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Enhancing Vision for Visually Impaired

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Abstract: *The prime concern of this study is scrutinizing the issues faced by students with low or no vision in various schools and universities. An individual's ability to read things that are only in digital format is an issue which may have required a lost vision individual to seek help from others. But, advancement in mobile technologies is making the lives of the visually impaired easier every day. But these mobile applications when combines with the latest technology provides people new ways of reading things and doing really anything in new ways: we learn to read with our ears and write with our voices. Even Though, visually challenged scholars most of the time remain dependent on third person for any digital information and today's busy schedule won't allow people to help all the time. Hence, there is a need for a fast and efficient system that could help visually challenged students to receive all the school or college related tutorials or details. This research aims to provide comparative study of existing solution for blind students and providing a solution.*

Keywords: *Visually impaired, Education, Challenges.*

I. INTRODUCTION

As a visually challenged student reaches up to some higher standard in his or her academics, they become the master of various techniques which help them in understanding almost all kinds of visual material. Many low or no vision learners use a combination of techniques, which includes readers, Braille materials and, sometimes, recorded books and lectures.

But, after identifying and analyzing routine challenges of visually impaired students in their; with the help of today's advanced technologies research has been done to make their life more convenient so that such students can bring more productivity out of their day and they can never feel like dependent on some third person for their school/university related activities. We aimed to make the studies and other curriculum activities of college more convenient and easier with the help of mobile devices that can be carried and accessed anywhere and anytime with much ease. There is no doubt that with the help of technology, humans can solve almost all the real world problems. Technology also plays the most important role in today's educational world. But, there is one well-known drawback of these mobile devices is that one needs to have proper vision abilities to operate them. Does it mean that visually impaired students cannot get benefited by today's advanced technological world for their education? The answer is, off course visually impaired can also use mobile devices for their studies without the need of a third person.

Impairment can be defined in many ways in the various fields. Impairment is partial or complete damage of mortal part or mental functioning, partial or complete damage of part of the person's body. Blind students face the problem of navigation, accessing resources and accessing information. They fail to access e-resources and have little access to computers gadgets or software due to lack of vision ability.

II. LITERATURE SURVEY

A. *Problems faced by Visually Challenged students while studying in University*

In the current scenario of the world, almost every human being understands the urgency of education despite belonging to any background. Also, not only education, but quality education is the need of an individual human being and the world. Almost all the academic curriculum across the globe is designed in a way such that it requires great utilization of eyesight, therefore, learners, having low or no vision face difficulties in academics. These difficulties experienced by visual challenges can sometimes be resolved by proper utilization of technologies. The guidance of a third person also plays a vital role in their learning. The major concerns of this research paper are optical defects and its impact on learning, adaptive teaching techniques for scholars with visual defects, problems faced by scholars with visual defects, and issues faced by professors while dealing with optically handicapped scholars.

B. *Visual Faults and Its Consequence on Education*

Ruin of eyesight of a person, brings a very low extent of sensory information to the scholar, resulting in lack or delay in various abilities learned as we watch others. This impacts resolving problem capabilities, language ripening, deductive reasoning, and abstract reasoning. At last this causes significant impact on one's learning and success, because a student cannot understand and use visual information to decipher various learning circumstances happening within surroundings.

C. Experimentation

1) *Existing schooling Solutions Available for Visually Challenged Students:* The existing schooling solutions that professors of various universities follows in order to satisfy best learning among students who are visually challenged have been stated as follows:

- a) *Adapting Written Texts:* Schooling contents needs to be adapted. Let suppose digital text is often adapted through change in contrast, change in the case, underlining or text bolding, adjusting spaces between characters, adding different colors and tremendous writing text should be used. However, the intensity of these adaptations is calculated solely by the rigorousness of visual defects and the requirement of the learners.
- b) *The Use of Optical, Audio and those devices which do not Involve Vision:* Verbal studies proves to be useful to the learners with visual defects. The integration of audio gadgets mainly helpful in the teaching methodologies. Optical gadgets such as, bifocals, telescopes and magnifiers use lenses to level-up a person’s residual vision and are normally prescribed by a doctor. The examples of non-optical devices for low vision include Braille, Braille writer and large prints, book stands, tape recorders, talking and recorded calculators, books and computers.

