



mid sem evaluation

Engineering design Project

Topic

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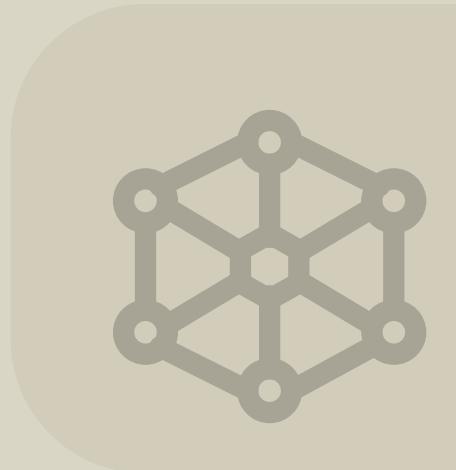
User/Field Study

- initial problem statement
- interview insights



Data Analysis

- data segregation
- refined Problem Statement



Tech/Product

- technology proposed
- software development
- hardware component



Concepts

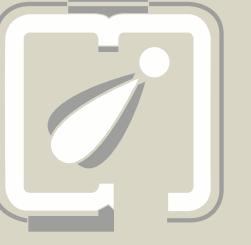
- concept model

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4



1.1 Initial Problem Statement

“Visually impaired individuals face challenges in accessing and understanding text-based information in their immediate environment.”



1.2 Interview Insights

User 1



College Student
Computer Science Major
Age: 20

current challenges

Difficulty reading textbooks, lecture slides, and classroom presentations. Struggles with navigating campus and public transportation.

usage scenarios

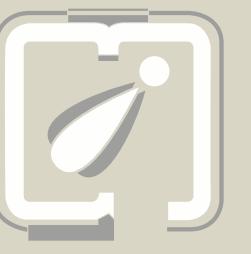
Reading textbooks, attending lectures, navigating campus, using public transportation, ordering food, accessing information on public displays.

desired features

Accurate and fast text-to-speech conversion, integration with learning management systems, real-time audio descriptions for videos, GPS navigation with audio cues.

interview insights

Expresses frustration with the lack of accessibility in digital textbooks and online learning materials.



1.2 Interview Insights

User 2



Working Professional
Software Engineer
Age: 35

current challenges

Challenges with reading emails, reports, and documents. Difficulty accessing information on computer screens and physical documents.

desired features

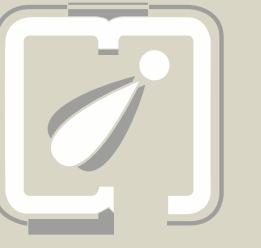
Accurate and fast text-to-speech conversion, screen reader integration with popular office software, document scanning and OCR capabilities, integration with smartphones for real-time information access.

usage scenarios

Reading emails, working on documents, attending meetings, accessing information on public displays, navigating public spaces.

interview insights

Highlights the need for seamless integration with existing productivity tools and a focus on efficiency.



1.2 Interview Insights

User 3



Senior Citizen
Retired Teacher
Age: 65

current challenges

Difficulty reading labels, menus, and medication instructions. Challenges with navigating unfamiliar environments.

desired features

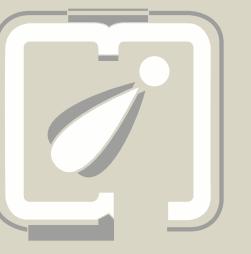
Large font display, voice-activated controls, clear audio output, integration with smart home devices.

usage scenarios

Reading medication labels, ordering food, navigating grocery stores, using public transportation, controlling home appliances.

interview insights

Emphasizes the importance of simplicity and ease of use, as well as the need for reliable and accurate information.



1.2 Interview Insights

User 4



Individual with Low Vision
Freelance Writer
Age: 32

current challenges

Difficulty reading small print, especially in low-light conditions. Challenges with recognizing objects and people.

usage scenarios

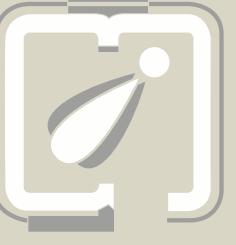
Reading books, newspapers, and digital documents, navigating unfamiliar environments, recognizing people and objects.

desired features

Adjustable font size and contrast, image recognition and description, integration with cameras for real-time object identification.

interview insights

Expresses a strong desire for a versatile device that can adapt to various lighting conditions and reading materials.



