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Contributions:

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### Interview with Olivia:

**Question:** What is the most frustrating thing when learning music

**Answer:** Takes some time to transcribe the piece of print sheet music to braille and is very costly. There is a software to do this but it is not screen read compatible

**Question:** Difficult activity in the day

**Answer:** Cleaning is difficult, Not knowing where burners are in the stoves

**Question:** Any challenges in college

**Answers:** Finding / getting materials in the library or cafeteria is hard. Navigation is the main hurdle

**Question:** Any challenge while travelling

**Answer:** Image to text recognition of AI can be improved. Finding transportation and translator apps don't have good screen readers. Security risk is also high

### Interview with Shaylyn:

**Question:** Appliances or things requiring touch can be difficult.

**Answer:** More touch sensitive screens

**Question:** When walking outside overhead things like branches and things can hit her and be an annoyance.

**Answer:** Something to block or identify overhead things

**Question:** Finding a door with just a cane is harder

**Answer:** A way to use a scanner to identify and tell where the door is

**Question:** Hard to read documents because scanning doesn't always work. Apps are not readily available.

**Answer:** Faster identification from apps

## **Interview with Marifer:**

**Question:** How is cooking affected by being visually impaired?

**Answer:** Everything needs to be in a specific place so she doesn't use a wrong ingredient.

**Question:** How is shopping affected by being visually impaired?

**Answer:** She needs people to go with her to describe everything to her.

**Question:** Does being visually impaired make it harder to do homework and schoolwork?

**Answer:** It is very difficult to do homework that isn't in braille and she needs outside assistance and she has to use a special braille math box to learn math.

**Question:** How is safety impacted by being visually impaired?

**Answer:** She is scared to run and thinks she will fall and hurt herself.

**Question:** Does being visually impact hygiene?

**Answer:** Everything needs to be in the same place or she doesn't know what she's holding, similar to cooking.

**Question:** How do you watch video media?

**Answer:** She uses a special program that describes what is happening .

## **Interview with Cedric:**

**Question:** What type of every day tasks are difficult for you as a visually impaired individual?

**Answer:** Tasks like picking clothes, reading signs, ordering from menus are difficult. During the pandemic, the constant use of signage made this struggle worse.

**Question:** What sort of devices or tools do you utilize to navigate your day-to-day life? Do you have any concerns about your reliance on these devices?

**Answer:** Uses cane, notetaking devices, Braille display, iPhone, Apple TV, Alexa, Google Home. Previously used magnifying glass and monoculars. One of his major concerns is the battery life for his devices.

**Question:** Do you consider navigating through your own home to be difficult or easy? Has becoming familiar with your space affected this at all?

**Answer:** Difficult, hands and arms hurt from bumping into things like cabinets or walls. Occasionally falls due to unexpected steps. Though the fact that it is his home makes it slightly easier to navigate, it can still be a challenge.

**Question:** How safe do you feel in outside environments as a visually impaired individual?

**Answer:** He considers his house to be considered safe because he is familiar with the environment, but outside environments are constantly changing. Feels the need to stay alert even without a guide dog or cane.

**Question:** Do you feel reliant on any people or tools in your life? Are you comfortable with being dependent or do you prefer independence?

**Answer:** Dislikes relying on others and apps. Prefers independence but accepts help when it is needed. Carries multiple backpacks in order to always be prepared.

**Question:** How difficult is it for you to interpret non-verbal cues and body language?

**Answer:** He is unable to read non-verbal cues and body language. Audio descriptions help for media but older content lacks this.

**Question:** What is your opinion on the costs of assistive devices?

**Answer:** Assistive devices are too expensive. Even basic tools cost a lot. Most blind people can't afford them without external help. Employers are reluctant to hire the visually impaired due to cost.

**Pain Points:**

- **Actual problem**
- **Current state**
- **Scope**

<u><b>Actual Problem</b></u>	<u><b>Current state of problem</b></u>	<u><b>Why is it a problem?</b></u>
Cooking	Marifer has to make sure everything is in the same place and nothing gets moved to know where everything is.	If anything ends up getting moved, it creates difficulty knowing what each ingredient is.
AI image to text recognition is not specialized enough	Olivia thinks that books which have images when asked to AI for the description doesn't properly say what's in the image. She also feels that when trying to recognize different signs such as 'stop' signs AI is not capable to recognize it properly	This is a problem because the visually impaired are not able to enjoy visual books. Navigation is also tempered
Overhead objects hitting	A cane cannot detect branches or signs hanging from above, causing impacts to the head	This can hurt people, causing scratches, bruises, etc

Running	Visually impaired individuals are scared to run as they can't see what's in front of them and current solutions work slowly.	This creates hazards in unsafe situations.
Using apps to identify objects	Apps are too slow or incorrect when used to identify objects or purchasable items	This can take a lot of time or give incorrect info to the blind, which could lead to more issues
Shopping	Marifer needs someone to go with her to describe all the clothes to her.	This is time consuming and inefficient and there should be ways for her to go shopping by herself.
Security	Olivia is afraid of human trafficking and other safety related issues	She has to rely on other people to navigate. She cannot move independently or travel alone. Sometimes people cannot cooperate properly
Navigating around house	Cedric's hands and arms hurt from bumping into things like cabinets or walls in his home.	Over time, the damage caused to his body can get worse. Which can lead to permanent damage.
Cost of assistive devices	Assistive devices are very costly. Even basic tools are unable to afford them without external help.	This limits accessibility for those who need it the most. It makes everyday tasks more difficult for the visually impaired.
Lack of audio descriptions in media	While some modern media have audio descriptions to be more accessible to the visually impaired, some older content lacks this.	This creates accessibility barriers for the people who need it the most. It excludes them from being able to understand visual elements in media such as actions, settings, and facial expressions.

### Customer Archetype:

A visually impaired college student who wants an affordable device that will make their everyday life easier.

**List of requirements (Functional, Non functional, constraints):**

- Wearable
- Non-invasive
- Fashionable
- Portable
- Affordable
- Focused on alleviating pain points in a visually impaired person's everyday life
- Based in a technology framework
- Includes a raspberry pi and many different sensors/devices
- Python interface

**Potential products (around 5):**

- A cane that can detect where the door is in the room. Using a video scanner and ai to identify where the door is, if it's open, closed. And using a beeper to alert where the door is facing in comparison to the person.
- An AI scanner that can quickly identify an object or thing using an image recognition scanner. This scanner will be attached to a cap.
- A bracelet trained to say whatever kitchen device is in front of the customer's wrist. It will be stylish and fun while also being very helpful while cooking.
- A device that makes a beeping noise on either side of the person, the beep gets faster the closer they are to hitting something on that side, like a cabinet or other. It uses ultrasonic sensors to detect how close the person is to hitting something. It is like a jacket with sensors along the side.
- A device that utilizes a PIR sensor and ultrasonic sensor in order to detect the nearest individual and the person's proximity to them. It can also have a function that can be toggled which notifies the visually impaired individual utilizing an active buzzer. One example of a use for this is to navigate crowded spaces like crowds or other general public spaces.