VISION SHARE

VISUAL ASSISTANT TO THE BLIND

https://kash1r.github.io/CS-SE-4351.001-Team-Project.github.io/

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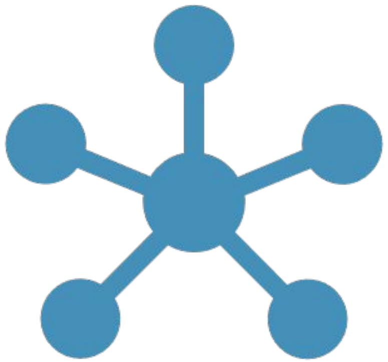

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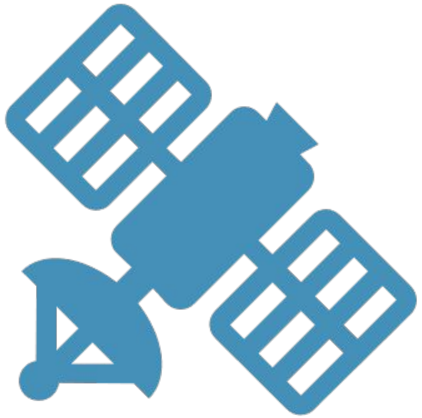

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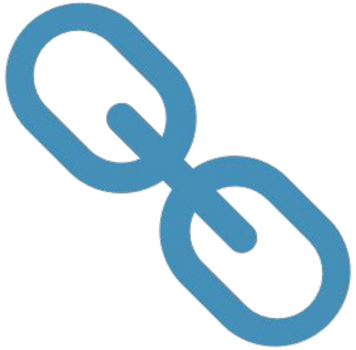


Connect

VISION SHARE: THE FUTURE OF DISABILITY INNOVATION

STAKEHOLDERS

For the People:

- Blind individuals requiring indoor navigation assistance
- Volunteers for Vision Share

Of the People::

- Owners of Vision Share
- Professor Chung

By the People:

- Team 1 (developers, engineers, etc.)

PROBLEM

- Problem:

  - Existing navigation aids for the visually impaired have limitations in indoor environments like buildings, hallways, elevators etc.
  - Traditional assistive devices may draw unwanted attention to the user's disability.
  - Lack of a discreet, integrated solution that leverages ubiquitous smartphone technology.

GOAL

1. Enable safe, fast and comfortable indoor navigation through an app on the user's familiar smartphone device.
2. Leverage real-time video assistance from volunteers to provide guidance without highlighting the user's impairment.
3. Utilize smartphone sensors and technologies like voice recognition to build an accessible user interface.
4. Learn user routines and environment contexts to provide personalized navigation suggestions.
5. Offer emergency communication capabilities for enhanced user safety and autonomy.
6. Ensure system usability, privacy, security across diverse users, devices and environments.

ASSUMPTIONS

- The user (visually impaired individual) has access to a smartphone capable of:

  - Making video calls

  - Running the Vision Share app

  - Accessing various sensors like accelerometer, gyroscope, etc.

  - Supporting voice recognition and audio feedback

- The user's smartphone has a stable internet/data connection to enable:

  - Real-time video communication with volunteers

  - Location tracking and data sharing

- There is a pool of available volunteers willing to provide remote video assistance through the app.

- Indoor venues like buildings, malls, etc. are mapped and their layouts/obstacles are available to the app's navigation system.

- The user is comfortable with and capable of operating a smartphone using voice commands and other accessibility features.

- Emergency contacts and local emergency services are integrated with the app for sending alerts.

