud, TejaswiniGhuge	Android	Be the eyes for a blind person in need of help remotely through a live video connection if you are sighted or be assisted by the network of sighted users if you are blind.
Talking Calculator	sanjeevneupane	Android	Designed for a wide range of users, this calculator has large colourful buttons, optional high contrast, full Voiceover support, and unique to this calculator; the option to use speech for answers, button names and formulas
Visual Brailler	American Printing House for the Blind	iPad	It is a simple braille editor. It's a braille writer for your iPad, and it has a place in every braille transcriber's toolbox. Use it for NLS certification exercises or to practice UEB
BARD Mobile	National Library Service for the Blind and Physically Handicapped (NLS).	Android	It provides access to braille and talking books directly from the NLS Braille and Audio Reading Download (BARD). It contains nearly 50,000 (and growing) books, magazines and music scores in audio and braille formats. Connect your Bluetooth ready device and instantly access braille materials.
Learning Ally	Anne T. Macdonald	iOS devices	Provides access to a library of more than 65,000 audiobooks is considered the best source for K-12 and college-level textbooks. Users can download and play on all iOS devices.

Today, the use of commercially available mobile devices shows great promise in addressing such challenges. Besides being equipped with increasing computational capacity and sensor capabilities, these devices generally also provide standardized possibilities for touch-based input and perceptually rich auditory-tactile output. As a result, the largest and most widespread mobile platforms are rapidly evolving into de facto standards for the implementation of assistive technologies. There is a bulk of information available on technological advances for visually impaired people. These developments include doc readers, object and colour identifiers using the cameras of mobile phones, walk assistants, voice calculators. Table 1 shows the existing applications which helps the blinds in different activities.

III. IMPLEMENTATION

A. Technologies Used

1) Text to speech conversion - Google API for text to speech conversion is used in the application. Google Text-to-Speech is a screen reader application developed by Google for its Android operating system. It powers applications to read aloud (speak) the text on the screen with support for many languages. The application uses this technique to communicate with the user in providing assistance. It is used in reading aloud the courses, chapters and letting the users know about app control keywords
2) Voice recognition - Google API for voice recognition is used for the voice recognition of users. Google Voice Search or Search by Voice is a Google product that allows users to use Google Search by speaking on a mobile phone or computer, i.e. have the device search for data upon entering information on what to search into the device by speaking. Commands from the user are obtained through voice and the user can control the movements in the application by saying specific control keywords e.g. “next “’play”.

B. App installations

Basic requirements are ; The front end of the android application is developed using Ionic (Ionic is a complete open-source SDK for hybrid mobile app development created by Max Lynch, Ben Sperry, and Adam Bradley of Drifty Co. in 2013.). Backend uses both Angular and Firebase (Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011) which is the cloud storage used as database .Angular 7(is a Typescript-based open-source web application framework led by the Angular Team at Google and by a community of individuals and corporations.) is used for connecting the admin panel(server page) to the database.

A second person’s help is required for the blind user at the installation time; Since the application needs Google authentications for the user identifications and logs the user in to the app (fig 1) .When the app is opened it asks for voice permissions form the mobile phones (fig 2), up to which the help of a second person is required. Once the initial settings are done, the applications provide introductory speech to the user about the working of the app, along with the audio keywords used to control the app and touch styles.

Fig.1 login with Google

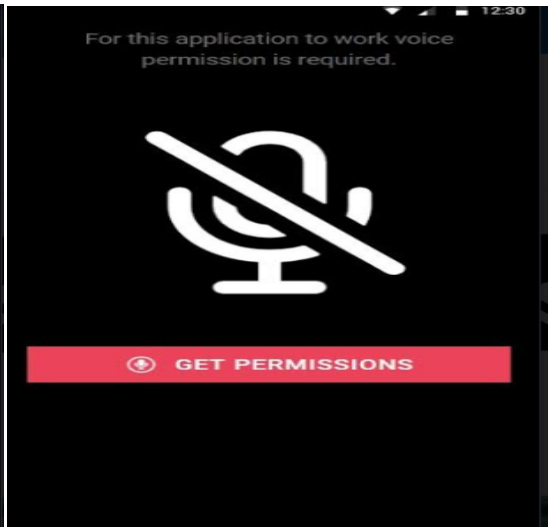

Fig. 2 Voice Permission

C. App Controls

Application runs in the background so that it can be opened using voice command. Using google assistant the user can switch the network connection. Net connectivity is required as the user access audio tutorials from the app database As depicted in (fig 3) After the introductory speech (The application introduces the app controls through voice) the user can select the subject page using voice keyword provided by the application The app will list the subject or courses using text to speech function. The user can scroll down and up using the volume up and down button. The user can select a subject using a single tap on the screen. Full length and full width category is provided to touch so that the touch works when the user touches anywhere on the screen. On each subject there will be subtopics. Each having a list of audio tutorials as chapters.