2.1 Interview Insights

User 4

Segmentation

Demographic

Geographic

Targeting

Age: 18-40 years old
Young, tech-savvy individuals seeking convenience and affordability
Gender: Male and Female
A gender-neutral product appealing to a wide audience
Income: Middle to upper-middle income
Priced competitively to attract a broad consumer base
Education: College graduates and above
Targeting educated consumers who value innovation

Urban Areas: Major cities and urban centers
Catering to the fast-paced lifestyle of city dwellers
Suburban Areas: Suburbs and satellite towns
Targeting families and individuals seeking convenience and comfort
Rural Areas: Rural communities and towns
Focusing on basic needs and affordability

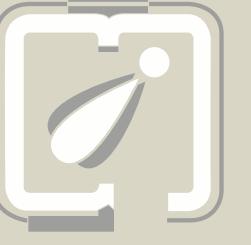
Positioning

Real-Time Accuracy

- Instant Text-to-Speech Conversion: Instantly converts text from any surface into spoken language.
- Advanced OCR Technology: Ensures accurate text recognition, even in challenging conditions.

Portability and Convenience

- Compact and Lightweight Design: Easy to carry and use anywhere.
- Long Battery Life: Extended usage without frequent charging.
- Rapid Charging: Quickly powers up for immediate use.



2.1 Interview Insights

User 4

Segmentation

Psychographic

Targeting

Age: 18-40 years old
Young, tech-savvy individuals seeking convenience and affordability
Gender: Male and Female
A gender-neutral product appealing to a wide audience
Income: Middle to upper-middle income
Priced competitively to attract a broad consumer base
Education: College graduates and above
Targeting educated consumers who value innovation

Positioning

Seamless Integration

- Compatibility with Assistive Technologies: Works seamlessly with screen readers and braille displays.
- Smartphone and Tablet Integration: Access information on the go.

User-Friendly Interface

- Intuitive Design: Easy to learn and use.
- Customizable Settings: Tailor the device to your specific needs.



2.2 Improved Problem statement

“ visually impaired individuals struggle to independently access and understand text-based information in their immediate environment due to limitations in current assistive technologies, such as accuracy, real-time transcription, and portability. ”

3.1 Proposed Technology

new innovation

The project emphasizes user-friendliness through features like Bluetooth headphone connectivity and potential future implementation of button-based picture capture for specific text reading.

Text-to-Speech Engine

The Python library pytsxs3 will converts recognized text into audio played through connected headphones.

Software Development

- Programming Language: **Python**
- Libraries:
 - Doctr (OCR)
 - pytsxs3 (Text-to-speech)
 - OpenCV (Optional: Image processing)

Optical Character Recognition (OCR)

The glasses will utilize an OCR system (Doctr library) to recognize text from the user's field of view.

Hardware Components

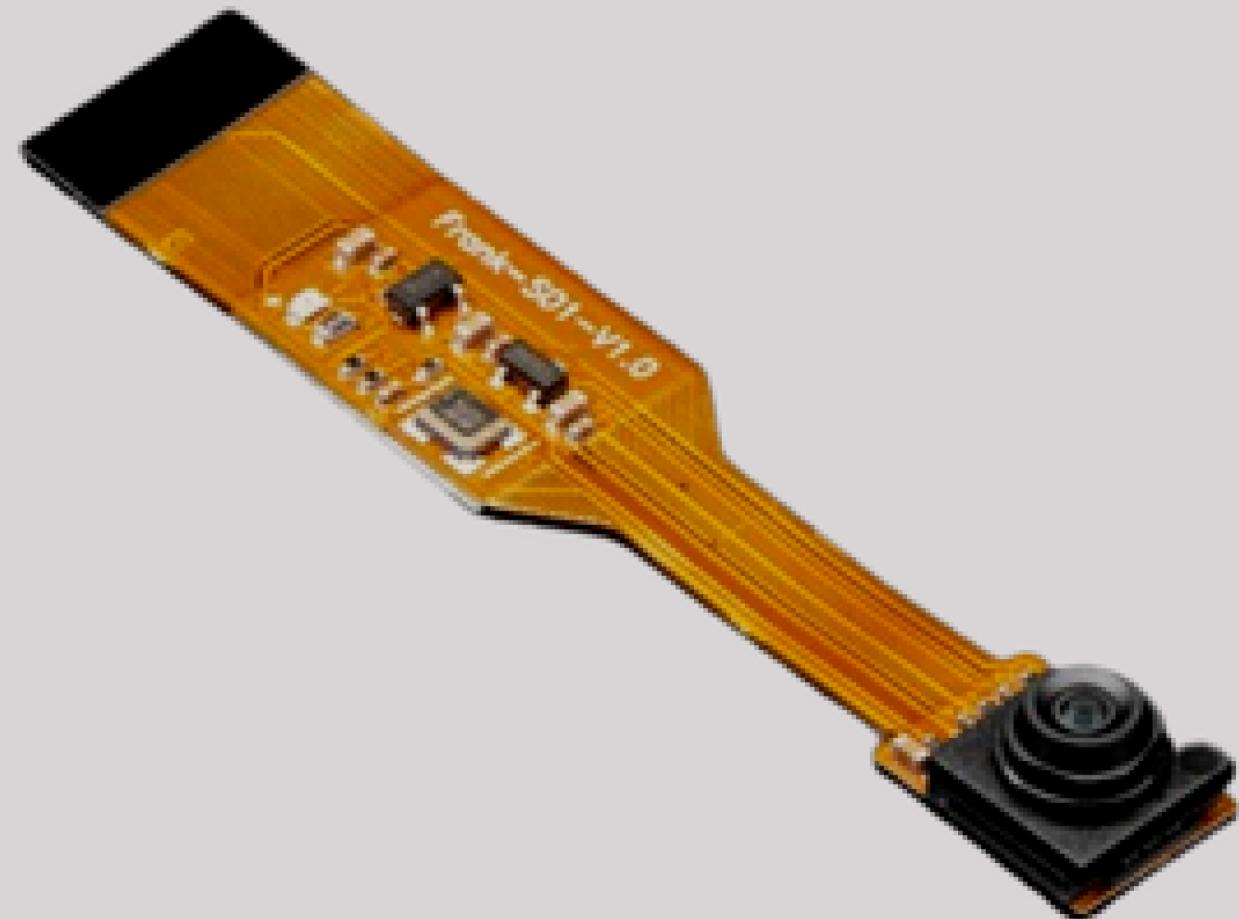
- Raspberry Pi Zero 2 W: Microcontroller for processing
- Zero Spy Camera: Captures text images
- Mini Speakers: Output the converted audio
- Custom Soundboard with GPIO Pins: Controls audio output
- 3D-Printed Frame: Houses the components
- Lithium-Ion Polymer Battery: Powers the device