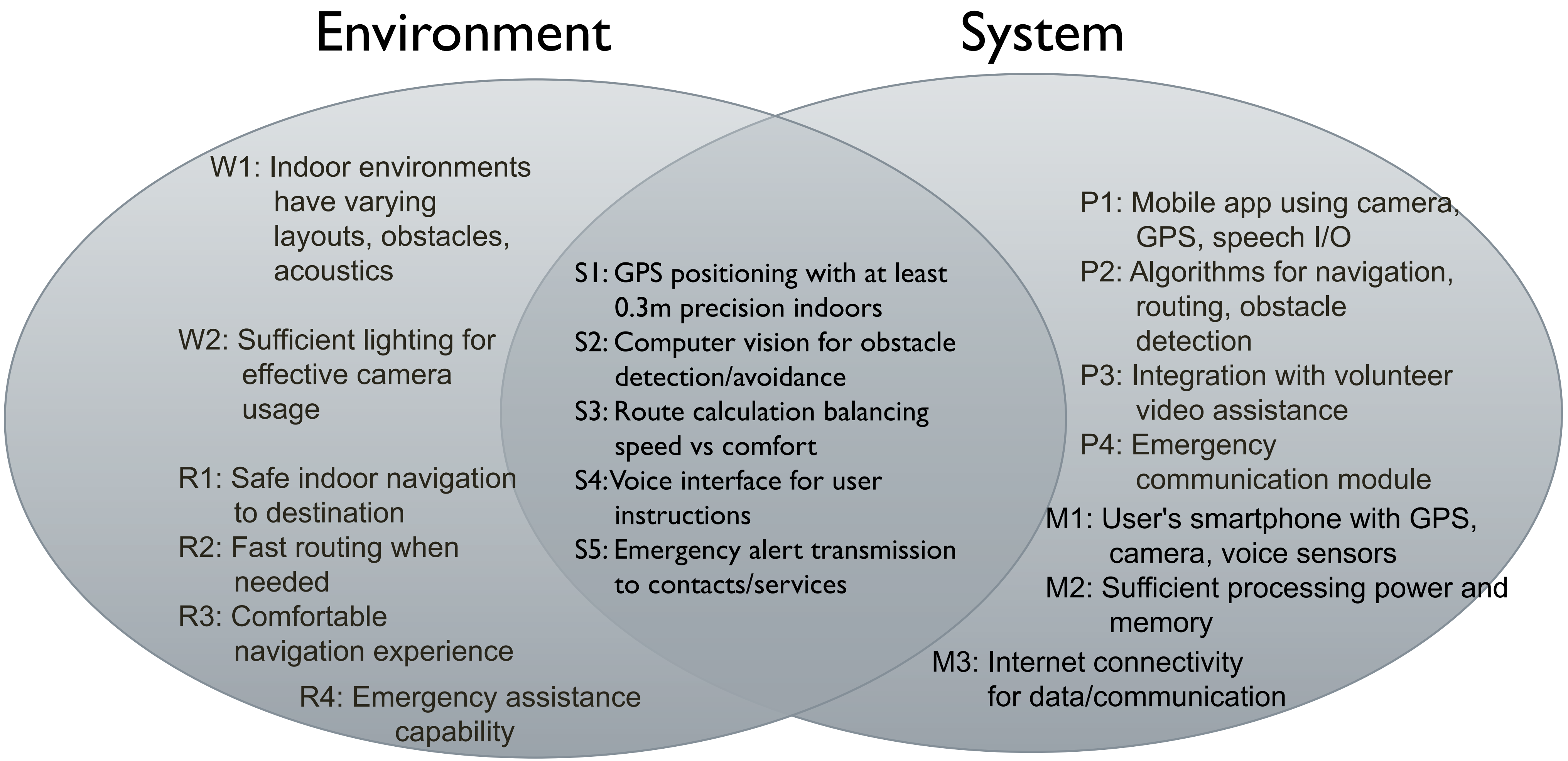
- The app has access to the user's calendar/schedule information to suggest routine destinations.

- Newer smartphone models with advanced sensors like LiDAR are available for enhanced navigation features.

