

Panoculon Lab

1) Challenges faced by visually impaired people:-

A. Reading

Current solution:- Now more than ever, there are braille documents, text-audio apps which are available.

Advancements:- AI Agents for conversion of text to audio then listening to the user; performing the task based on the users instructions. Like taking notes; clarifying doubts.

OCR to scan and convert printed text into digital format which can be read by screen readers.

B. Movement and walking

Current solution:- Dogs and canes

Advancements:- AI power smart glasses to perceive the environment, give directions

C. Consuming entertainment:-

Current solution:- To “watch” a football match they usually require a friend who guides there hands to tell them how the goal was scored and pass was made.

Advancements:- A physical device which automatically relays information on time in the same way but at the comfort of your house and even when they are home alone.

D. Cooking assistant

Current solution:- dependent on others

Advancements:- Here too use of AI glasses or any device physically attached that has a clear view of the cooking can help. For example, to know if the onions have been caramelized, they usually turn brown. This can be detected.

E. Getting jobs in the field they are interested

Solution:- “Research” in the field they are interested in would cut the problems they would face in the corporate world in the same field. Multiple govt education institutes have reservations for people with disability

Advancements:- In any corporate job, the most import is reading mail, answering, setting and attending meetings. A complete AI agent which does this on voice command.

If the person is interested in coding, we can upgrade IDEs which would read out the errors

2) Advantages I feel that visually impaired people have.

- Other senses are better
- Improved empathy and therefore social intelligence.
- Improved memory.

3) Currently existing smart glasses or wearable AI products

Ray-ban Meta:-

- Built on Qualcomm's new AR1 Gen 1 platform which is the first dedicated platform for augmented reality glasses.
- Meta's AI dictates messages or uses voice commands to take pictures and videos. Some of that functionality is on-device, which means the glasses don't always need to be paired to the phone to do basic functions such as recording videos or taking pictures.
- We can also share our view on video call via whatsapp and messenger.
- They can see what we are reading and with the help of AI translate it to us in our language.
- Integration to Instagram and direct live streaming.
- If you are recording a video with its help, it will turn on a white light and let people know you are recording which is amazing.

Improvements:-

- They need to add the direct object search functionality like google lens.
- They need to integrate the Meta AI with other apps. Additionally, the photos are captured in portrait and not in landscape mode.

Apple watch series 9:-

- Accelerometer to detect if the user has fallen down and call the emergency service automatically.
- Blood oxygen, Heart rate notifications
- Periods cycle tracking

Improvements:-

- Predictive analytics to build out a personalized exercise plan and give notifications to the user to "slow down" or "push harder".

4) AI Powered devices

A fitness device which can detect any abnormal change in body while exercising. Personalized devices for people of different age, sex and health conditions. This will store the users data and based on present heartrate and BP give suggestions.

This device would record sleep pattern.

Another feature would be to calculate the caloric intake of the person and based on their goal of either reducing or increasing weights suggest if more steps are needed for the day and how many.

Visually impaired people:- text-to-speech, vibration patterns, voice activated.

Smart glasses with enhanced edge detection and improved color identification.

Most visually impaired people are not completely blind but partially. If we can use computer vision techniques for edge detection, this would definitely be an improvement. These can then be used in real time.

Additionally for people who are color blind, we can use smart classes to identify those colors and convert to the colors they can perceive.

Not a device but a “Productive app” which kills all the unproductive apps on the phone for a duration of time with no override. Or if you want to study but with the help of YouTube videos, such an app would only recommend productive content on it.

5) Technical pipeline

Fitness device

Sensor Input (heart rate, blood pressure, accelerometer, sleep sensors)

- > Data Collection and Preprocessing (continuous monitoring, filtering)
- > Abnormal Change Detection (using thresholds and machine learning models)
- > Personalized Analysis and Feedback (age, sex, health condition-based suggestions)
- > Sleep Pattern Analysis (detect sleep stages and quality)
- > Caloric Intake and Activity Recommendations
- > User Interface and Data Storage

Smart glasses

Camera Input

- > Image Preprocessing (noise reduction, normalization)
- > Edge Detection (using algorithms like Canny, Sobel)
- > Color Identification (color space conversion, color correction)
- > Augmented Reality (AR) Overlay

- > Display Output (render augmented information on the glasses' display)
- > User Feedback Mechanism (adjust settings based on user input)
- > Performance Optimization (reduce latency, optimize power consumption)

We can use models such as Tinyllama for fitness devices. We can use techniques such as Qlora on LLMs.

These devices will only be making predictions and not actually be trained with the help of a smart phone. We can train the model with the help of higher computational resource.

6) Run a local inference

Used the Tinyllama model from hugging face with the help of **Termux** and KoboldCpp.

Video is present in the github repo.