

SENG 310 – Human Computer Interaction

Dr. Charles Perin

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B03-4

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Design Requirements

Phone App:

- Pathway Tracking: Must be able to track the user's pathway through the trail and have snapshots from AR glasses plotted on the trail map.
- Customizable Display: Must allow users to customize AR glasses display, enabling them to choose what they want to see. For example, experienced hikers might not need navigation.
- Detailed Information Review: Must allow users to review detailed information about identified flora and fauna in real-time as well as after the hike.

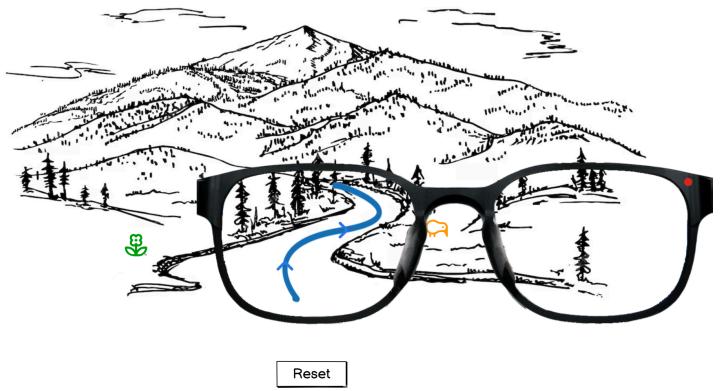
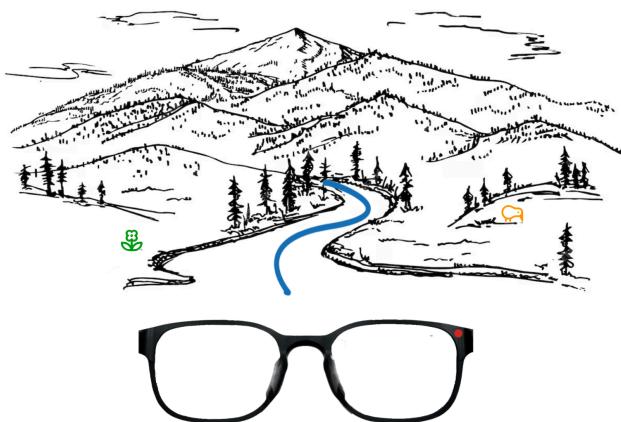
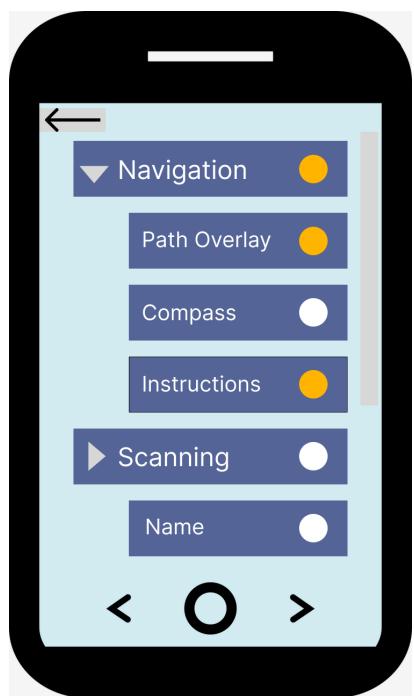
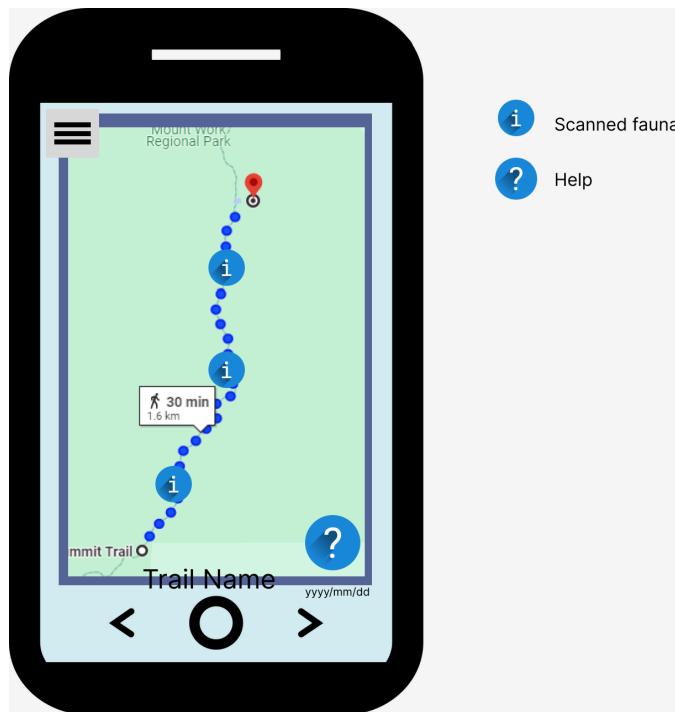
AR Glasses:

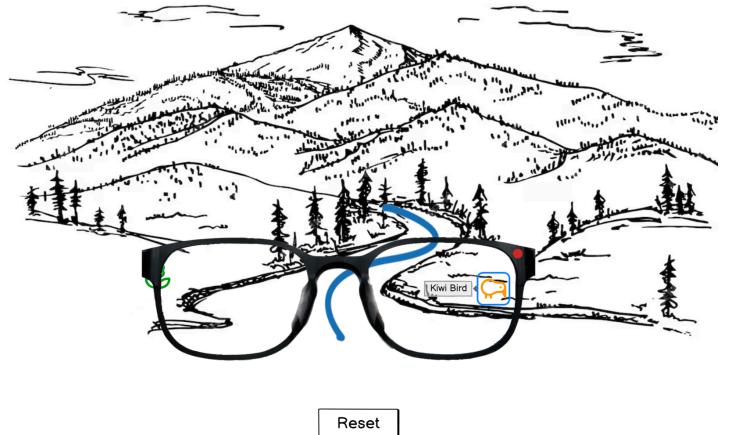
- Real-Time Identification: Must be capable of scanning and identifying plants and animals in real-time, catering to users with less knowledge or keen to learn more about local flora and fauna.
- Reliable Navigation: Must provide reliable navigation, especially for novice hikers on poorly labeled trails, using visual overlays to clearly guide users along the route.
- Alerts and Updates: Should provide real-time trail updates, including alerts for weather conditions and hazards, and detect potentially dangerous animals using the built-in camera.

Brainstorming Results

Our brainstorming session focused on improving our design requirements for our hiking app that will be integrated with AR glasses. To start we each created sketches and ideas for potential features and functionalities based on the interviews we did for the last project. Focusing on the main ideas that were brought forward by different interviewees. When creating these first sketches we tried to focus on user experience and understandability. We also used a notebook to write down group ideas to encourage a collaborative environment while considering all ideas brought forward.

Some Sketches Created During the Brainstorming





Interesting Sketches and Ideas

- 1. Dynamic Trail Mapping:** A feature that allows real-time updates of the trail map based on the user's input and shared data from other hikers. This would include things like geotagged points of interest, hazards, and path adjustments.
- 2. AR Enhanced Flora and Fauna Identification:** A real-time identification system that will overlay information about plants directly onto the AR glasses. This system could include more interactive elements such as voice commands for additional details or saving images of specific findings.
- 3. Safety and Emergency Features:** Integration with an emergency system and real-time communication with rescue services. This feature would use the phone's GPS and the AR glasses camera to provide specific location data and live video if needed.
- 4. Customizable User Interface:** This allows the interface of the AR glasses to be personalized for different types of hikers. For example, have options for minimalist UI for experienced hikers or comprehensive guides for novices.

Grouping Ideas and Selection Process

We grouped the ideas into several categories: Navigation, Safety, Educational Features, and User Experience. Each category was then evaluated on: feasibility, potential user impact, and uniqueness compared to existing solutions. The most promising ideas were *Dynamic Trail Mapping* combined with *AR Enhanced Flora and Fauna Identification*. This combination was chosen for its innovative approach to enhancing both the safety and educational aspects of hiking which was mentioned lots in the interviews that were conducted in the last project.

We also looked at the different sketches we created and each voted on our favorite designs while also mentioning what exactly we liked about that sketch. This was done by separately giving each sketch a rating out of 5 to narrow down the initial ideas. Next we discussed some particular things we liked about each design. Then we combined these ideas into slightly higher fidelity prototypes which are shown in the videos and storyboard.

