

# Bomber

The Smart Ski Goggle for the Novice Skier

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MADELINE KING

PROJECT 1

DESIGN AND PROTOTYPE, FALL 2021

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# Problem Statement

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How might we help novice skiers gather information necessary for a safe descent by being informed of suggested routes, inclement weather, their speed, and avalanche risk via smart goggles?



# The Pitch

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On one hand, skiing is one of the most popular winter sports, and research shows people are satisfied when they engage in skiing. On the other, it is a high-risk sport, and there are half a million injuries per year. Most of these injuries occur in novice skiers.

Bomber, an AI-driven smart ski goggle, helps novice skiers descend the mountain safely with a series of recommendations: routes that avoid icy trails, for users to manage their speed, and for users to descend the mountain based on avalanche risk and inclement weather. Bomber facilitates a hands-free system that is a natural add-on to gear skiers already wear, so that they continue to feel comfortable and agile during descent.

# Behaviors and Motives

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- ✓ Downhill skiing represents one of the most popular winter sports worldwide.
  - ✓ 2,000 downhill ski areas
  - ✓ 67 countries
  - ✓ 400 million skier days annually
- ✓ Skiing is associated with pleasure, ultimately leading to a feeling of satisfaction in participants.
  - ✓ The visual stimulus of nature itself elicits positive affective responses.
- ✓ Skiers feel motivated to engage in skiing to experience pleasure, freedom, nature, challenge, balance, and social interactions.
- ✓ Skiers traditionally use folded paper maps or board-mounted larger scale maps near ski lifts to aid in decision-making: which slope to take next, where to have lunch, etc.
  - ✓ Such maps do not support the sharing of customized content.

# Injury and Risk

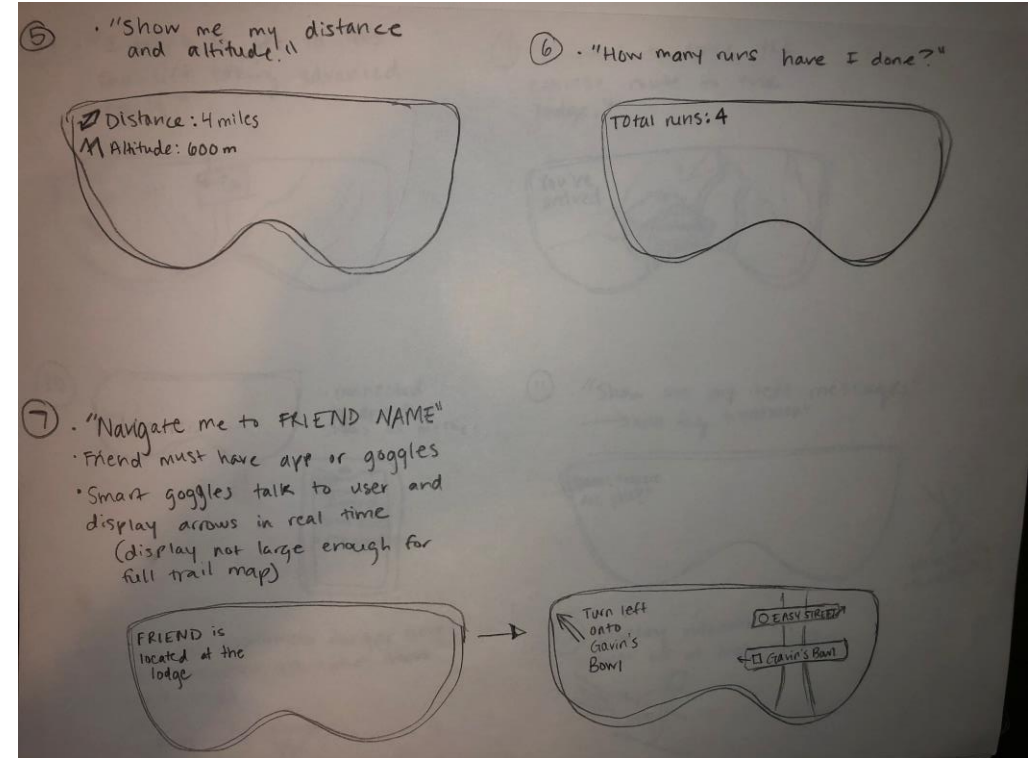
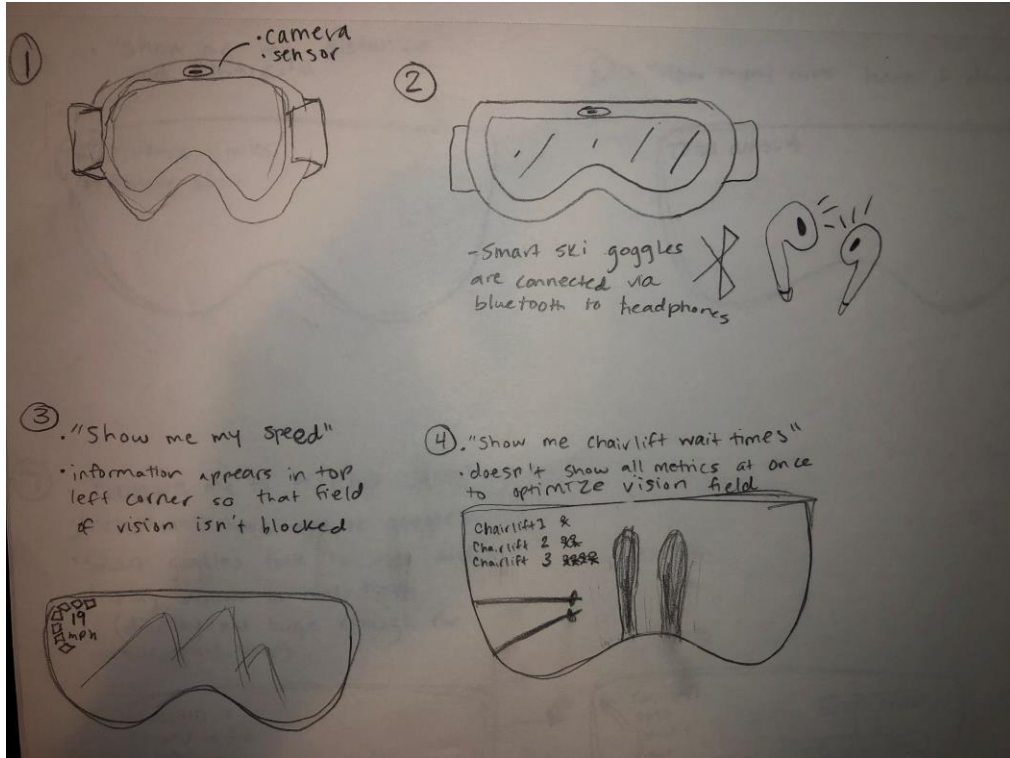
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- ✓ In the U.S., there are over 500,000 ski related injuries per year.
  - ✓ Cranial trauma is responsible for up to 54% of total hospital injuries.
- ✓ Collisions and falls constitute a significant portion of injuries (up to 76% of trauma).
  - ✓ Injuries are commonly associated with excessive speed, adverse slope conditions, and overconfidence.
- ✓ Ski level is the primary impetus in minimizing ski injuries.
  - ✓ 83% of low extremity injuries were of skiers who had been skiing a week or less.
- ✓ Novice skiers assess terrain for avalanches less complexly than experts
  - ✓ Novice skiers weigh information in the avalanche forecast differently and use different strategies to gather information about the snowpack on a trip
  - ✓ Expertise is important for making the best possible risk assessment in avalanche terrain.

