REAL TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

TEAM ID: PNT2022TMID52015

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PROJECT REPORT

1. INTRODUCTION

1.1 PROJECT OVERVIEW

The advancement of technological knowledge started back in the 21st century when the new economic modality was taking its shape. Since then, technology has played its vital role in charting the development direction for the globe. Today the advancement of technological knowledge has simplified the people's life which was even unimaginable to think of the people before eras. I Since the role of technology in evolving the living standards of people across the globe is inevitable, so does to the lives of people with disabilities. Disabled people cannot do

everything by themselves. A disability may be present from birth or occur during a person's life time like having accidents. They need others to help them in many situations. So as to overcome this they need to use information and communication technology because they live in a digital society

1.2 PURPOSE

The projects aims to develop a system that helps to detect every object in front of the blind and convey the information in the form of voice output. By using artificial intelligence and global positioning system(GPS) user can also be able to find their current location. Here, an app is developed which enables the blind to interact with their surrounding environment and be normal in their day to day life.

2 LITERATURE SURVEY

2.1 EXISTING PROBLEM

The biggest challenge for a blind person is to navigate around places. Obviously, blind people roam easily around their house without any help because they know the position of everything in the house. As most of the blind people depend on the objects' shape and texture to identify them ,it is very difficult for the blind to identify the actual thing around them. It is difficult for the specially a-bled people to get help during emergency situation. Hence they are in lack of assistance.

2.2 REFERENCES

PAPER:1

TITLE: Empowering people with disabilities through AI

AUTHOR: World Business Council for Sustainable Development (WBCSD),

PUBLISHED ON: 2020

CONCEPT: Microsoft's AI for Accessibility amplifies human capability through grants, investments of technology and expertise. This initiative have found solutions for helping people with disabilities in the form of several apps

ADVANTAGE:

1. These apps such as seeing AI app (for read to people with low vision) ,Helpicto (designed to help children with autism) and Microsoft translator (to help all children to learn with same level of care) using Microsoft.

DISADVANTAGE:

1. Not ensuring the evaluation of the quality of data, models and algorithms can result in negative outcomes.

PAPER :2

TITLE: Role of application of AI and its importance in the health care industry.

AUTHOR: Giriraj Kiradoo, Associate professor, Government Engineering College, Bikaner, Rajasthan, India.

PUBLISHED ON: 2018

CONCEPT:

Replication of the existing human activities through machine learning especially in health centers. Artificial intelligence has revolutionized the healthcare industry and now computer devices and software help to solve various challenges and detecting diseases using AI. It further provides practical solutions to these issues.

ADVANTAGE:

1. Detects diseases with accuracy of 90%

DISADVANTAGE:

1. Possibility of a defective diagnosis.
2. Susceptible to security risks.

Paper 3:

Topic : Artificial Intelligence for Web Accessibility

Authors Name : Abou Zahra Shadi , Judy Brewer , Michael Coope

Published Year : 2018

Concept:

Artificial Intelligence used to improve accessibility of the world wide web,making Web-based interfaces accessible for people with disabilities rather than on Web enabled products and services

Disadvantages:

1.Lack of accuracy and reliability

2.At the current AI is not matured enough to replace the needs

Future work:

1.AI function for accessibility will emerge more gradually with initially more simple tasks

2.AI will further support the production of accessible web content

Paper 4:

Topic : Real Time Communication in distributed Environment

Author's : Akihiko Miyoshi , Hideyuki Tokuda

Published on : 1997

Concept :

In this it proposes

1. A distributed real time communication mechanism to support distributed real time applications

2. Real time communication model

3.Implementation overview of of our system

Disadvantages :

Comparing the performance of different protocol it is about 0.2ms slower

Future Work :

Under Heavy load condition real time communication gets stable

PAPER 5:

TITLE: A System for Accessible Artificial Intelligence

AUTHOR: Randal S. Olson, Moshe Sipper, William La Cava, Sharon Tartarone, Steven Vitale, Weixuan Fu, John H. Holmes, and Jason H. Moore.

