

Standalone android app for Visually Impaired people

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Abstract

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Purpose of the study: In the race for performance improvements and extensive features that make lives easier, usability and reach-ability of the technology have taken a backseat. This is especially so for an abled section of our society. Here the researchers have formulated an android app for visually impaired ones.

Methodology: The goal of the research is to develop and verify the efficiency of an android application at helping the visually impaired to connect to the mainstream by providing an alternative method to perform general operations on an android device such as making calls, sending and reading text messages, and saving reminders or notes independently

Main Findings: The major problems faced by the visually impaired ones are texting, calling, note-making whereas with the help of this application everything becomes very easy to operate.

Applications of this study: Study of this application suggests us to deploy it at each and every visually special user so, that they can be benefitted with this.

INTRODUCTION

Android is a mobile operating system built on Linux Kernel, designed primarily for touch screen devices. Android is collectively developed and maintained by a consortium of developers known as Open Handset Alliance, with Google as the main contributor. Being open-source software it is used in devices belonging to a wide price range and hence holds a large market share. However, the popularity of the OS is restricted by the fact that it is primarily designed for touch screen devices where the mode of interaction is a GUI with a capacitance screen to recognize gestures and take appropriate actions.

This is a great barrier for visually impaired people to overcome as the GUI becomes completely useless to them. Performing simple operations like making a call or sending a message becomes a hassle without a GUI since the feedback of the device cannot be known. Many such impaired people are deprived of using smart-phones because of no such functionality for them to use the device. These devices when engaged with such features, it can become a revolutionary product for them. There may be various situations when visually impaired needs to call or message their near and dear ones or add note but they could not do.

Here, the fanged application has the capability to solve the issue and bring a smile upon their face. The application takes voice input to perform such tasks.

PROBLEM DESCRIPTION

This era is the era of communication and technology. Communicating with people not only in our vicinity but also outside our physical reach has become an absolute necessity (Brady, E., et al. 2013). While the rapid progress in technology has made it extremely convenient. The convenience only extends as far as one can use these devices. One such instance is the inability of our current devices to be helpful to visually impaired people in terms of making communication without involving assistance from a 3rd Party. Even Android devices in spite of their popularity and accessibility over all economic sections of the society are still out of reach for visually impaired people. (Lutz, B.J and Bowers, B.J (2005), Park, B and Lee, K.C (2011)) The OS extensively relies on Graphical User Interface for human interaction creating a barrier for the blind. Losing one's vision doesn't bar one from excelling in life but being unable to share information with others sure makes the journey difficult.

The goal is to make it possible for blind people to avail basic services like making calls, sending and reading messages and saving reminders or notes on an android device through an application and verify its reliability and performance.

EXISTING SOLUTIONS

GOOGLE VOICE ASSISTANT: Google Voice Assistant gives a way to interact with the android device via voice commands (Wu, S and Adamic, L.A (2014)). One can make calls and send or read messages as well as save notes using Google assistant. However, Google Voice Assistant has number of limitations, such as:

- Google Voice assistant could not properly work for blind people.
- Android Talkback: Android Talkback reads aloud the text displayed on the screen as well as the element or button the user clicks so as to make it easier for the person without sight, to use the existing interface instead of using a different type of interface ([Chowdhury, R et al., 2020](#)).
- Limitations: Typing a long message using talk back is difficult as each key has to be pressed twice. Also developing muscle memory to type on a keyboard without actually looking at the screen requires a lot of practice and all the effort is wasted if one needs to change the device with another with a different screen resolution ([Chaudhry, M et al., 2008](#)).

SYSTEM DESCRIPTION

The System is an Android Application built for Android Operating System version 4 and above. The application is developed using Android Studio IDE and Java as the language of development.

The Application uses Android's Talkback Feature ([Shinohara, K. \(2006\)](#)), Text To Speech API ([Colwell, J.\(2002\)](#)) and Speech Recognizer API in synchronization to give the user a conversation driven action flow. The application lets the user interact with the screen with the help of talk back for instantaneous actions like pressing a button and uses Speech Recognizer API to convert voice command such as messages and database queries (like searching for a name in contacts) into textual format ([Colwell, J.\(2002\)](#)). The application also uses Text To Speech API to read SMS or Notes saved in memory in textual format, to the user. All these APIs and Services are native to the device and do not require an Internet Connection.

The application also makes different System Calls and requires different Permissions, to help the user in making Calls, sending and reading Messages and saving and reading Notes in the device storage. The application uses content providers to access contacts and messages ([Pallavi, A. et al. \(2020\)](#), [Tripathy, H.K., et al. \(2022\)](#)).