D. Comparative Study Of Various Solutions Available For Blind Students

For students who are blind or visually impaired, there are different solutions available to help them in many ways. There are many solutions which provide them voice over services, so that they can access the respective facility with their voice commands and thus simplifies their work to some extent. Modern technology^[1] and smartphones have helped to close the gap between disabled students and their peers. In this section, we have provided a comparative study of different tools listing out their features which are available for the benefit of blind students (refer table 2.1).

Product	Android/IOS Support	Specialized Feature	Cost	Language Support over voice	User Interface	Mainly Useful For
Kindle App	Both	Audio books from Amazon.com	Free	English	Easy to use	Book reading
Alarmed: Remainder+Timers	Both	Alarm + Remainder	Free : IOS Paid : Android	English	Easy to use	Setting Alarm and Reminders
KNFB Reader	Both	Text to Speech	Paid	English	Moderate to use	Listening Text
Scientific Calculator	Both	Talking Calculator	Free : Android Paid : IOS	English	Easy to use	Calculations
Google Translator	Android	Translation	Free	109 Language support	Easy to use	Language Translation
Dragon Dictation	Both	Dictate messages	Free	English	Moderate to use	Dictate messages & more
Audible	Both	Audio Books	Paid after one month	English	Easy to use	Book Reading
Access Note	IOS	Note Taking	Free	English	Easy to use	Converting voice into text notes
EverNote	Both	Record Voice Notes, Organizer, Planner	Free Paid : for more features	English	Easy to use	Storing voice notes, photographs, text

Table 2.1 Different Solution Available

We aimed to make the studies and other curriculum activities of college more convenient and easier with the help of mobile devices that can be carried and accessed anywhere and anytime with much ease.^[2] There is no doubt that with the help of technology, humans can solve almost all the real-world problems. Technology also plays the most important role in today's educational world. A good news is that the visually impaired can also use these mobile applications for their studies without the need of a third person.

III. PROBLEM STATEMENT

The National Federation for the Blind estimates that in 2017, 7.29 million adults reported to have a visual disability. In 2015, 42% of blind or visually impaired individuals were in the workforce, but less than 15% had earned a bachelor's degree at an accredited higher learning institution. In contrast, more than a quarter do not finish high school.

Technology has made available other benefits for blind people, including talking calculators, book readers, digital screens with speech output, Braille printers, and many more. Many low or no vision people use combined methods, including readers, Braille materials, and, sometimes, recorded books and lectures.

But, Very few tools are designed^[3] specifically for visually challenged college scholar that handles all their college related activities. Moreover, there is no solution yet developed for students specifically.

There are different types of problems that exist in the current solutions for visually impaired students. These problems are:

- A. Not specifically designed for university/school work.
- B. Blind students need continuous help from third person for college activities.

Thus, there are problems associated with the existing system, therefore to overcome this we came up with "Vision for Visually Impaired (VVI)".

IV. PROPOSED SOLUTION

A. *Vision for Visually Impaired System*

These days very few applications are designed for visually challenged people. Moreover, there is no solution yet developed for students specifically. We aimed to make the studies and other curriculum activities of college more convenient and easier with the help of mobile devices that can be carried and accessed anywhere and anytime with much ease. There is no doubt that with the help of technology, humans can solve almost all the real world problems.

Technology also plays the most important role in today's educational world. But, there is one well-known drawback of these mobile devices is that one needs to have proper vision abilities to operate them. Does it mean that visually impaired students cannot get benefited by today's advanced technological world for their education? The answer is, off course visually impaired can also use mobile devices for their studies without the need of a third person. Thus, we have come up with Vision for Visually Impaired System.

Impairment can be defined in many ways in the various fields. Impairment is partial or complete damage of mortal part or mental functioning, partial or complete damage of part of the person's body. Blind students face the problem of navigation, accessing resources and accessing information. They fail to access e-resources and have little access to computers gadgets or software due to lack of vision ability.

B. *System Implementation*

Proposed system is accessed by two entities namely, Admin and Student. Admin need to login with their valid login credentials first in order to access the android application. After successful login, admin can access all the modules and perform/manage each task accurately. Admin can perform tasks such as adding a new student with details, add college related content and its details, add video for reference and view and answer the query.