Image Processing

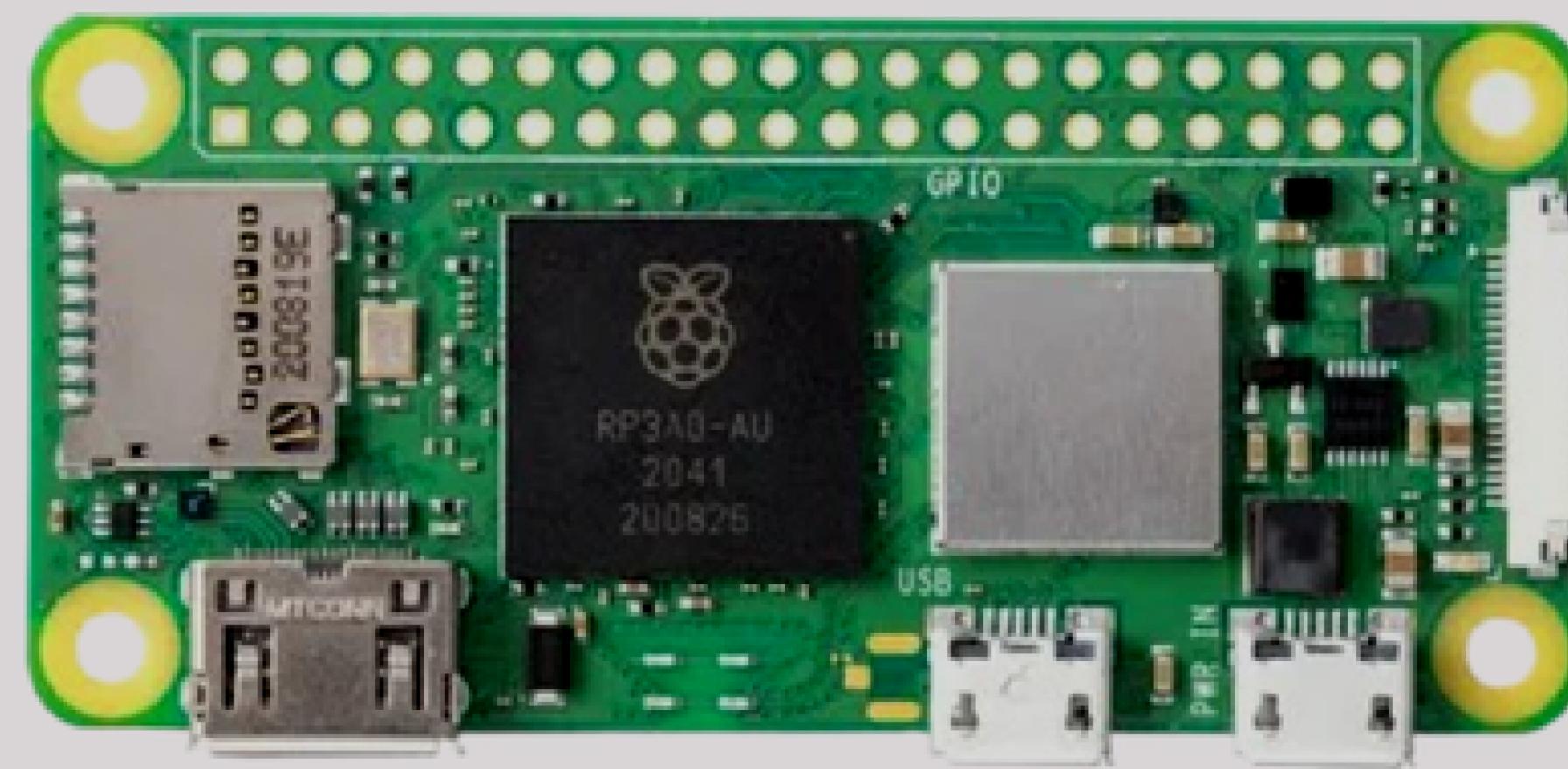
we will be using OpenCV (Open Source Computer Vision Library) for image capture, potentially for future functionalities like picture-taking.



