SRISHTI 2019

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PROJECT ABSTRACT:

It is observed that, nearly 37 million people across the world are blind and among them 15 million (i.e.) 15% are from India. Although there are various accessible systems developed for the visually challenged masses, they are not fully feasible and they find it difficult to adapt in their everyday life. The difficulties faced by these people while crossing the roads are massive and a lot of deaths are recorded in past years. On fact-finding, availability of applications in the market to address blind people is limited with voice recognition and object detection. Thus, the idea behind our proposal **OCULUS** is, a smart glass which mainly aims to reduce the death rate of the visually challenged groups while crossing the roads. This can be achieved by attaching a spy camera with the oculus to detect the objects and instructs the user by voice commands to either wait or move in other direction in order to proceed further. There are some added features like capturing pictures and videos using these glasses which results in efficient data retrieval system. Thus, it helps them to overcome their inferiority complex and make them feel like common people. This increases self-confidence of the visually challenged groups and allows them to live independently.

INTRODUCTION:

Problem Statement:

The major problem being faced by the visually challenged people are tedious to lead the day-to-day life despite many barriers. Blindness affects a person's ability to perform many jobs and also activities outside of a workplace, such as sports and academics. Many of these social challenges limit a blind person's ability to interact with people, and this reduces their self-esteem. People confront a number of visual challenges every day – from reading the label on a water bottle to figuring out if they're at the right bus stop. They find difficult to navigate themselves out. Their obstacles are nothing but the objects which they could not recognize. They always require a trusted person by their side to guide them. Thus an application can overcome their problems by incorporating features such as detecting and recognizing objects, sharing location, tracked by the trusted contacts, finding nearby doctors, etc

Existing Solution:

There are many applications and devices for the blind mass and the low vision people. There are apps for object recognition like Be My Eyes for connecting them with sighted people for visual assistance through a live video call, the TapTapSee app utilizes the device's camera and Voice Over functions to photograph objects and identify them out loud for the user. The apps for navigation involves BlindSquare which is the accessible GPS application, Lazzus app knows your current location (Street & number), adds favorite places and allows to browse nearby places. The features like recognizing objects, navigation, reading, finding nearby doctors, setting reminders, ordering foods are not matured in single common application to connect the blind people with the environment.

Scope:

As we have mentioned in the existing system there are many application which are not in sequence and cannot be used easily by the blind people. So, we have developed an application that manages the handling of difficulties faced by the blind people that includes reading, directing the location, object detection, setting reminder and to identify the trusted people which is associated with each individual. In order to solve those difficulties **OCULUS** provides a good and efficient solution.

Technology Used:

- **Android**
- **Dialogflow API**
- **Spy camera**
- **OCR**

FEASIBILITY STUDY:

Preliminary investigation examines project feasibility; the likelihood the system will be useful to the organization. The main objective of the feasibility study is to test Technical, Operational and Economical feasibility for adding new modules and debugging old running system. All systems are feasible if they are given unlimited resources and infinite time.There are aspects in the feasibility study portion of the preliminary investigation:

- Operational feasibility
- Technical feasibility
- Economical feasibility

i. OPERATIONAL FEASIBILITY:

OCULUS does not require third person involvement or a labor towards the maintenance of the application.Cost for training is minimized due to the user friendliness of the developed application.

ii. TECHNICAL FEASIBILITY:

Keeping in mind the existing system network, S/W & H/W they are on the separate applications which the blind people cannot access separately. So, **OCULUS** provides an application that in-built all those separate applications with some new innovation.

iii. ECONOMIC FEASIBILITY:

The application is economically feasible, keeping in mind:

- Lesser investment towards training.
- The system as a whole is economically feasible over a period of time.
- One-time investment towards development.