PUBLISHED ON: 2017

CONCEPT: AI system that is specialized for machine learning analysis of complex data in the biomedical and health care domains. We discuss how genetic programming can aid in this endeavor, and highlight specific examples where genetic programming has automated machine learning analyses

ADVANTAGE:

1. provide automatically generated results that are informed by previous analyses across different data sets.
2. GP can also be harnessed to optimize a sequence of existing data analysis

DISADVANTAGE:

1. Integrating GP into PennAI
2. To bring AI technology to anyone that wants to use it for big data analytics.

PAPER 6:

TITLE: The Communication System

AUTHOR: Dr. Radhika Kapur

CONCEPT: Basic concept of communication system is discussed. The elements of communication system is explained in brief.

ADVANTAGE:

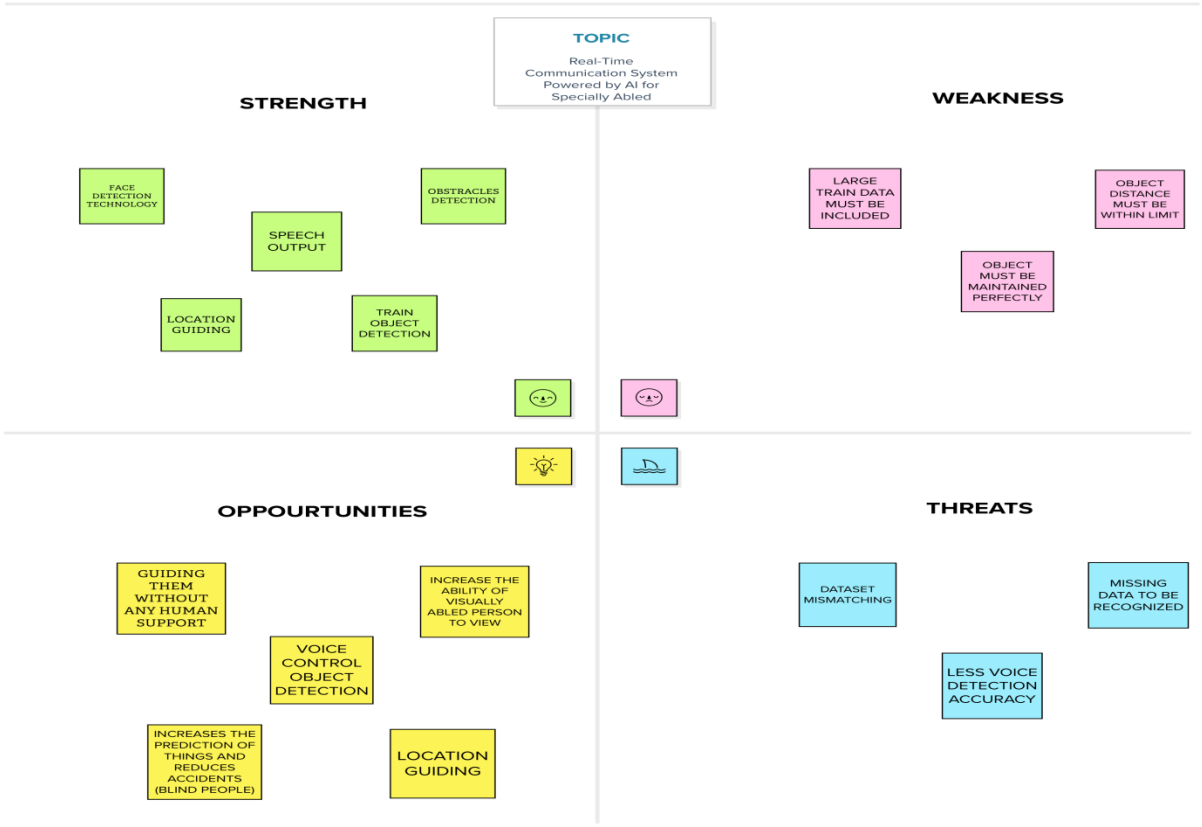
1. numerous components to operate
2. impart adequate understanding in terms of the communication system
3. At the lower values, the noise causes a reduction in the fidelity in analog communication and produces the errors in digital communication.