# Wearables

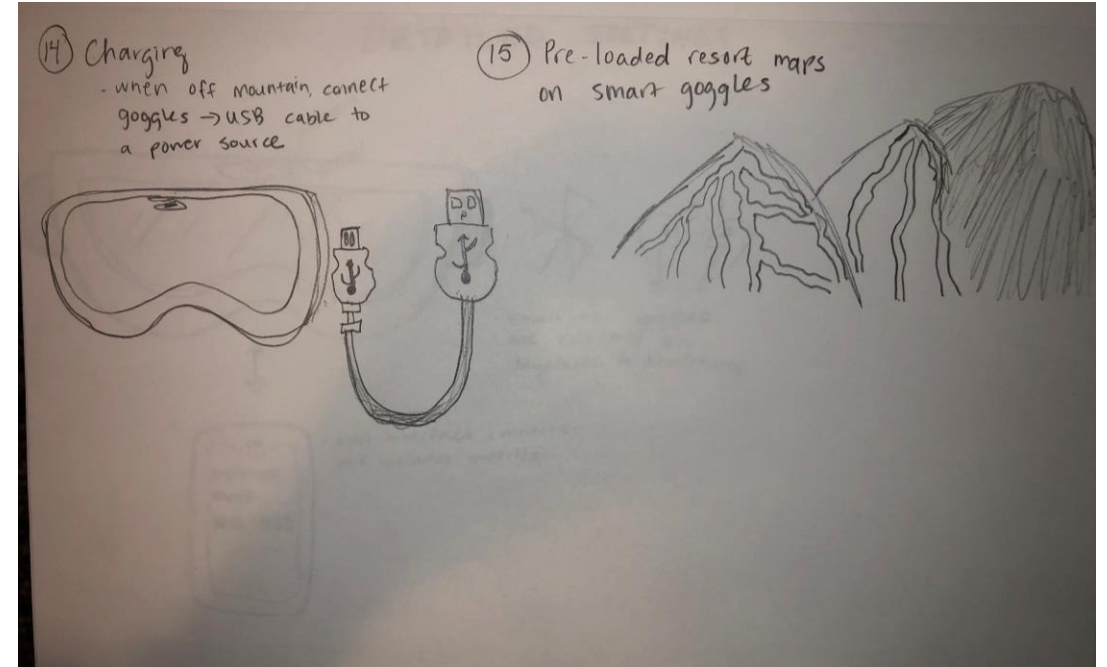
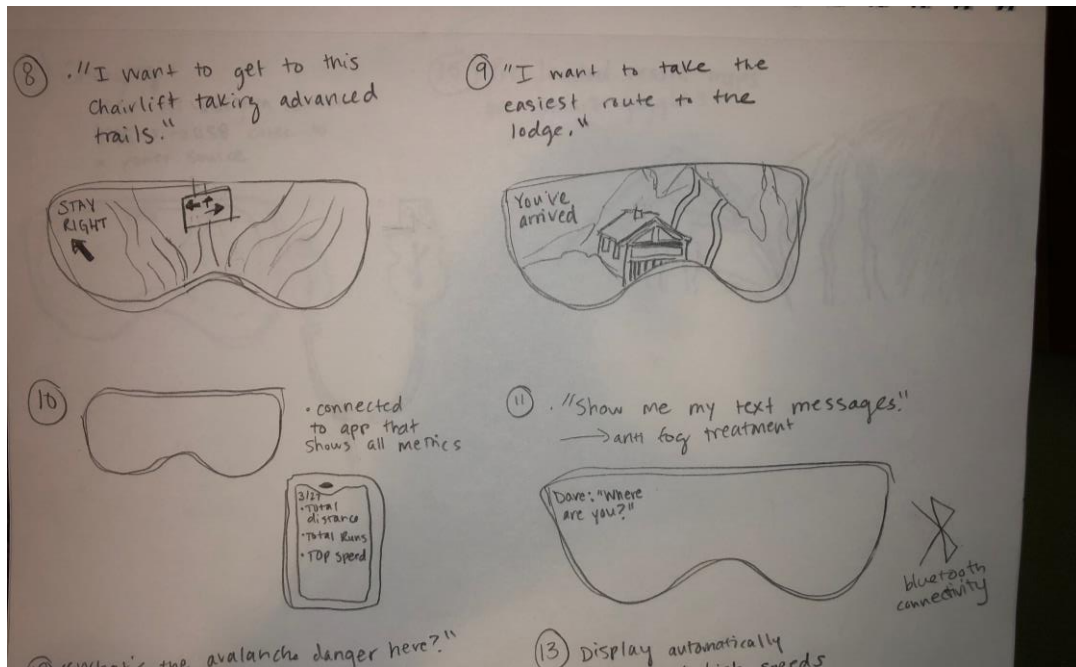
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- ✓ Wearable devices should be nonintrusive and allow athletes to move in unconstrained, natural manner
  - ✓ Ski goggles are already part of a ski “uniform.” Adding AI to them allows skiers to move in a natural manner that doesn’t disrupt their comfort or agility, which is crucial for such a high-risk, high-speed sport.
- ✓ Smart glasses-based information systems can support tasks which require high attention, like skiing, by presenting relevant information into the user’s field of view.
  - ✓ Smart goggles facilitate a hands-free navigation and less distraction.