TECHNOLOGY STACK:

ANDROID:

World is contracting with the growth of mobile phone technology. As the number of users is increasing day by day, facilities are also increasing. Starting with simple regular handsets which were used just for making phone calls, mobiles have changed our lives and have become part of it. Now they are not used just for making calls but they have innumerable uses and can be used as a Camera , Music player, Tablet PC, T.V. , Web browser, etc. And with the new technologies, new software and operating systems are required. The user access the glass with the help of an android application in his/her mobile phone. Android phones typically come with several built-in applications and also support third-party programs. Developers can create programs for android using the free Android software developer kit.

DIALOGFLOW API:

Dialogflow is a powerful tool that allows us to create conversational tools without the complications of needing to handle natural language processing backed by Machine Learning.At Dialogflow the whole 'conversation' take place. Dialogflow is backed by Google and runs on Google infrastructure, which means you can scale to millions of users.

The Dialogflow API is integrated with the oculus to match keywords and give the most precise answer. If the user rises a query it matches with the best intent that was created by us and the model is trained. Dialogflow's API predicts meaningful entities and extracts the important facts and ignores the distractions. Thus dialogflow API acts as an intermediately between the android application and the other API's that are being used.

SPY CAMERA:

A spy camera is a device that is capable of capturing video (and sometimes audio) of a location without the user's knowledge. It can be worked with a single click,but we made it in such a way that it activates by the voice commands of the point people.This types of cameras often comes in various resolution like 720p,1080p.It can be easily connected to the PC.You can have the video stamped with the date and time of recording,Many people use it for a task when video proof can be helpful ,but here we use it mainly for two purposes.

-Object detection.

-Text and Image recognition.

A. Object detection:

Object detection is the process of finding instances of real-world objects such as faces, bicycles, and buildings in images or videos. Object detection algorithms typically use extracted features and learning algorithms to recognize instances of an object category. It is commonly used in applications such as image retrieval, security, surveillance, and advanced driver assistance systems (ADAS).

The spy camera is connected with oculus to detect the objects and indicate the user by voice commands that an object is present on his way. This may indicate him to either wait or move on some other direction in order to proceed further. Thus it helps the user to walk on the roads safely.

B. Reading Text:

The spy camera capture images and with the help of OCR engine converter, it will detect particular faces, objects, logos and gives information to the user about the images with voice commands. This process happens with the help of CLOUD VISION API which greatly helps to alert the blind about instruction boards on the roads, passport documents, invoices, computerized receipts, business cards, etc.

OCR:

Stands for "**Optical Character Recognition**". OCR is a technology that recognizes text within a digital image. It is commonly used to recognize text in scanned documents, but it serves many other purposes as well.OCR software processes a digital image by locating and recognizing characters, such as letters, numbers, and symbols. Some OCR software will simply export the text, while other programs can convert the characters to editable text directly in the image. Advanced OCR software can export the size and formatting of the text as well as the layout of the text found on a page.

PROJECT DESIGN:

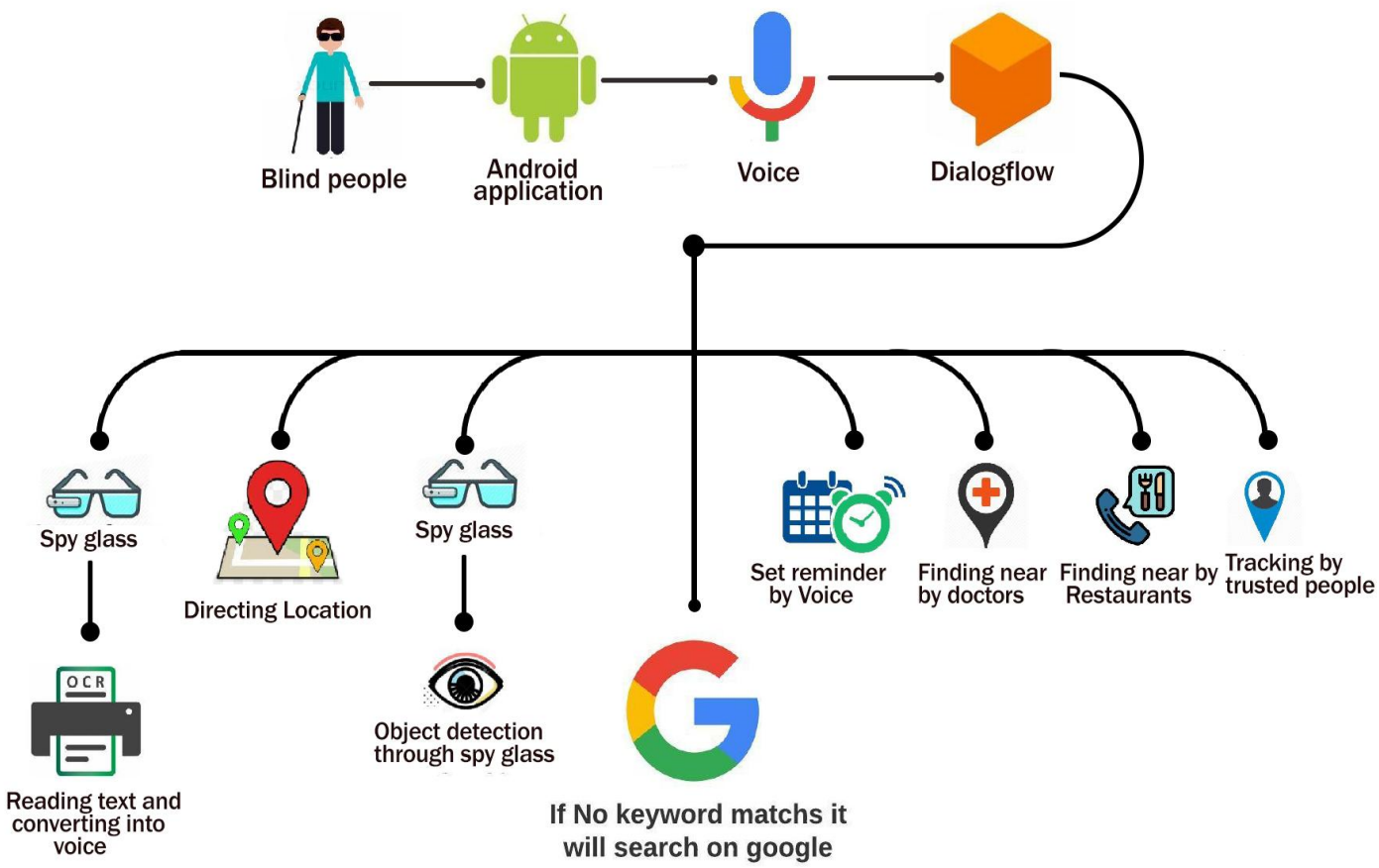


Fig: 2

In the Fig: 2 it is clear that the user interacts with the Android application through voice. The dialogflow API is used to match the keywords and extract the best response. If there is no matched keyword, then search is made in Google for giving a response to their query.

USE CASE DIAGRAM:

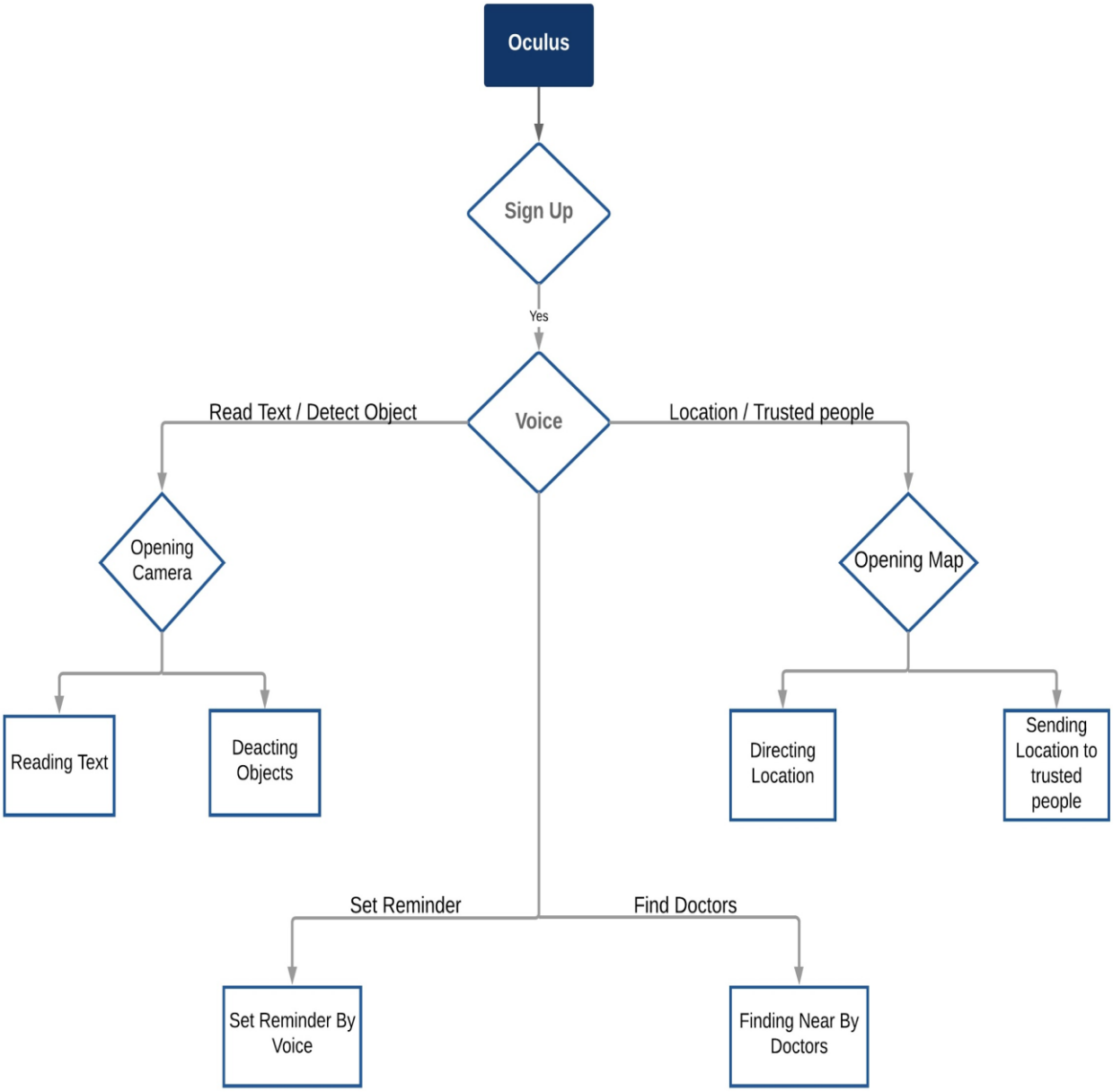


Fig: 1

In the above use case diagram Fig: 1 explains the workflow of **OCULUS**.

1. Once the application is opened the user must sign in with the appropriate account.

   i.e If the user press the Down volume button it automatically signs in to the previously authenticated account.

2. Then the user must command with the voice.

3. If they command to read the text or detect an object the camera will be opened and does the respective action.

4. If the command is a request for location or to share the location with the trusted people, it directs to the Google maps.

5. If the command is to set a reminder, It will automatically fix the reminder.

6. If they command to find the nearby doctors, it searches for a doctor's location and the Google maps will direct them by the voice command.

SYSTEM FEATURES:

(A) NAVIGATION:

The feature is enabled to help the visually challenged groups to find their routes from the start to the end destination. The Google maps API is enabled for this purpose along with object detection which greatly helps them while travelling.