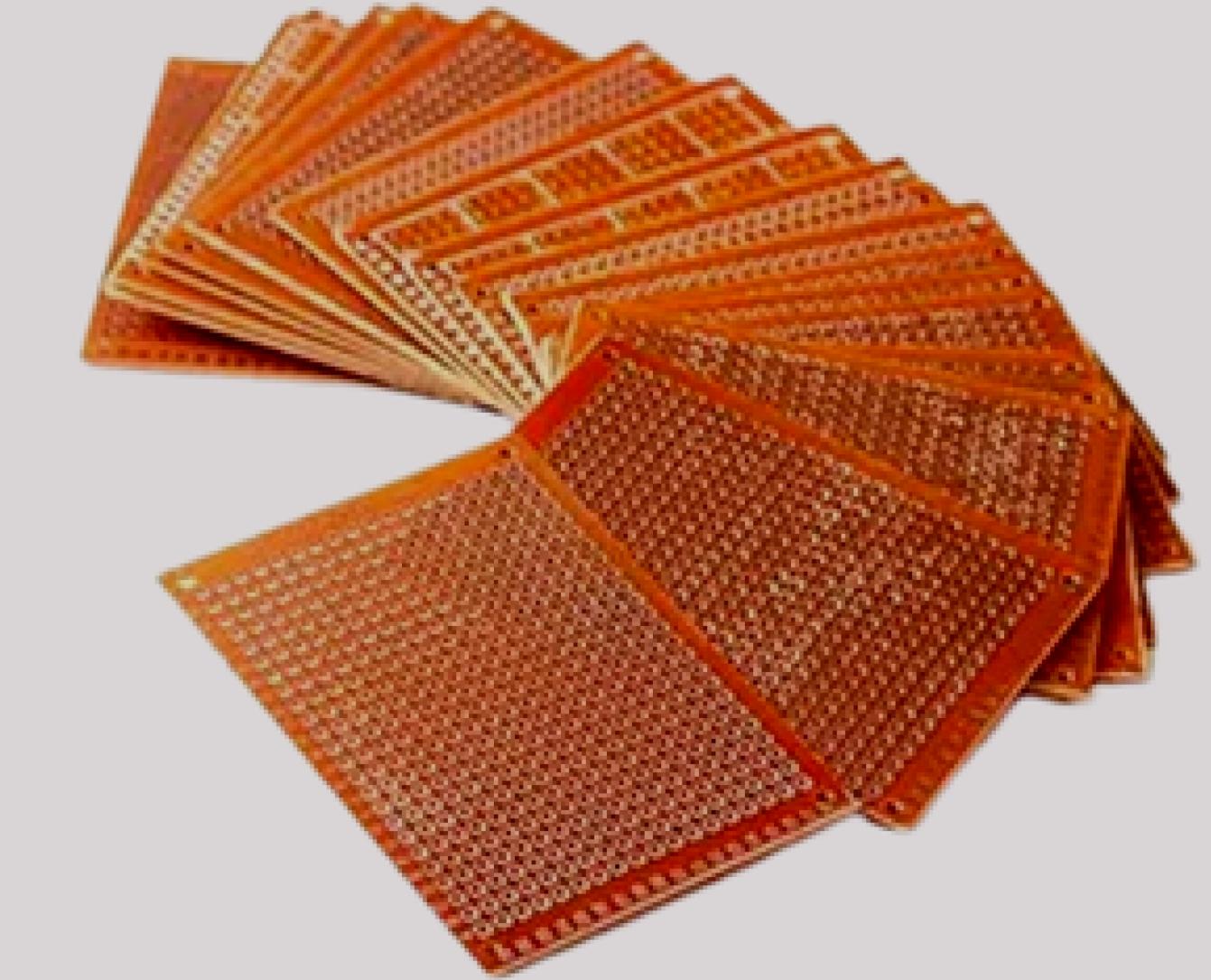
Micro Speaker



Zero Spy Camera



Raspberry Pi zero 2W



PCB Sound Board



3.7V Battery Pack



PLA Black Filament