DISADVANTAGE:

1. to accommodate the signal spectrum
2. to understood that the rate of information transmission cannot exceed the channel capacity

3. IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING

Template

Brainstorm & idea prioritization

a group problem-solving technique that involves the spontaneous contribution of ideas from all members of the group is discussed.

10 minutes to prepare
1 hour to collaborate
4 persons

Share template feedback

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**
Members of our team to be gathered

B **Set the goal**
our problem statement is set as goal

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1 Define your problem statement

to reduce the disabilities and difficulties faced by visually abled people using artificial intelligence.

5 minutes

PROBLEM

How might we [reduce the disabilities and difficulties faced by visually abled people] ?

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Person 1

- THE PROJECT TO BE DEVELOPED MUST BE A GOOD INNOVATION IN THIS TECHNOLOGY.
- MOREOVER IT MUST LEAD THE VISUALLY ABLED PERSON TO WORK AND MOVE ON THEIR OWN
- .INVOLVEMENT OF FACE REGONITION WILL IMPROVE THE PROJECT IN HIGH LEVEL
- EASILY ACCESSIBLE HANDHOLD DEVICE

Person 2

- GPS TRACKING SYSTEM CAN BE INVOLVED IN THIS PROJECT
- BY THIS THE LANDMARK CAN BE DETECTED AND THE BLIND PERSON CAN BE GUIDED TO THE MARKED PLACES
- .THE INSTRUCTION MUST BE GIVEN AS A VOICE OUTPUT TO THE USER
- NO MANUAL INVOLEMENT

Person 3

- TEXT REGONITION CAN BE INVOLVED.
- BY THIS THE USER CAN BE ABLE TO READ OUT THE TEXT TO BE DETECTED.
- PARTICULAR DISTANCE MUST BE PROGRAMMED
- POINTING THE DATA IS NEEDED.

Person 4

- TYPING INPUT CAN BE INVOLVED.
- BY THIS THE DATA CAN BE ACCURATELY GIVEN AS THE INPUT.
- THE TYPED INPUT CAN BE PROCESSED AND CORRESPONDING OUTPUT CAN BE GAINED
- MULTI LANGUAGES CAN BE USED

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

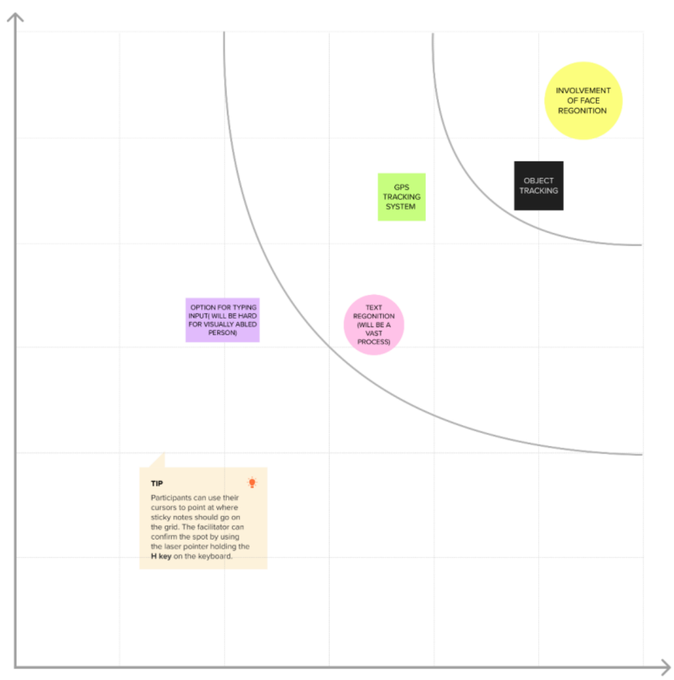
TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