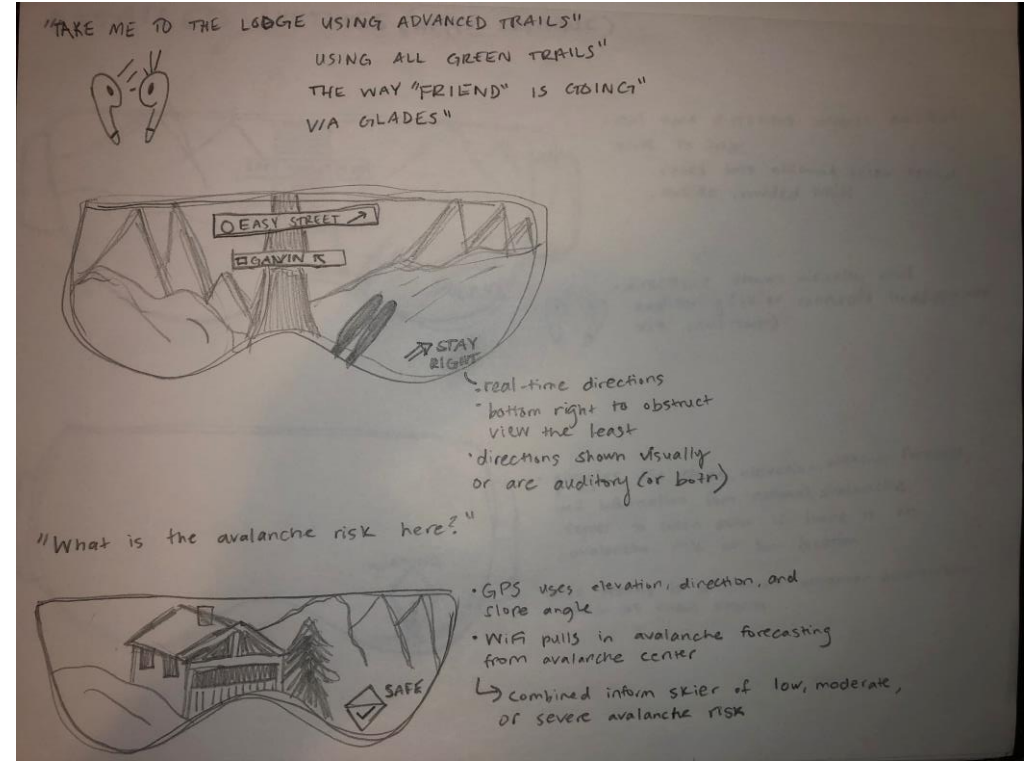
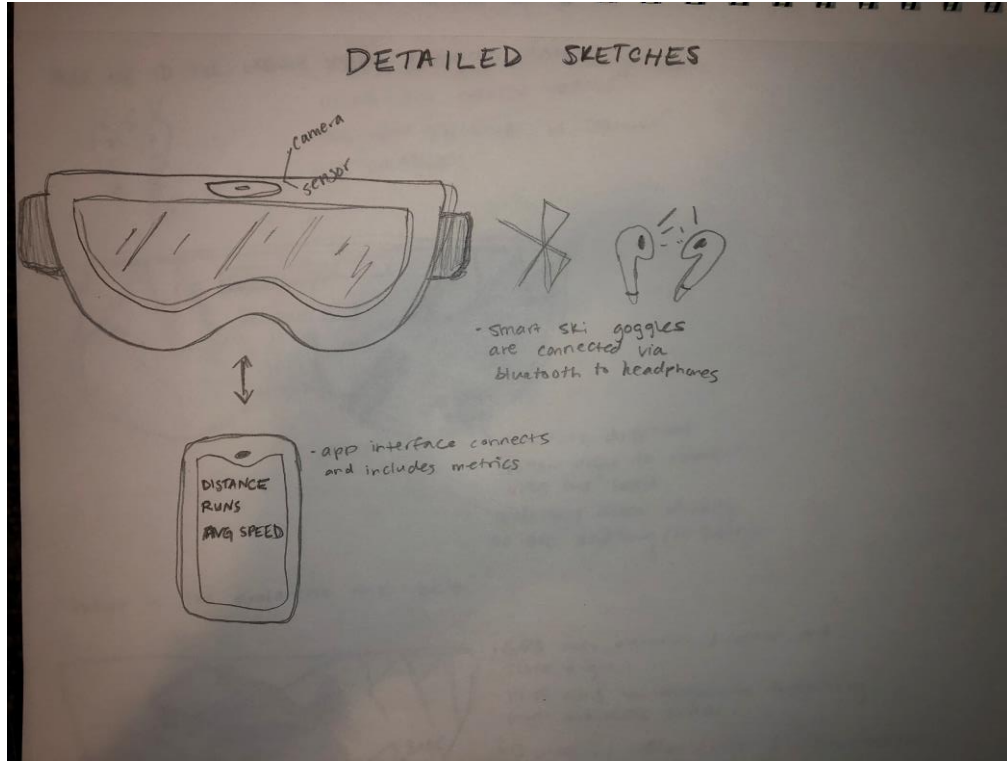