WRSPM MODEL

- **World (W): Indoor environments; user can communicate with app; sufficient lighting for camera.**
- **Requirements (R): System to safely guide user to indoor destination and call for help if needed.**
- **Specification (S): Use GPS for navigation, camera/computer vision for obstacle detection and virtual assistance, algorithm for route calculation.**
- **Program (P): Mobile app using camera, GPS, and lidar as sensors and speech as actuator.**
- **Machine (M): User's smartphone with necessary sensors and connectivity.**

WRSPM MODEL (VEN DIAGRAM)



FUNCTIONAL REQUIREMENTS

- FR1 - The system shall analyze the user's routine and suggest destinations based on patterns like frequently visited locations, time of day, etc.
- FR2 - The system shall be able to handle different types of obstacles (construction, accidents, road closures) when calculating routes and providing navigation instructions.
- FR3 - The system shall have features that allow users to easily communicate with emergency services or contacts in case of an emergency situation.
- FR4 - The system shall prioritize user privacy by providing options to control how location and other personal data is used and shared.
- FR5 - The system shall provide a mechanism for users to give feedback on preferred routes, which can be used to improve future route calculations.
- FR6 - The system shall suggest logical "next actions" to users based on their current location and routines (e.g. pick up groceries on the way home).
- FR7 - The system shall provide detailed navigation instructions beyond just driving directions (e.g. which building entrance to use).
- FR8 - The system shall automatically detect emergency situations and alert authorities/contacts as appropriate, while still giving the user autonomy to override if needed.

NON-FUNCTIONAL REQUIREMENTS

- NFR1 - The system shall strike a balance between suggesting the fastest routes and the most comfortable/scenic routes based on user preferences.
- NFR2 - The system shall strive for ubiquity, the system must ensure robust data security and user privacy controls are in place.
- NFR3 - The system shall let users be able to customize the system to suit their preferences, but this needs to be balanced against overly complex UI/UX.
- NFR4 - The system UI and interactions shall be designed for usability across diverse user groups (e.g. disabilities, technophobia) and environments (e.g. driving, walking).
- NFR5 - The system shall have architecture that is extensible to accommodate future technologies like self-driving cars, augmented reality, etc. as well as evolving user needs.
- NFR6 - The system shall have core services for cross-platform compatibility across different devices, operating systems, and hardware.
- NFR7 - The system shall suggest fastest route to better balance against overall system usability so that neither is compromised completely.
- NFR8 - The system shall allow user customizations to balance against making the system overly complex and difficult to extend/maintain.
- NFR9 - The system shall have UI text, voice interactions, etc. to maintain usability across different languages and linguistic variations.
- NFR10 - The system shall have different feedback mechanisms (audio, visual, haptic) be available to suit user comfort and situational needs.

AS-IS SCENARIO: USER NEEDS TO GET TO AN ECSSS CLASS

- Bob is on his way to his ECSS class.
- He finds a door that he assumes is the classroom.
- Instead, it's a window on the 3rd floor.

TO-BE SCENARIO: USER NEEDS TO GET TO AN ECSSS CLASS

- Bob is on his way to his ECSS class.
- Vision Share guides Bob in the right direction.
- Bob arrives at his classroom on time because a volunteer on Vision Share helped to guide him to the destination.