The user can say commands “play” and “pause” or a single tap on the screen for the respective functions to be performed. If the user “double taps” while playing the audio; voice command requests button popups which allows the users to navigate to the next tutorial or previous tutorial using corresponding voice command; the same method goes for navigating to next or previous pages of chapters or contents. If the user needs to listen to the course list, he can just say the command “course list”, so that the app will list out again the set of courses via audio and the user can choose the courses as per his wish.

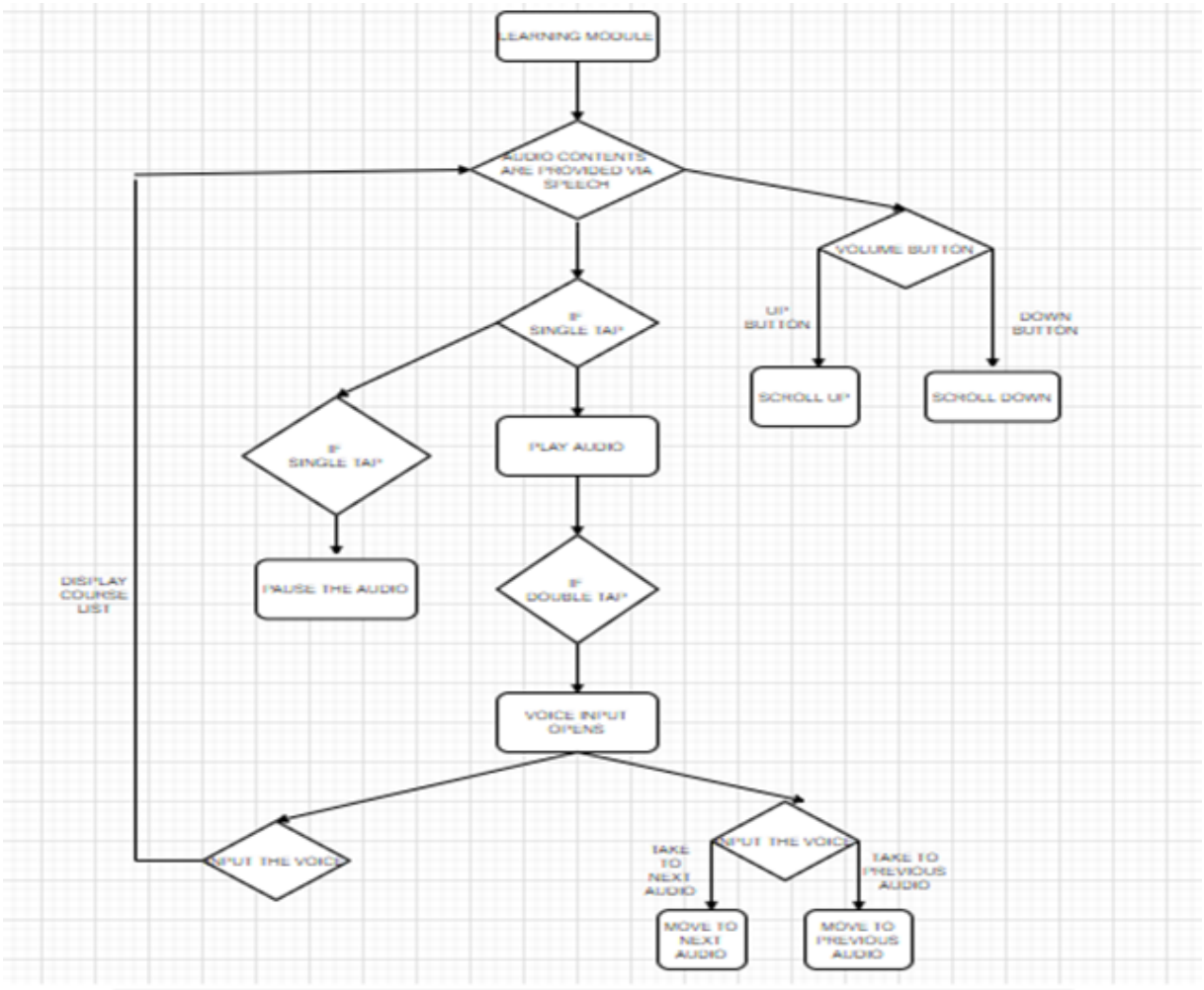

Fig. 3 Flow Diagram

IV. DATABASE

Application has 4 entities: user, course, chapter, and lecture. All the details of the users are stored in the user table. There is a table for