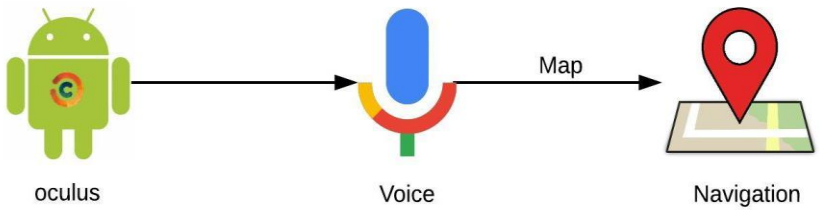


Fig: 3

(B) SET REMINDER BY VOICE:

The important task that must be completed on time by the user is fed on evernote and then it reminds the user with the help of voice commands. This helps them to do their daily activities easily. Using this feature the user can track his/her progress easily. For this we have integrated oculus with evernote using evernote cloud API.

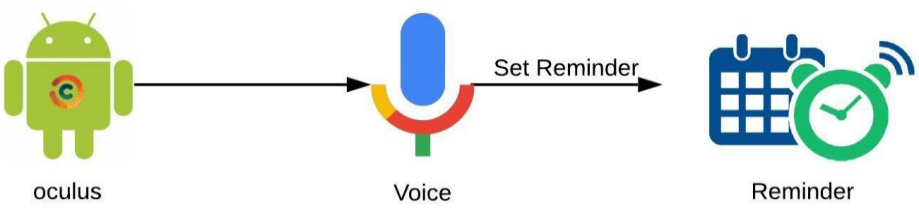


Fig: 4

(C) FINDING NEARBY DOCTORS:

If the person is urgently in need of a doctor, the user will give a voice command and the application will automatically give the location of the hospitals, clinics according to the availability of the doctors. This helps them to avoid a critical situation.

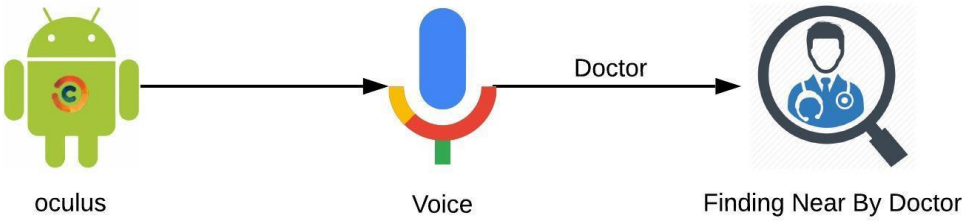


Fig:5

(D) OBJECT DETECTION:

If the person is walking, he must know what are all the objects present in front of him and this application will automatically detect the individual objects and give a voice command about the object. This helps them to walk out safely.

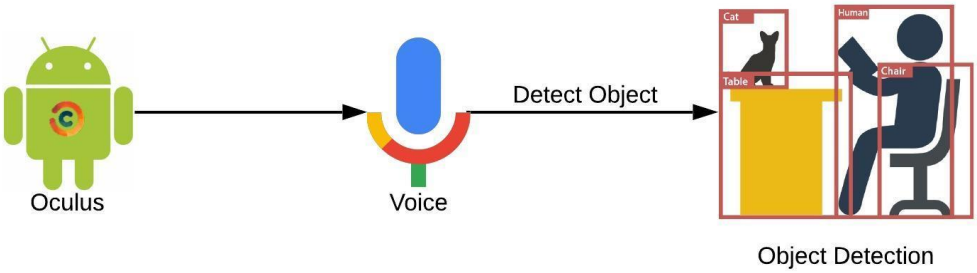


Fig: 6

(E) TRACKING BY TRUSTED ONE'S:

The user can select a list of trusted contacts who can track their current location. The geographical area where the person using this application will be updated to the people in their trusted list and this lets them to be free without worrying about their safety. Thus this feature satisfies the parental guiding.

