Midterm Presentation

Bouldering Path-Finding

Group Members and Contact Information

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Abstract

This Android app is designed for beginner boulderers to improve their climbing technique. Using the phone's camera, the app scans indoor boulder problems and analyzes the holds using image recognition. It then provides a visual stick-figure representation, demonstrating the optimal route to complete the climb. The app takes into account factors like hold size and distance and utilizes information from the climber to offer personalized guidance. By modeling efficient body movements and recommending energy-saving techniques, the app helps climbers tackle routes up to V3 level, enhancing their skills and making climbing more accessible and enjoyable for newcomers

User Stories

1) As a user, I want to be able to download the app from the Google Play Store so that I can use it.

2) As a user, I want to be able to create an account so that my data persists.

3) As a user, I want to be able to enter my personal information to get tailored solutions.

4) As a user, I want to be able to scan boulder problems so i can get the solutions.

5) As a user, I want to be able to identify hold types for more accurate solutions.

6) As a user, I want to be able to save scanned problems so that i may refer to them in the future.

7) As a user, I want to be able to generate the next best solution if the first one doesn't suit me.
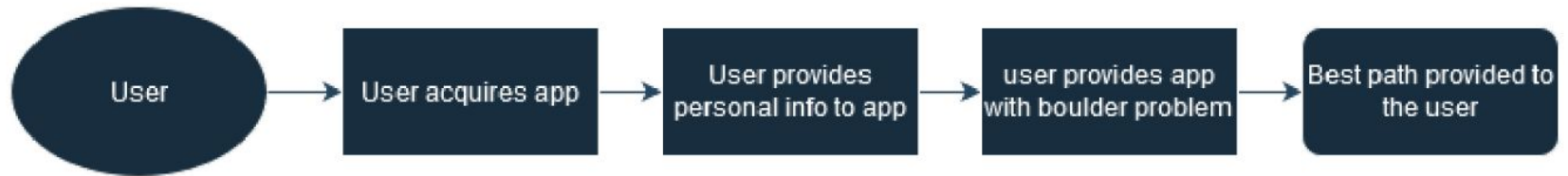
Design Diagram

Design level 1: The user provides the app with a boulder problem and gets an optimal path up the course

User → User provides app with boulder problem → Best path provided to the user
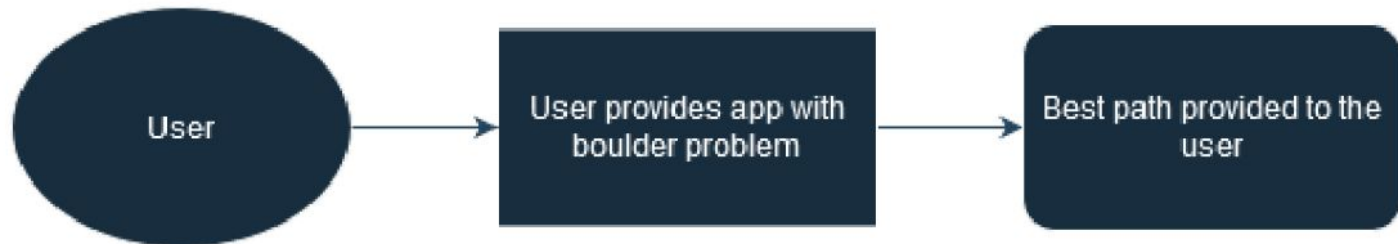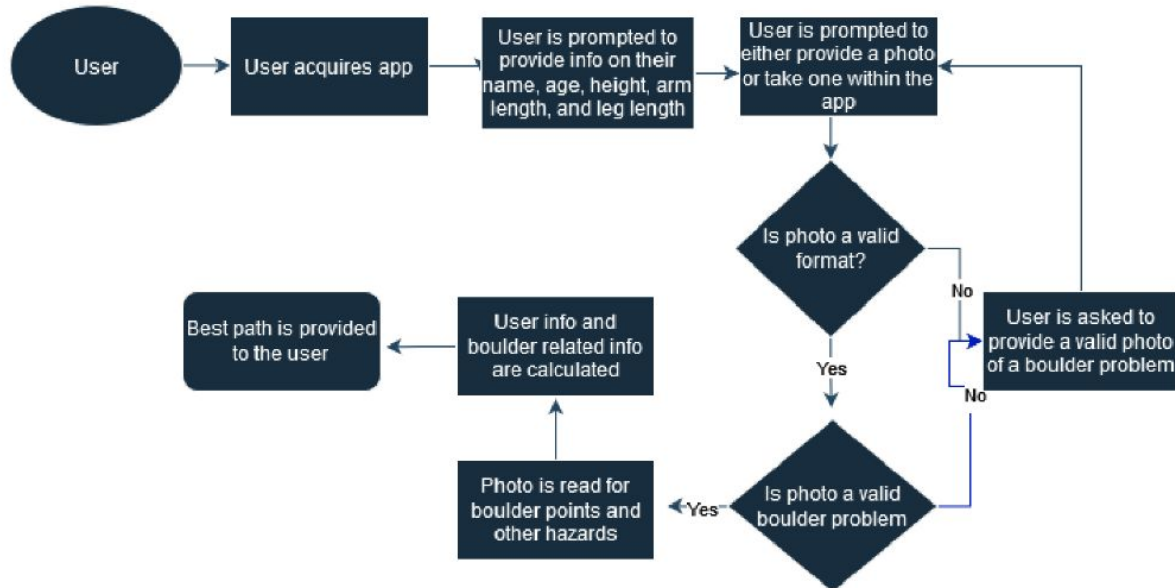
Design Diagram