- FACE REGONITION
- ABLE TO GUIDE THEM
- NO MANUAL INVOLEMENT
- VOICE OUTPUT
- EASILY ACCESSIBLE HANDHOLD DEVICE
- GUIDING THROUGH A LANDMARK

4 Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A **Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

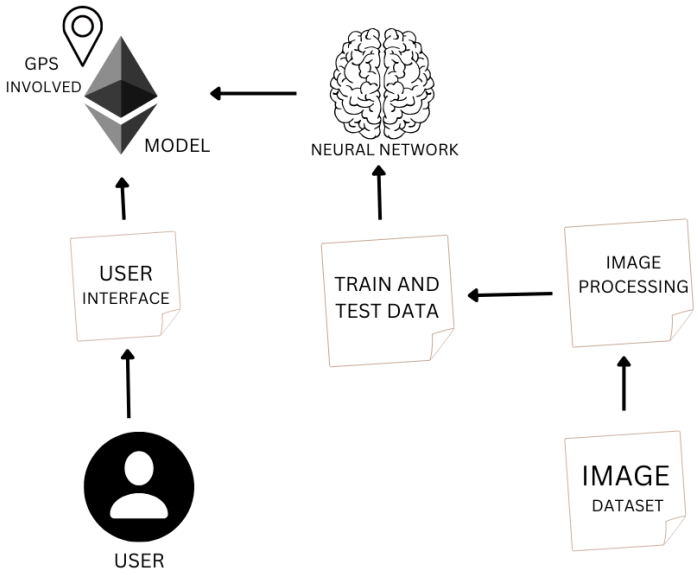
Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