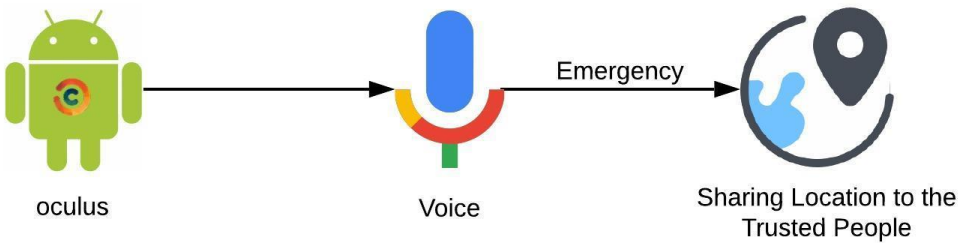


Fig: 7

(F) TEXT TO VOICE:

If the search, results in logos, faces or an object the user needs to know the information about the object. So, the OCR Reader scans and gives the information about the object to the user with voice command. This helps to alert the blind about the sign boards on the road,receipts and business cards.

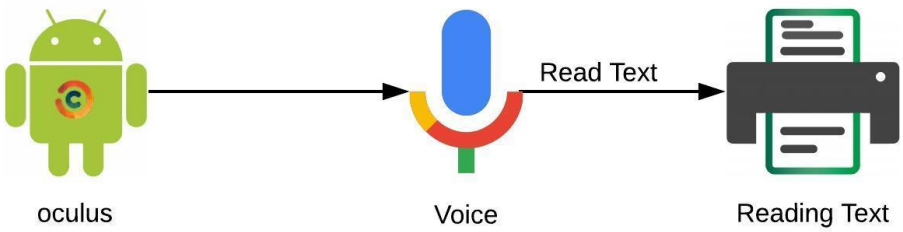


Fig:8

(G) CONNECTING WITH GOOGLE:

If none of the keywords match among the above mentioned features it automatically connects with Google and searches for the respective keywords through voice command and give precise answers in accordance with the requirement.

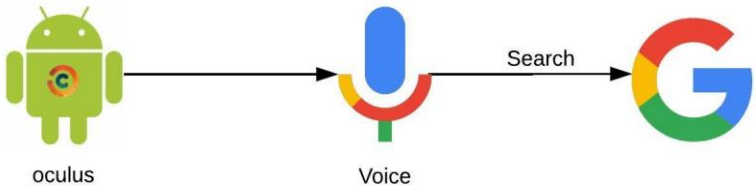


Fig: 9

SYSTEM REQUIREMENTS:

Hardware Used	Spy Glass camera
Software Used	Android studio 3.1
Cloud Platform	Dialogflow , Firebase
Programming Languages	Java, XML
Operating System	Windows 7 +, Android

PROJECT MODULES:

Our proposal OCULUS has been divided into four modules. They are

1. Application development:

The oculus application is purely based on android operating system and is developed with google's native IDE Android Studio.As far now Android Studio grabs a unique standalone and it is not very tedious to develop applications here. The application can be classified into two types

(I) Front End Development
(II) Back End Development

I. FRONT END DEVELOPMENT:

The front end is purely based on **XML**(Extensible Markup Language) in which it decides how the User Interface of the should be.It is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. Oculus needs only voice recognition to perform all the operations and hence the XML is simple in this android application.

II. BACK END DEVELOPMENT:

In Android Studio, backend process can be programmed with the help of both the languages (i.e Java and Kotlin). Here we have used **java** in order that it has open source integrations and predefined functions. So that it will be so easy to code and get the desired outcome.

2. Integrating Dialogflow API

The **Dialogflow API** is integrated in order to recognise the voices of the visually challenged people which is the base of this project. **Dialogflow** is a Google-owned developer of human–computer interaction technologies based on natural language conversations. The company is best known for creating the Assistant (by Speaktoit), a virtual buddy for Android, iOS, and Windows Phone smartphones that performs tasks and answers users' question in a natural language.