Related Works Considered

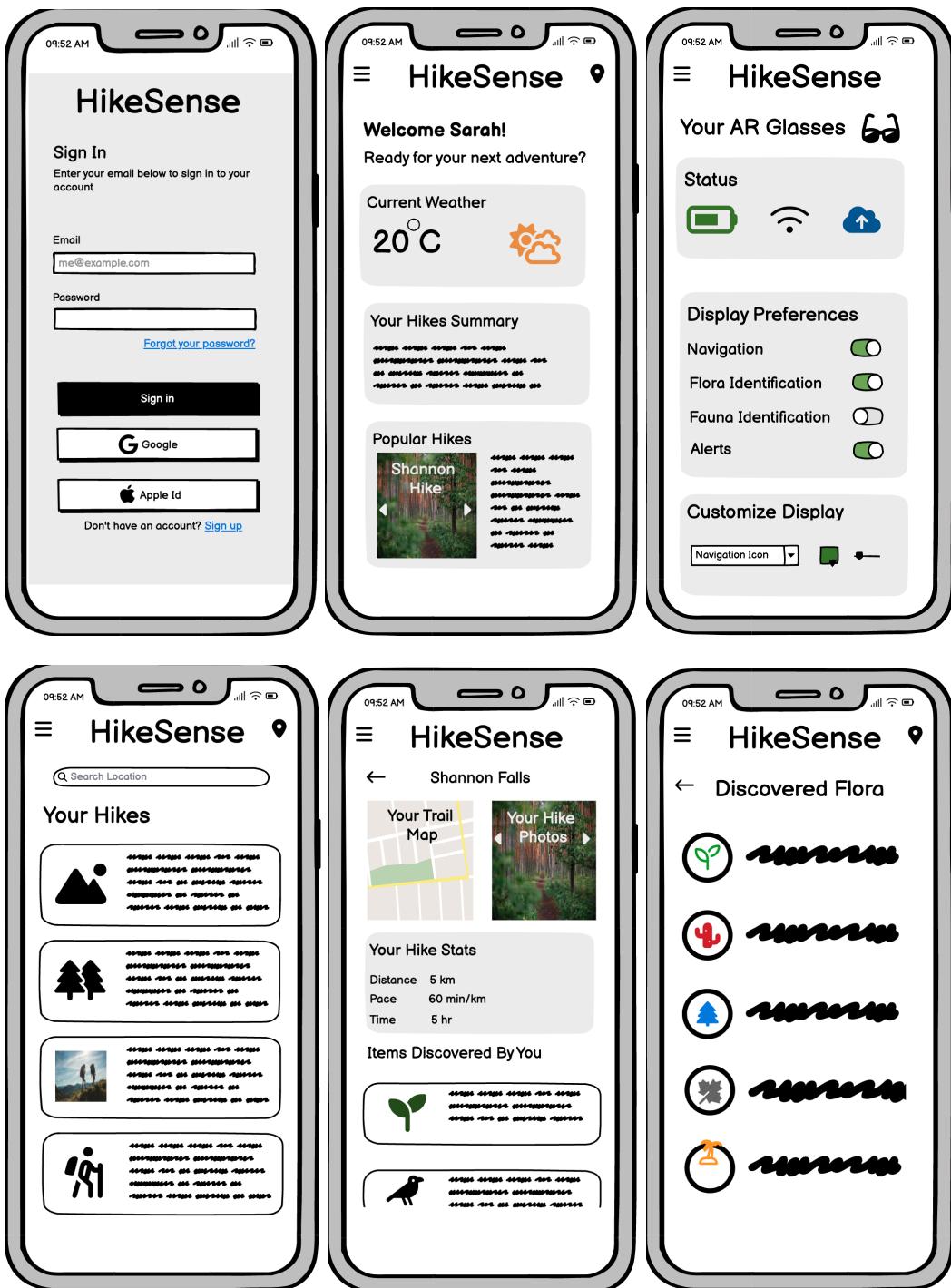
We review several existing hiking apps to identify gaps and opportunities for innovation:

- 1. AllTrails:** Provides detailed trail maps and user reviews but lacks real-time AR integration
- 2. Seek by iNaturalist:** Focuses on identifying plants and animals using the phone camera but does not integrate with navigation or AR glasses.
- 3. Google Maps AR:** Google offers AR based navigation in urban environments but it does not work for hikes or detailed nature information
- 4. Garmin GPS Devices:** Known for being a reliable navigation system in outdoor settings but it lacks real-time identification and detailed trail maps with reviews

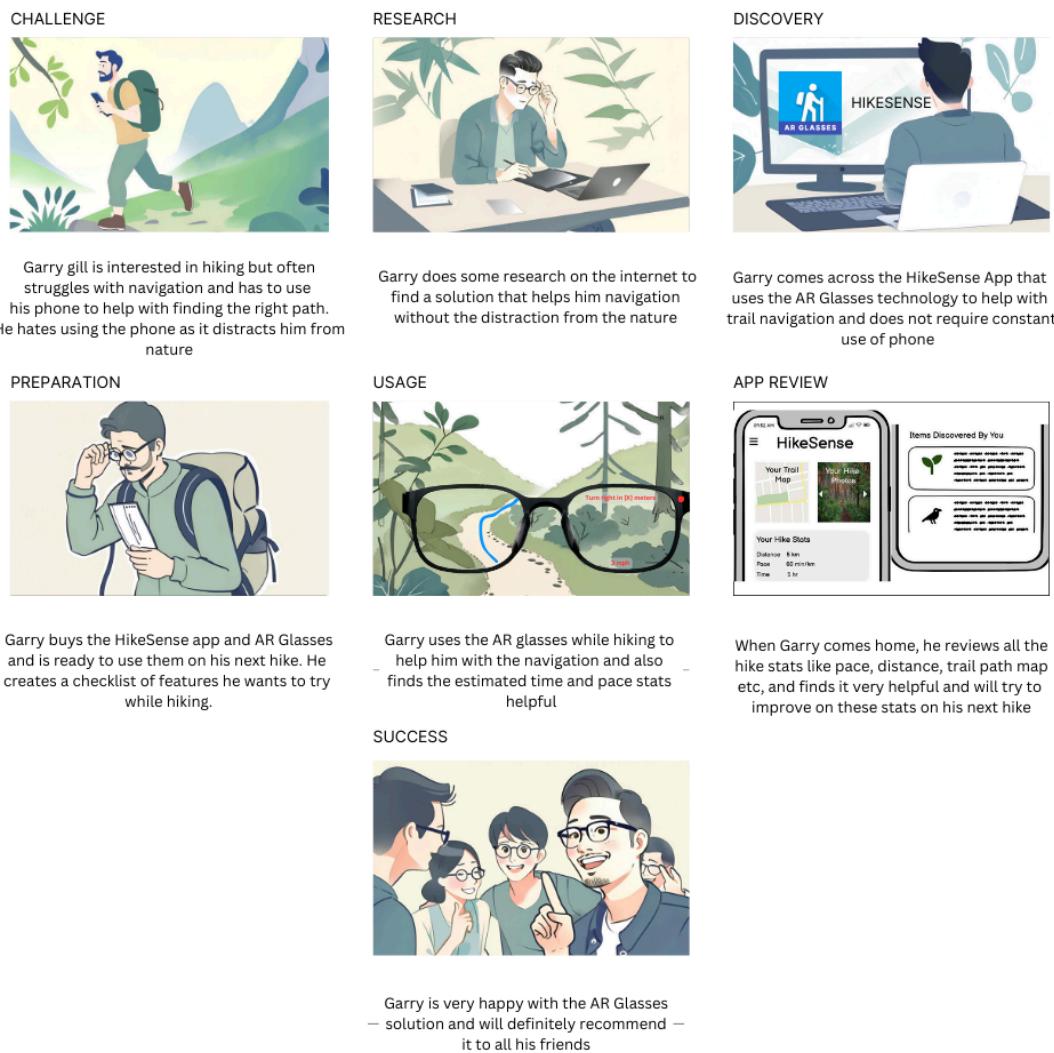
Key Differences from Existing Works

Our idea distinguishes itself by combining a navigation system with real-time flora and fauna identification and customizable user interfaces in a single platform. Unlike existing solutions that focus on one or two aspects, our design aims to provide an all-in-one tool for novice and experienced hikers, enhancing safety, education, and overall hiking experience.