Visually challenged students need to login using their voice command which will help students to successfully log into the system. All the details will be read out loud by the application which will help students to listen and respond to it. Students can listen to the video library from any section; listen to top 10 trends, Course forum, Notice and Placement cell details are read out on selection of course and topic.

Students can also add a comment on a respective notice and on a course forum. Students may ask any query to admin which will be answered by admin itself which will be listened by students (refer Fig 4.1).

C. API used

In this Google's Speech Recognition API has been used. Speech recognition is the ability of a machine or program to identify words and phrases in spoken language and convert them to a machine-readable format.

Google's Speech-to-Text^[4] permits developers to transform audio to text by applying strong neural network models in an easy-to-use API.* The API recognizes 120+ languages and alternatives to support our global user base. Voice command-and-control can be enabled audio can be transcribed from call, and more.

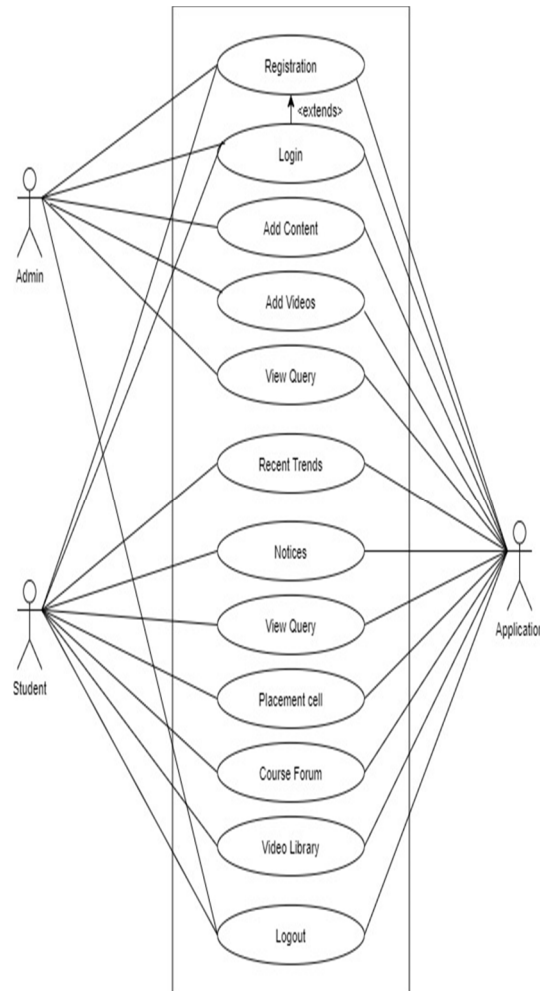


Fig 4.1 Use-Case Diagram

Google Text-to-Speech^[5] permits text into human-like speech in 180+ voices across 30+ languages and alternatives. It administrates innovative research in speech synthesis (WaveNet) and Google's powerful neural networks to convey highly reliable audio. With this easy-to-use API, we can create authentic communications with our users that transform device interaction, customer assistance, and other applications.

V. FEATURES AND BENEFITS

There are many advantages of this system that are described below:

- A. We have used C# as the main language to implement the system due to its flexibility, ease of use and extensive collection of libraries.
- B. Its simple interface improves the ease of data updating and retrieving.
- C. It provides all the university trends, announcements and notices easily at one place.
- D. It automatically launches as the user unlocks his or her mobile device.

VI. OUTCOMES

The prime concern for publishing this piece of work is to provide some possible solutions for the issues faced by low or no vision students in their academics. The routine problems faced by these college pupil are in respect to daily activities performed like writing, reading, speaking, listening, insufficient information, difficulties in accessing college related announcements, important notices, placement cell information, courses details, policies, procedures, in appropriate teaching methods, resource constraints, less teacher participation, programmes and hard curricula. All these issues can be resolved with our application “vision app for visually challenged students”, making the best possible use of smart phones and many different assistive devices.

Also, with the purpose to overcome the defiance and challenges, it is necessary that these students should be proffered with proper support and assistance at home and in school, they should be aware of how to benefit from technologies and assistive devices must grow positive thinking and pushed for learning.^[6]

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