3. Database Connectivity:

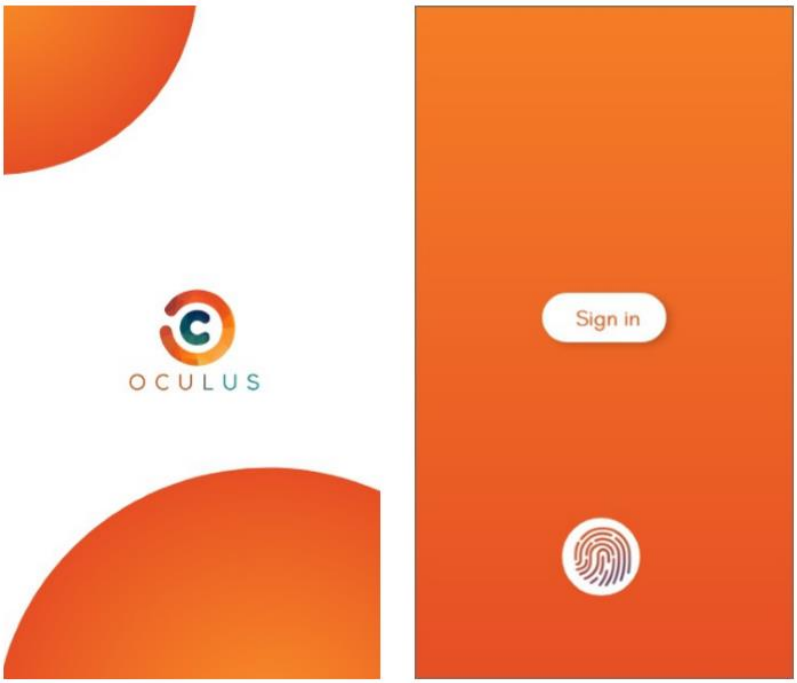
Oculus is integrated with **Firebase Realtime Database** in order to store information such as user credentials to sign in and time details said by the person to set reminder. The Firebase Realtime Database is an API that synchronizes application data across Android and Web devices, and stores it on Firebase's cloud. The product assists software developers in building real-time, collaborative applications. Oculus is connected with database 24x7 through internet, which is helpful to the point people.

4. Integrating Spy Glass Camera

Spy Glass Camera is connected with Oculus through WiFi, which is used in Object Detection to detect any obstacles or any trusted faces. The modules **Arducam Mini Camera OV2640 2MP & ESP8266 Nano V2** are used for connecting with the Android device. The ESP8266 module is used to connect the android device wirelessly. These modules are connected with a battery that could withstand about 48 hours and recharged regularly. It is cost efficient compared to other modules or constructed cameras and smaller in size such that it could be attached along with the glass the point people wear.

RESULTS:

Oculus helps the visually challenged people to navigate with much safety. This boosts the self-confidence in them to explore the world without dependencies. Thus, they can overcome their difficulties by signing in using any of their mobile hardware like volume down button and just give a voice command.



A. Splash screen of the application

B. Sign in using fingerprint or volume

C. Accessing features using voice commands

FUTURE IMPLEMENTATION:

In the future implementation we have planned to incorporate many features like face detection, ordering food etc,..

(i) FACE DETECTION:

In the application if the voice command is given to detect the face then the camera will be opened and detect the person in front of the user and gives the information about them if already stored in the database.

(ii) ORDERING FOOD:

If the voice command is to order the food then it will direct them to the appropriate site through voice commands.

(iii) BOOKING CAB:

As the same if the voice command is to book a cab then the online websites for a cab will arrive and direct towards user requirements.

CONCLUSION:

The application now integrates every separate features into a single application "**OCULUS**". This helps in avoiding the aid of a third person along with them. At present we have developed this application in Android but planned to extend in iOS and even new modules can be added without affecting the existing system.

REFERENCES:

[1]. Taraghi, B., & Babaei, M. (2015). “Object detection using Google Glass”.

[2]. Maga, B., & Velmurgan, K. J. (2017). “An efficient approach for object detection and tracking”.

[3]. Pissaloux, E. (n.d.). A characterization of vision systems for blind people mobility.

[4]. Mulla, A., Baviskar, J., Baviskar, A., & Bhovad, A. (2015). GPS assisted Standard Positioning Service for navigation and tracking: Review & implementation.

[5]. Takahashi, Y., Niibori, M., & Kamada, M. (2014). NeighborNote: An Evernote Application with Capability of Suggesting Related Notes Based on User Operation History.