Design level 2: the user has to acquire the app then provide the app with some personal information to assist in finding the best path up. The user then provides app with a boulder problem and the best path is provided

User → User acquires app → User provides personal info to app → user provides app with boulder problem → Best path provided to the user

Design Diagram

Design level 3: The user must acquire the app on its proper app store (android or ios). The user must then create an account where they can provide info on their height, age, skill level, and limb length. After that the user can provide a picture of the boulder problem either within the app or upload a photo themselves. Once the photo is verified as a proper format, readable quality, and identified as an actual boulder problem the photo is accepted. The app will then use the boulder problem data and user data to provide an optimal path based on their physical features, skill level, and boulder problem provided

User → User acquires app → User is prompted to provide info on their name, age, height, arm length, and leg length → User is prompted to either provide a photo or take one within the app

Is photo a valid format?
No → User is asked to provide a valid photo of a boulder problem
Yes ↓

Is photo a valid boulder problem
No → (back to User is asked to provide a valid photo)
Yes → Photo is read for boulder points and other hazards → User info and boulder related info are calculated → Best path is provided to the user

Major Project Constraints

Economic - Due to financial limitations the team will be relying on freeware or open-source tools for image processing and algorithms. Limited budget removes our ability to use premium libraries.

Diversity and Culture Impact - Since the app aims to offer personalized climbing paths, it must account for diversity in its user base, including different body types, abilities, and preferences.

Complexity - Due to the breadth of bouldering problems and their levels, we have to constrain our intended solution to a certain grade level. In this case we are intending our application to work at lvl v3 and below.

Review of Project Progress

- Identified Android as targeted system
    - Identified how we will store app data
- Identified constraints on supported functionality
    - Limiting solutions to certain grade levels
    - Off-loading some of the image detection to user-input
- Identified how we will visually represent problem solutions
- Developed a workable heuristic to begin testing with
- Created a basic android app to build off of

Expected Accomplishments

Major milestones to accomplish include:

1. environment setup
2. pathfinding algorithm
3. application layout and user interface
4. image processing
5. climbing visualization
6. data management
7. app deployment

We expect to complete the preliminary research and simple prototyping for the first six milestones.

Division of Work

Ethan Reed: Research, Documentation, Coding, Image Processing and Detection

Tristan Pommering: Research, Application Development

Bridget Hoernschemeyer: Research, Data Management, Movement Visualization

Oankar S Ghorpade: Research and Application Development

Expected Demo at Expo

Expected Demo at the Expo will be in the form of a video. This will show one of the team members scanning a route and being provided with a solution. This would then be followed by that team member, demonstrating the generated path is admissible. We could also show multiple team members scanning the same problem and getting different personalized solutions.