Permissions used by the application are:

- ✓ android.permission.RECORD_AUDIO
- ✓ android.permission.READ_CONTACTS
- ✓ android.permission.CALL_PHONE
- ✓ android.permission.SEND_SMS
- ✓ android.permission.READ_SMS

SYSTEM ARCHITECTURE AND IMPLEMENTATION

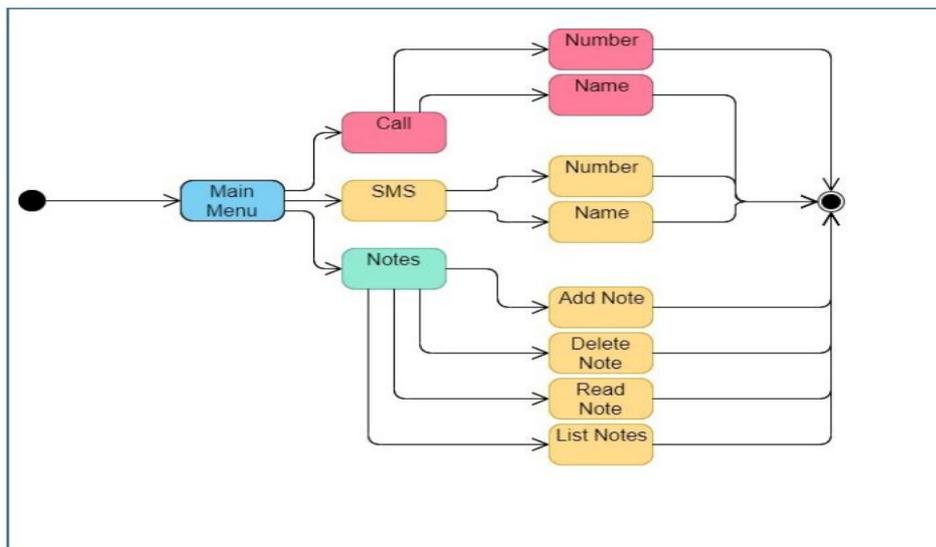


Figure 1: Architecture of the App

The Architecture of the app showcases the various functionality of the app. The app comprises of three things i.e. CALL, SMS, NOTES. A single voice input is enough to handle these three features present in the app.

Case 1: CALL

Here the user gets an option to select the call functionality by vocal input. Then the app requests the user to speak the name or the number of the person whom he/she wants to call. Hence, the call is placed.

Case 2: SMS

Here, the user can send messages to his/her recipient by vocal inputs. The same way of selection of recipient is given either to select by Name or Number.

Case 3: NOTES

The notes are an icing on the cake feature in this app. Many a times people may need a person to remember some things and note it down for him/her. Through vocal inputs these operations can be managed, add a notes, delete notes, read notes etc. The notes will also be read by the app itself for the impaired ones.