# Sketches

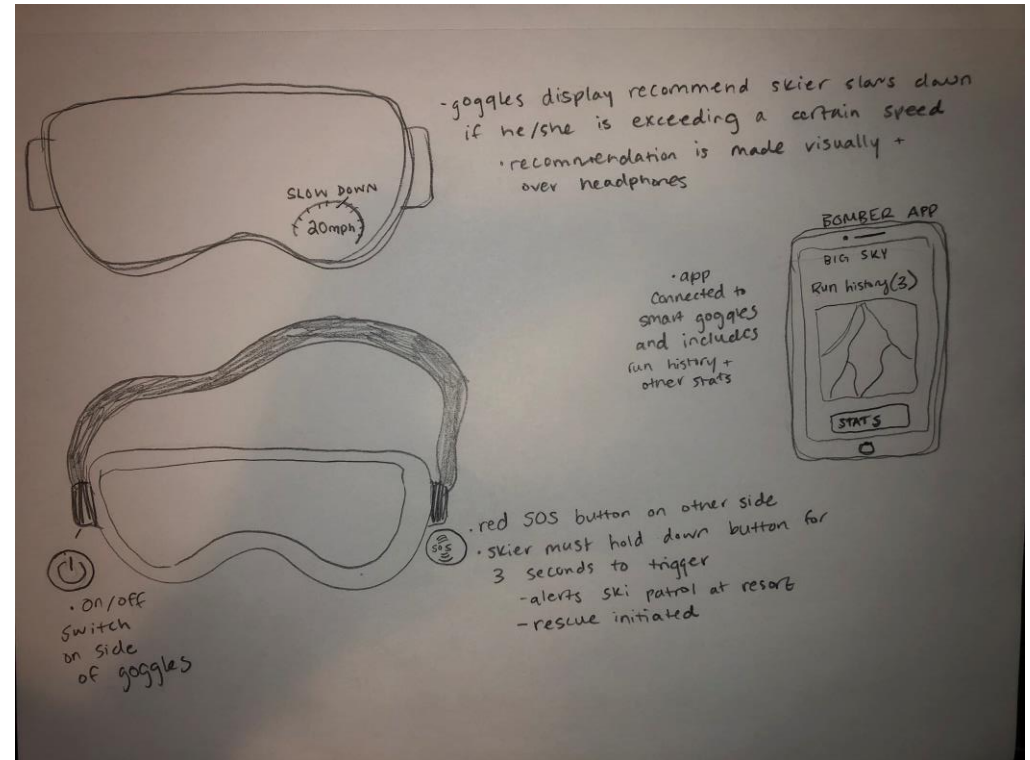
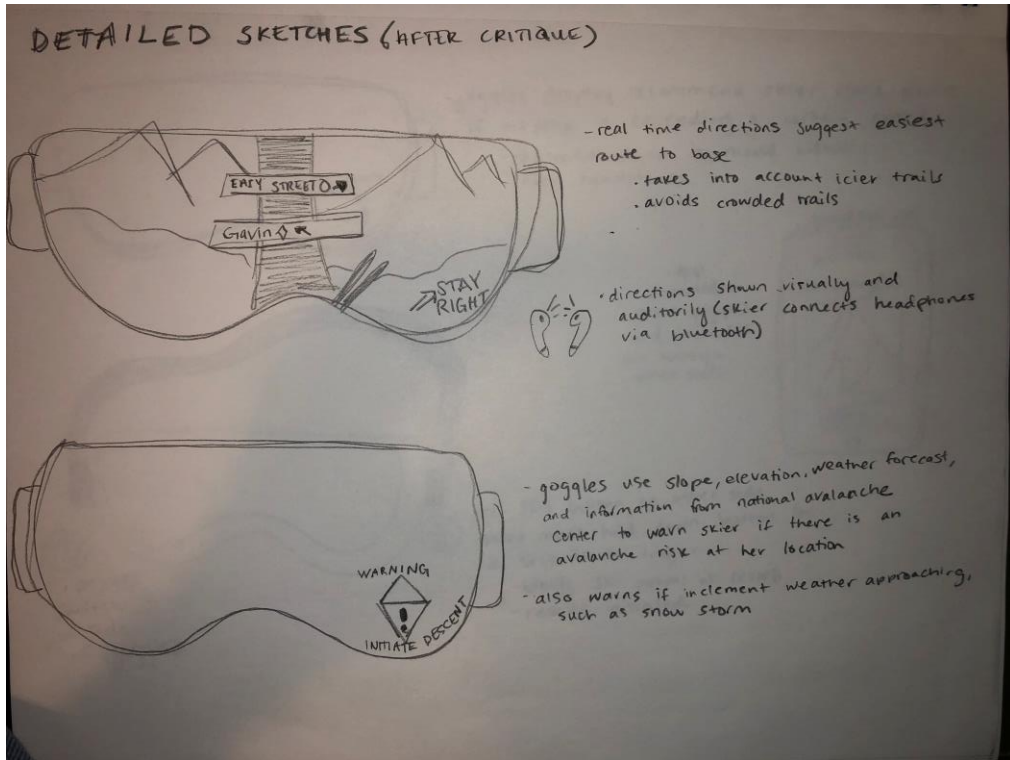