Share template feedback

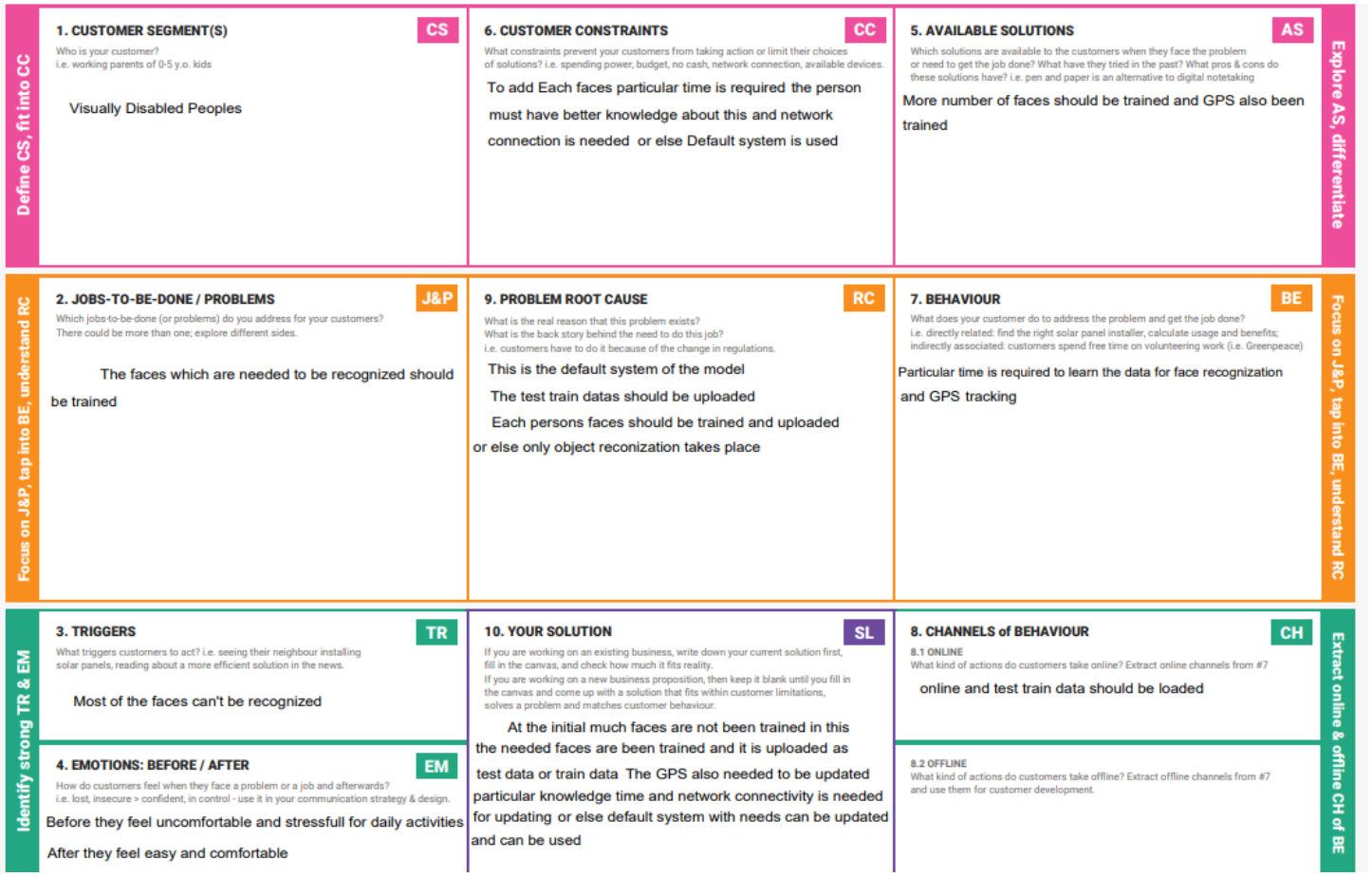
3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Even though human and his technologies have improved a wide, these technologies can never match the human sense. Especially, when it comes to specially abled person, the human sense plays vital than using normal technologies. But when Artificial intelligence is concerned, the technology gets nourished with the human sense. The disabilities of specially abled person can be overcome by means of artificial intelligence. There may be lack of accuracy and reliability, by implementing the existing AI methodologies. Here accessibility must be mainly focused. A lot of apps use artificial intelligence to favour accessibility. Depending on the type of disability of the person, communicating with others can be a challenge, AI can be at the service of people with disabilities at its highest accuracy. Convolution neural network can be used to create a model that is trained on different hand gestures. The app can be developed which enables deaf and dumb people to convey their information using signs which get converted to human-understandable language. This improves their ease of communicating without difficulties.
2.	Idea / Solution description	In our project, we add the train and test set of data in the neural network. These datasets are derived by the means of image processing under a specific image dataset. These image processing is done by python coding in depth. Once the datasets are tested and trained, they get stored in the neural network for data fetching. When the user asks for data recognition, it is sensed by the user interface of the project model. The image thus identified is processed by image processing technologies implemented in the project device. Then the image is compared with the test and train dataset in the neural network and the result is

		given as vocal output in the inbuilt voice system in the project device of the user. Also, when the particular object is spoken or specified by the user vocal, the data is checked in the dataset and the location is instructed to the user. By this project, the data is recognized and directing is done to the specially abled person.
3.	Novelty / Uniqueness	Ensuring secure and safe mobility for the visually impaired is a complex task that requires precision and effectiveness. In prevailing detection systems for the visually impaired, it detects only the object which the user points at. But in this approach we have introduced an object recognition system that will be able to detect all the objects and obstacles present in front of the user and this helps the user to get more information about what is present in their surroundings. This approach also helps the visually impaired to find an object which the person needs and this will guide them to find the object of their choice. This can also improve the accuracy of the detection system comparing to the detection systems for the visually impaired that are already in existence. This helps the visually impaired for a secure and safe movement in indoor and outdoor environments.
4.	Social Impact / Customer Satisfaction	For people with disabilities, mobility proves to be one of the most challenging issues to overcome. How can wheelchair users get around in the city in an autonomous and serene way when they constantly need to be aware of the location of environment. In our project How to Help People with Disabilities Get a Better Experience on the obstacles, we saw that people with disabilities need to rigorously prepare every trip they make. Luckily for them, a lot of navigation apps based on AI technology can help them gain more autonomy and more spontaneity when they're getting around.
5.	Business Model (Revenue Model)	The project has a specified architecture where the neural network is involved in the process. The neural network involves the test dataset and train dataset. These datasets are used in fetching and comparing the data with the input images. The business model of the project is as follows,

		
6.	Scalability of the Solution	By using this project any visually abled person can take a move like an ordinary person. This device will scan the object in front of the person wearing this device. This will increase the accuracy by checking multiple objects around the surroundings. This will also increase the voice control for using several options like scanning QR codes. This can be easily used by even an ordinary person in all aspects. Also, when it has high accuracy, the capability will be increased.