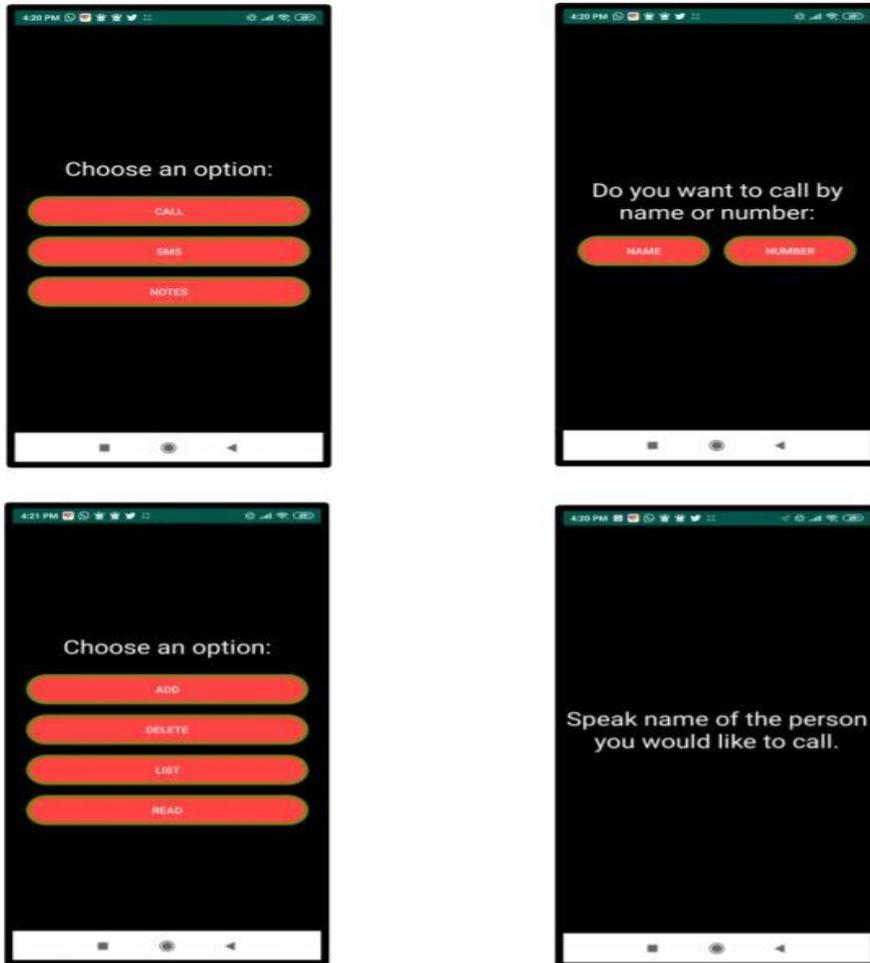


Figure 2: App Screenshot - Showing the features

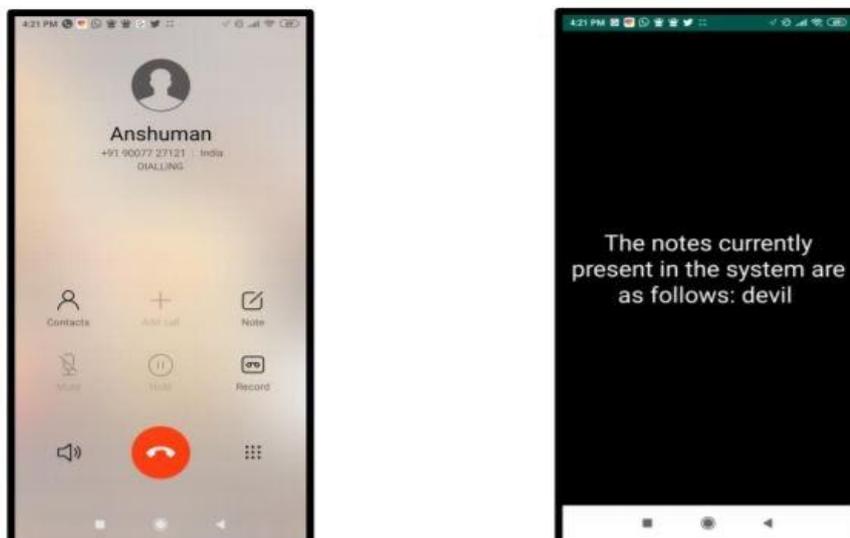


Figure 3: Output Screen Snap

RESULTS

The motto behind the development of this application was to bring a smile on the faces of such especially abled beings. This app makes it more useful to them and makes usage of smart phones easier to them. The system was tested this application over a group of especially abled people at School Of Hope, which is an school for such kind of specially abled ones. The researchers made a record by testing it on 10 people and asked the feedback and recorded the happiness quotient of the user which was the researchers aim to bring a smile on their face.

Table 1: Happiness Index.

Person	Disablity	Call	SMS	Notes	Behaviour
P1	Visually	Happy	-	Happy	Happy
P2	Visually	-	Happy		Happy
P3	Visually	-	Happy	Happy	Happy
P4	Visually	Happy	Dull	Dull	Dull
P5	Visually	Dull	Dull	Happy	Dull
P6	Visually	Happy	-	-	Happy
P7	Dumb	-	-	-	Dull
P8	No Disability	Happy	Happy	Happy	Happy
P9	Visually	Happy	Happy	Happy	Happy
P10	Visually	Happy	Dull	Happy	Happy

Table 2: Behaviour Table

Person	Behaviour
P1, P2, P3, P6, P8, P9, P10.	Happy
P4, P5, P7.	Dull

Thus, the researchers were able to bring smile to the maximum of the end user.

CONCLUSION

The application is only a step forward to make Android devices more accessible to the visually impaired. It will enable blind people to use basic operations of a smart-phone such as Calling and SMS independently without any assistance and make their life a little less inconvenient. There is scope for future development. As the technology progresses collecting and training speech recognizer for different languages will become economically feasible and with the advent of new Machine Learning Algorithms the accuracy of the recognizer will also increase.

LIMITATION AND STUDY FORWARD

Several new features can be added such as Image Classifier to identify and detect objects or read texts in the real world using Optical Character Recognizer, using the Camera in the device.

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