# Sketches



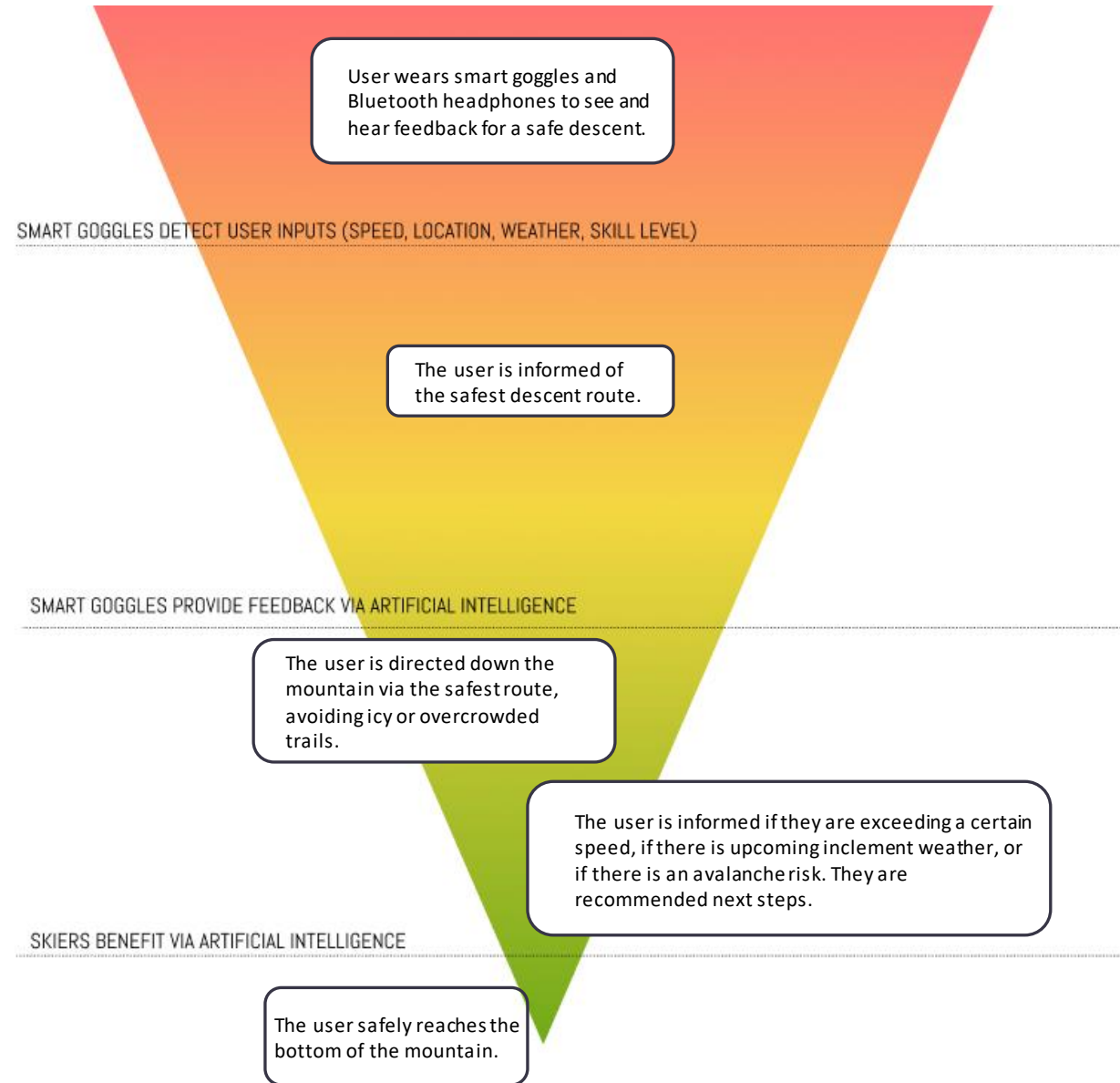
# Detailed Sketches



# Detailed Sketches

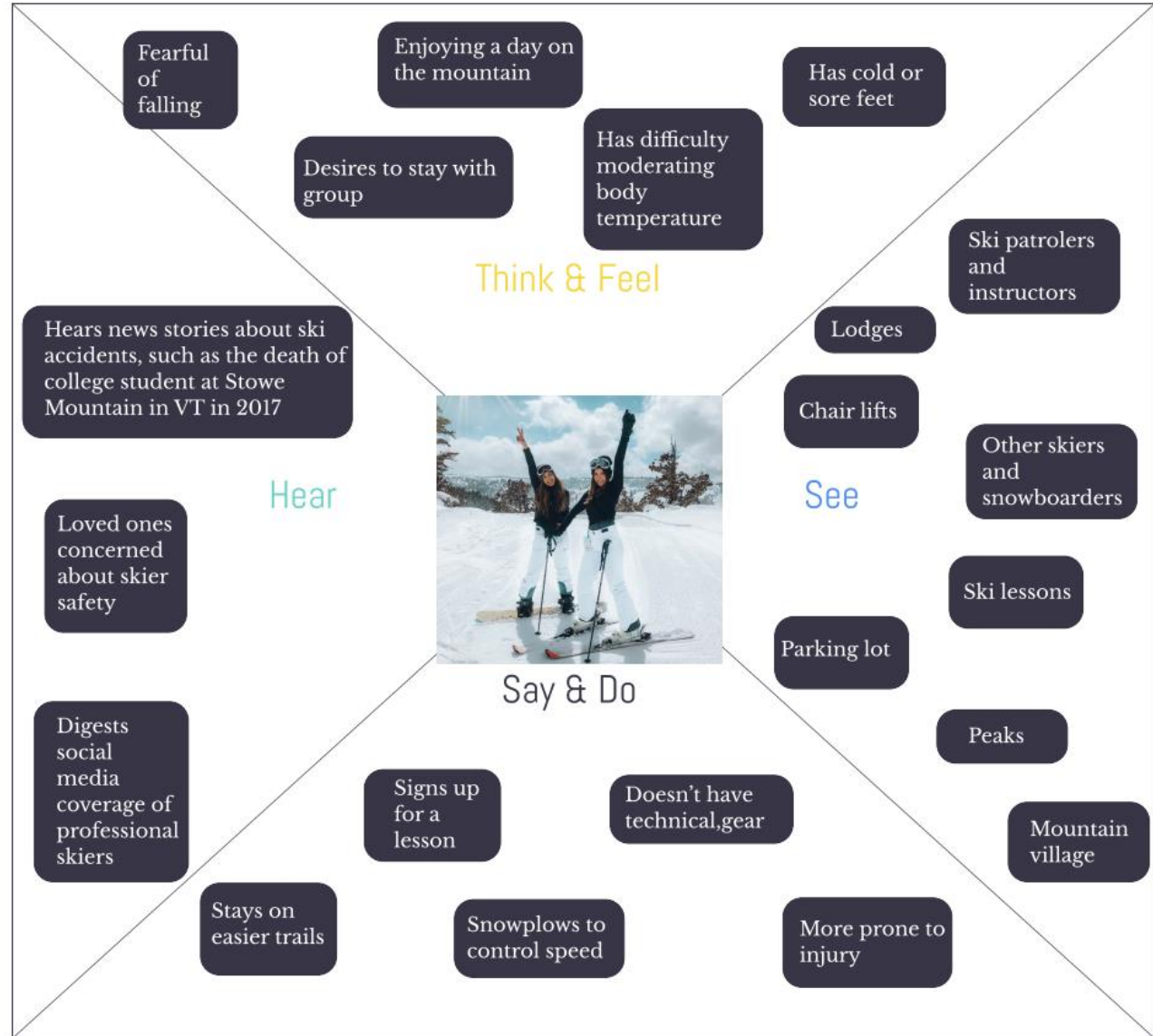
# Idea Filter Creative Matrix

Filtering ideas down the idea filter to test their validity as potential solutions.



# User Empathy Map

Ashley, a novice skier with very little technical skill, is enjoying a Saturday alpine skiing on groomed trails at a resort in Montana. She is not familiar with the trails, and she is doing her best to make it down the mountain without hurting herself. Ashley is skiing to be out in nature and to enjoy herself on her weekend off.