3.4 PROBLEM SOLUTION FIT



4 REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User registration	Registration through Gmail
FR-2	User Confirmation	Confirmation through Gmail
FR-3	Registration for test and train folders	The user must be confirmed with the test and train folder which is to be recognised.
FR-4	Registration for GPS location	The location must be registered.
FR-5	Input must be given	By Image Processing
FR-6	Location must be given	Location can be given as voice message for tracking the location.
FR-7	Functional Requirements Done	Voice outputs will be given.

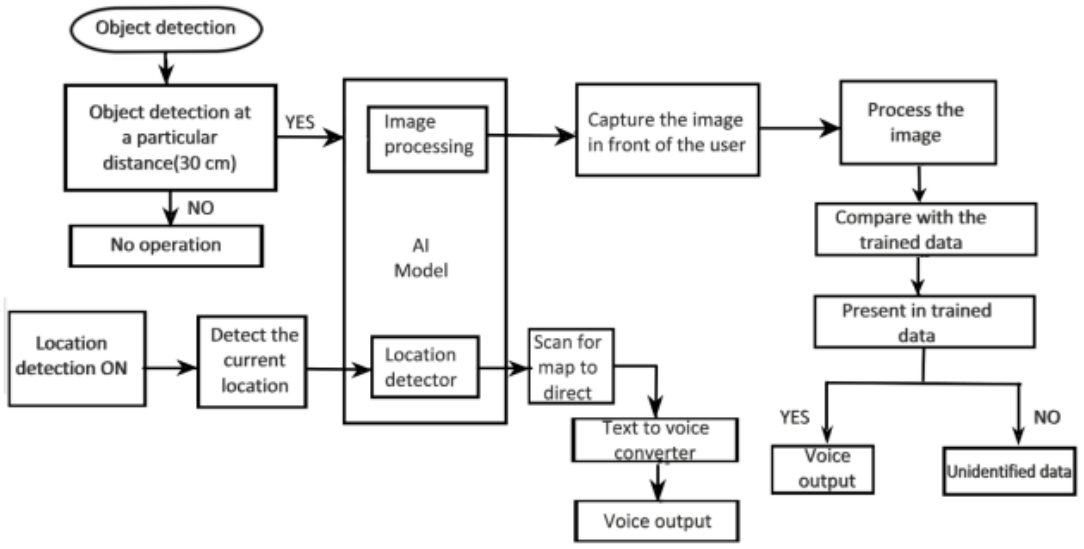
4.2 NON FUNCTIONAL REQUIREMENT

NFR.No	Non-Functional Requirements	Description
NFR-1	Usability	This device can be helpful to the blind peoples to know about their surroundings and environment.
NFR-2	Security	The device will be only accessible by the user through Gmail confirmation and the data will not be hacked in ease.
NFR-3	Reliability	The device will be more reliable because we use accurate sensors and GPS systems.
NFR-4	Performance	The performance of the device is high in speed and low power usage so that the user can use without interruptions.
NFR-5	Availability	The device will be available in the market to buy it.
NFR-5	Scalability	The scalability of the device is high in terms of network and GPS issues.

5 PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



Here the device detects the object and if the object is detected at a particular distance of 30 cm, image processing takes place by capturing ,processing and comparing the detected image with the trained data. If the image is present in the trained data, then the device provides the output in the form of a voice signal. If the image does not match with the trained data, then the device gives the output as unidentified data. The location detector in the AI model is used to detect the current location of the user and provide the data in the form of a voice signal.