Final Sketches:



Storyboard:



This storyboard illustrates the journey of Garry Gill, a novice hiker, as he discovers and interacts with our HikeSense App and AR Glasses solution for seamless trail navigation, enhancing his hiking experience by eliminating the need for constant phone use and providing valuable hiking stats.

Video Prototype:

In the video, Sarah uses the HikeSense app in combination with AR glasses to enhance their hiking experience. As she explores the trail, the AR glasses capture real-time footage of the surroundings. The HikeSense app then identifies and categorizes the various flora and fauna encountered during the hike. This allows the hiker to access detailed information about the plants and animals they see, making the hike both educational and immersive.

Heuristic Evaluation:**Flora and Fauna Identification:**

Subfeatures	Severity
Scanning	4/5
Information pages	3.5/5
Taking pictures	2/5

In total, We have given Flora and Fauna Identification an overall score of 3.5 as it's a major feature in the application via AR glasses. First, the scanning takes precedence in the subfeatures as we estimate it will be the most difficult to implement and will act as a core starting point for information pages. Additionally, we will display whether a scan is in process or finished, thereby adhering to the visibility of the system status. To help users recognize, diagnose, and recover from errors we will have a UI in the AR Glasses displaying when scanning is occurring and instructions or tips if errors are encountered. Expanding on that, we will provide strong error prevention in the scanning feature such that the system remains intact even with poor scanning data. Furthermore, information pages within our application are the next vital component as it's the next direct step from scanning for trip storage. Lastly, taking pictures is the lowest-priority subfeature as its development isn't crucial to our app's main features. Although, we keep in mind it also may be developed as a part of scanning flora and fauna.

Navigation:

Subfeatures	Severity
Overlay	4/5
Instructions	3.5/5
Arrival time estimation	2/5

Overall navigation is a major feature of our application via AR glasses providing it with a combined severity of 3.5/5. This severity is representative of the importance of navigation as

a whole, but, priority leans towards overlay, then instruction, as it provides a major use for novice and experienced users alike. Next, instructions are a useful addition or alternative to the overlay, but not our main feature for navigation. However we recognize a subset of users will prefer just instructions, hence the customizable display shown in the sketches above, so, we utilize aesthetic and minimalist Design by allowing users to provide customizable displays for options. Thus, options for overlay, instructions, or both provide flexibility and efficiency of use by providing options for novice and experienced users. Though, arrival time estimation is a nice additive it doesn't pose a major importance to our vision as our goal is to encourage users to spend more time outdoors so timing it isn't vital.

Safety Emergency Features:

Subfeatures	Severity
Alerts	3/5
Emergency Calls	3/5
Reroutes	3.5/5

Overall, Safety and Emergency features are given a severity of 3 as they are important features to be added, but while in development, fauna scanning and navigation take precedence as the main features. Moreover, the difficulty of implementing these tasks is much lower as other systems exist for us to pull into our system to solve this problem. However, once development reaches this aspect of the project, reroutes should take precedence in the refinement stage of creation as it correlates with navigation as well. But, the safety features provide consistency and standards to our app as other apps, like Google Maps, provide alerts for issues in traveling. Additionally, providing an in-glasses capacity for emergency calls assists with providing users confidence and freedom as they don't need to worry about losing their ease of communicating with emergency workers.

Reflection on the Process

What Worked: Being able to collaborate and having an open discussion fostered creativity and allowed for a wide range of ideas. Using sketches allowed everyone to come up with ideas quickly and explore many different ideas. It also helped visualize concepts and create a better understanding among team members. Also using the heuristic evaluation made it easier for all team members to discuss and determine the most important features to implement, while specifically looking at usability.

Challenges: It was challenging to balance the desire for innovative features with making sure to stay within the realm of feasibility. Also ensuring that all members' ideas were considered equally required careful moderation. Additionally, making sure that we did not give all the features the same heuristic score was difficult since some members believed that some features were more important than others while other team members believed the opposite.

Future Improvements: Next time, we would allocate more time for the brainstorming session to allow for more exploration of each idea. Additionally, having more people or even some potential users for the session would be beneficial. This is because they could provide feedback to the designs in real time and potentially different perspectives which would allow us to refine our concepts. For the heuristics we could try giving a bigger range for scores to make the difference in importance more apparent especially since a lot of the scores ended up being the same.

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