# Pains & Gains

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## Pains

- ✓ Frustrated learning new technique and skill
- ✓ Has difficulty navigating unfamiliar trails and terrain
- ✓ Has senses that are acclimating
- ✓ Fears falling and getting injured

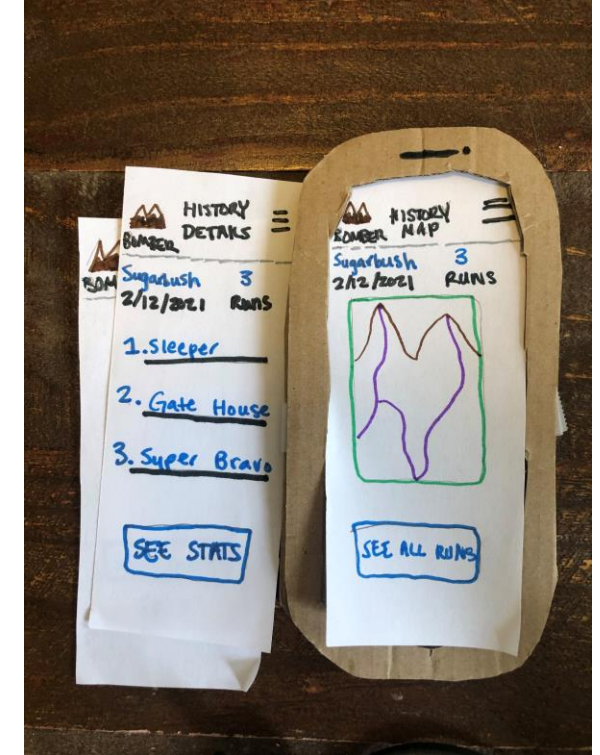
## Gains

- ✓ Desires to stay with group
- ✓ Measures success by not getting hurt
- ✓ Desires comfort and agility
- ✓ Desires to spend time on the mountain
- ✓ Excited to learn a new skill
- ✓ Wants to feel in control
- ✓ Wants to have fun