course and it is linked to chapters which show chapters are arranged inside each course and inside each course there are audio tutorials for each lecture (fig 4).Firebase, No SQL database is used here. Firebase provides extra security features other than provided by firebase can be added in later stages.

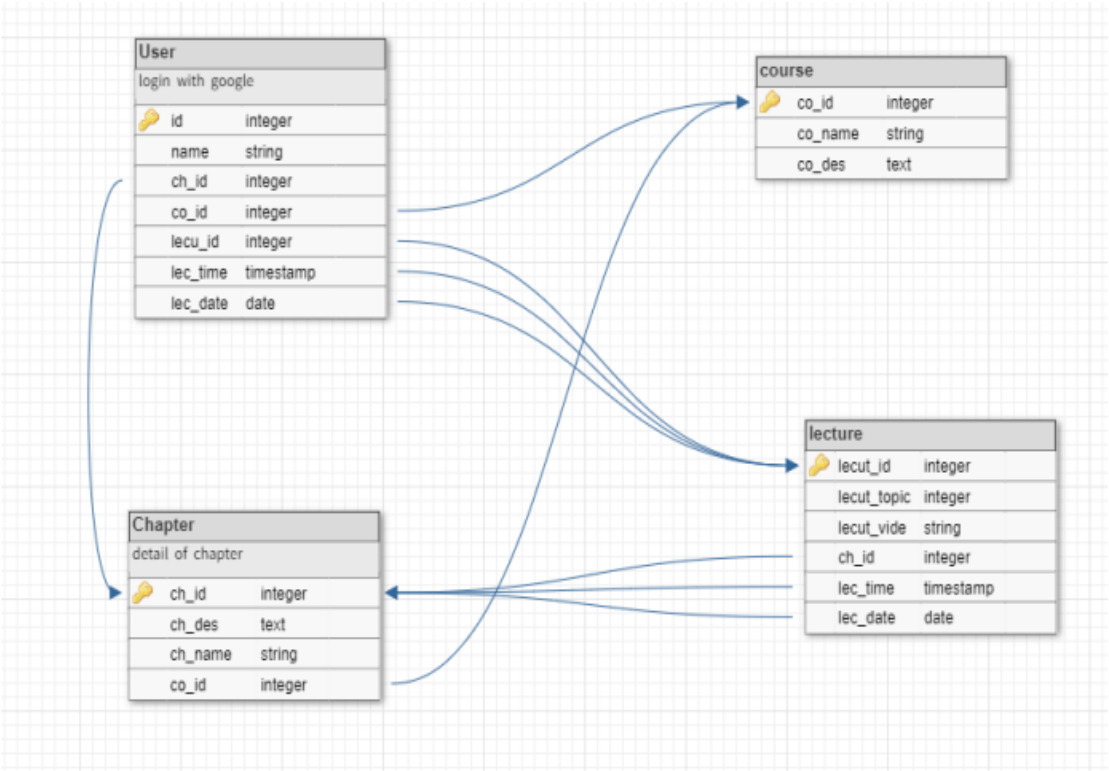

Fig. 4 Database Diagram

V. CONCLUSIONS

The project demonstrates an idea of an application providing learning tutorials for visually impaired people. In this paper we have presented system designs, use cases; of the application "Phoenix- The blind learning application. "Phoenix" can benefit a large number of visually impaired users' by providing them with audio tutorials for learning and making the app easy to use for the users.

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