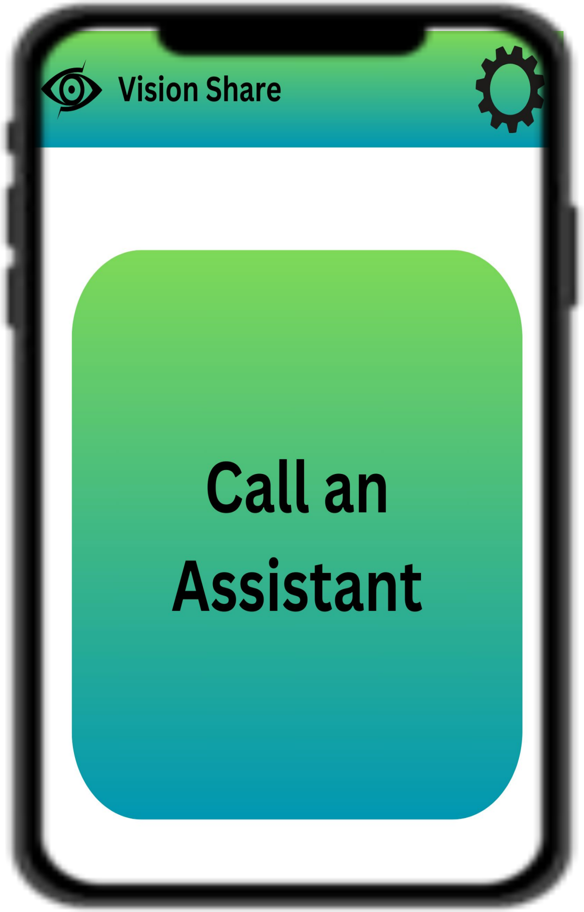
AS-IS SCENARIO: USER RUNS INTO ANOTHER PERSON

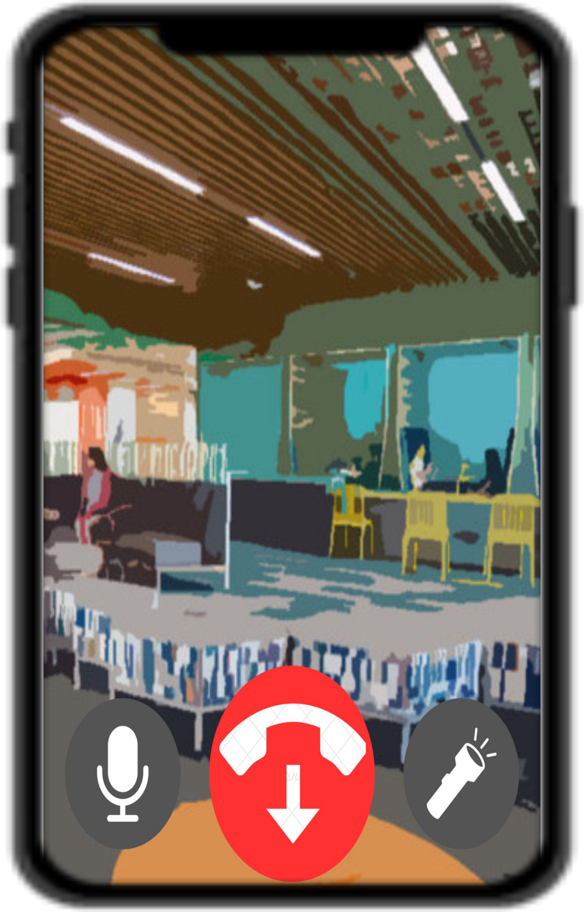
- Jake is on his way to his dance class.
- Didn't hear the person who was walking the other direction.
- Collided with the person and got knocked out.

TO-BE SCENARIO: USER RUNS INTO ANOTHER PERSON

- Jake is on his way to his dance class.
- Didn't hear the person who was walking the other direction, but Vision Share detected them.
- Jake was able to avoid running into the person because a volunteer on Vision Share helped to guide him to the destination.

MOCKUP WALKTHROUGH





REQUIREMENTS CREEP

- Our team has agreed on a 25% creep rate with a variance of 10%.
- The estimation of creep rate may not be precise, as it depends on various factors, including:

  - The size of the team working on the project.

  - The extent to which the final product deviates from the initial prototype.

  - The availability of resources required to implement the changes effectively.

  - Requirement creep is calculated as the ratio of the number of requirements that necessitate changes to the total number of requirements.

The Creep

Why We're The Best

- Our application is simple to use and easy to understand, making screen readers easy to interpret for the user.
- Utilizing volunteers over call, as well as sensors is more reliable than sensors alone.
- Our model is building on and improving already proven methods of utilizing technology to guide the visually impaired.

THANK YOU