# Jobs-To-Be-Done

User Goal: Descend the mountain safely





# Rough and Ready Prototype

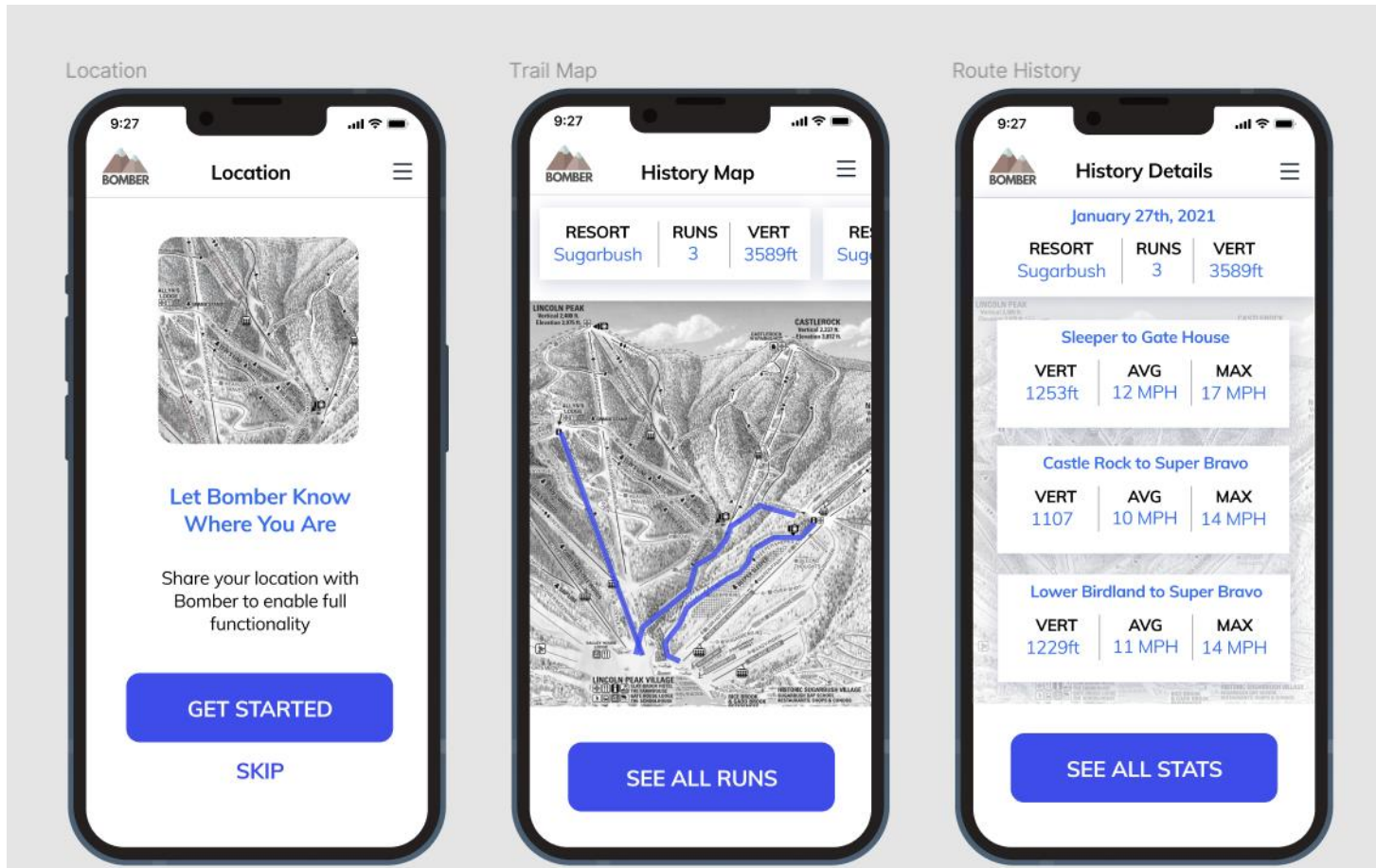




# Wizard of Oz Video

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YOUTUBE [LINK](#)



# Digital UI: Bomber App Screens

The Bomber app is the companion mobile app of the smart goggles. The user can refer to the app to see their route history on a given day and their stats, such as total distance, total runs, and maximum speed.

# Digital UI: State of Goggles

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Information is displayed in the top right corner of the goggle display to minimize disruption of the user's field of view.

# Secondary Research Citations

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