5.2 SOLUTION AND TECHNICAL ARCHITECTURE

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table

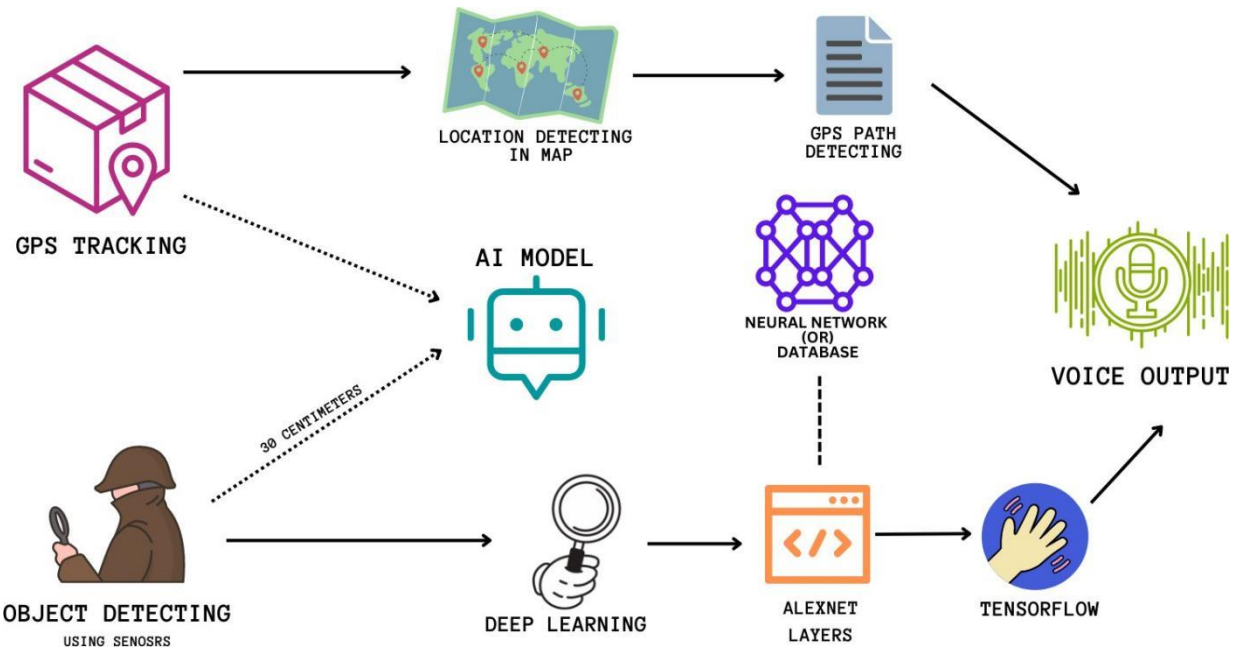


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Open source framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architectur e	Justify the scalability of architecture(3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application(e.g. use of load balancers, distributed servers etc.)	Technology used
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used

5.3 USER STORIES

Use the below template to list all the user stories for the product

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail.	I can receive verification code and invitation	Medium	Sprint-1
Administrator	Login	USN-4	As a user, I can log into the application by entering email & password	I can login to my account	High	Sprint-1
Customer service	Training data (dashboard)	USN-5	Ask for the trained data to be added.	I am adding the trained data to get the image recognized.	High	Sprint-1
Customer	Object detection	USN-6	Detecting the object within 30 cm distance.	I can sense any objects that are at a distance of 30 cm.	High	Sprint-2
Customer	Location detection	USN-7	Detecting the location in the map.	I can set the destination to be reached.	High	Sprint-2
Customer service	Capture the image	USN-8	Captures the image and detects the image using image processing.	I can check for the image in trained data	High	Sprint-3
Customer service	Location fix	USN-9	The path will be fixed.	I can know the direction which will be given as voice output.	High	Sprint-4
Customer service	Person/Object fix	USN-10	The name of the person or the object is detected.	I can get a voice output if the name is registered in the trained data.	High	Sprint-4