THEIA

Indoor Navigation for Visually Impaired Users

Team LagZilla

Ross Kugler, Huy (Harry) Ky, Dylan Gyori, Nickolas Sturgeon,
Benjamin Bordon, Camille Orego

Phase 1 Presentation

Scenario 1
Indoor Navigation

AS - IS

Stevie is trying to go to his next classroom.

He knows he needs to walk ahead a few steps and then turn left around the corner.

However, he is not sure when to turn. He took a guess, but turned too early, hit the wall and hurt his head.

Scenario 1
Indoor Navigation

TO - BE

The THEIA app asks Stevie to give his current location and the destination.

The app calculates the route from the current location to the destination.

THEIA tells Stevie, "Walk ahead 10 steps, then turn left."

Using THEIA, Stevie successfully makes it to his destination without hurting himself.

Scenario 2

Caretaker Configuration: Planning A Path

AS - IS

Maria (caretaker) wants to help her son Stevie become more independent in navigating around campus.

She tries using standard navigation apps like Google Maps to plan his routes, but these apps aren't designed for blind users.
The interface is primarily visual, the audio guidance doesn't give enough detail ("turn left" without saying when or how many steps), and there's no way for her to customize settings for his specific needs like preferring step counts over distances or avoiding stairs. She can't save his frequent destinations in a way that's easy for him to access without reading a screen.

Stevie remains dependent on Maria walking routes with him first or relying on memorization.

Scenario 2

Caretaker Configuration: Planning A Path

TO - BE

Maria opens THEIA on Stevie's phone and accesses caretaker mode.

She configures the app settings based on Stevie's needs: sets audio guidance to use step-based instructions (since Stevie prefers counting steps), adjusts voice volume to a comfortable level, enables route preferences to avoid stairs when possible, and sets up his emergency contacts (herself as primary, his roommate as secondary). She also inputs his frequent destinations (two classroom buildings, the library, the dining hall) so Stevie can quickly select them.

When Stevie uses THEIA, the app is already customized to work the way he needs it to.

Scenario 3

Emergency Response & Services

AS - IS

Stevie is walking to his next class when he trips and falls.

His phone flies out of his hand and lands several feet away. He is disoriented and hurt but doesn't know where his phone is to call for help. He tries calling out but there's no one in the hallway. He has no way to contact his caretaker or emergency services.

Meanwhile, campus police receive a 911 call from someone who heard a cry for help, but they only have a general campus location from cell tower triangulation. The campus has 5 large buildings in that area, and officers must search multiple buildings and floors, losing critical response time.

No one knows Stevie's exact location, and he remains unable to get help for a long period of time.

Scenario 3

Emergency Response & Services

TO - BE

Stevie falls and his phone flies away. THEIA's fall detection using the phone's internal gyroscope activates:

After 10 seconds with no movement, THEIA provides an audio prompt: "Do you want me to notify emergency contact(s)?"
Stevie replies "NO": emergency alert cancel.
Stevie replies "YES" or the app receive no response for 5 seconds: THEIA notify Stevie's emergency contacts with his precise location ("Engineering Building, Floor 2, near Room 215"). THEIA required caretakers/emergency contacts confirmation. If no confirmation received, THEIA will notify emergency service (911)
Emergency responders receive exact location and can dispatch directly to the right building and floor, reducing response time to under 5 minutes.

Priority Scenario

Scenario 3: Emergency Response & Services

Why This Is Our Priority

- Critical safety feature (life-threatening situation)
- Involves multiple stakeholders (user, caretaker, emergency responders)
- Demonstrates distinct functionality beyond navigation
- Life-saving capability

Priority Scenario

Scenario 3: Emergency Response & Services

Analysis: What-If & What-kinds-of Questions

What-If Questions:

Q: What if fall detection triggers accidentally?
A: User can reply “NO” to the audio prompt trigger: “Do you need help?”

Q: What if phone is out of reach and user can't hear beep?
A: The emergency contact will be notified after the response time allocation has passed.

What-kinds-of Questions:

Q: What kinds of falls trigger detection?
A: Impact and stillness detection, configurable sensitivity (low/medium/high)

Q: What kinds of notifications?
A: Call and texts to the emergency contact, 911 call if user confirms they can’t move.

Priority Scenario

Scenario 3: Emergency Response & Services

Analysis: Who & When Questions

Who Questions:

Q: Who detects the fall?
A: Phone sensors (accelerometer and gyroscope)

Q: Who gets notified in what order?
A: 911 first if user is unresponsive or confirms they cannot move, followed by the caretaker.

When Questions:

Q: When should 911 be called?
A: If the user confirms they are not ok or are unresponsive, 911 is called automatically first.

Priority Scenario

Scenario 3: Emergency Response & Services

Analysis: How-To Questions

How-To Questions:

Q: How to locate phone when out of reach?
A: Loud beep with increasing volume and vibration.

Q: How to obtain accurate indoor location?
A: Cached navigation position, Wi-Fi/Bluetooth beacons, and building floor plan data.

Priority Scenario

Scenario 3: Emergency Response & Services

Advantages of THEIA

Intelligent route planning and turn-by-turn guidance

Works in unfamiliar buildings immediately

Emergency services (fall detection, location sharing)

Low cost (~app only vs. $40k-60k for guide dog)

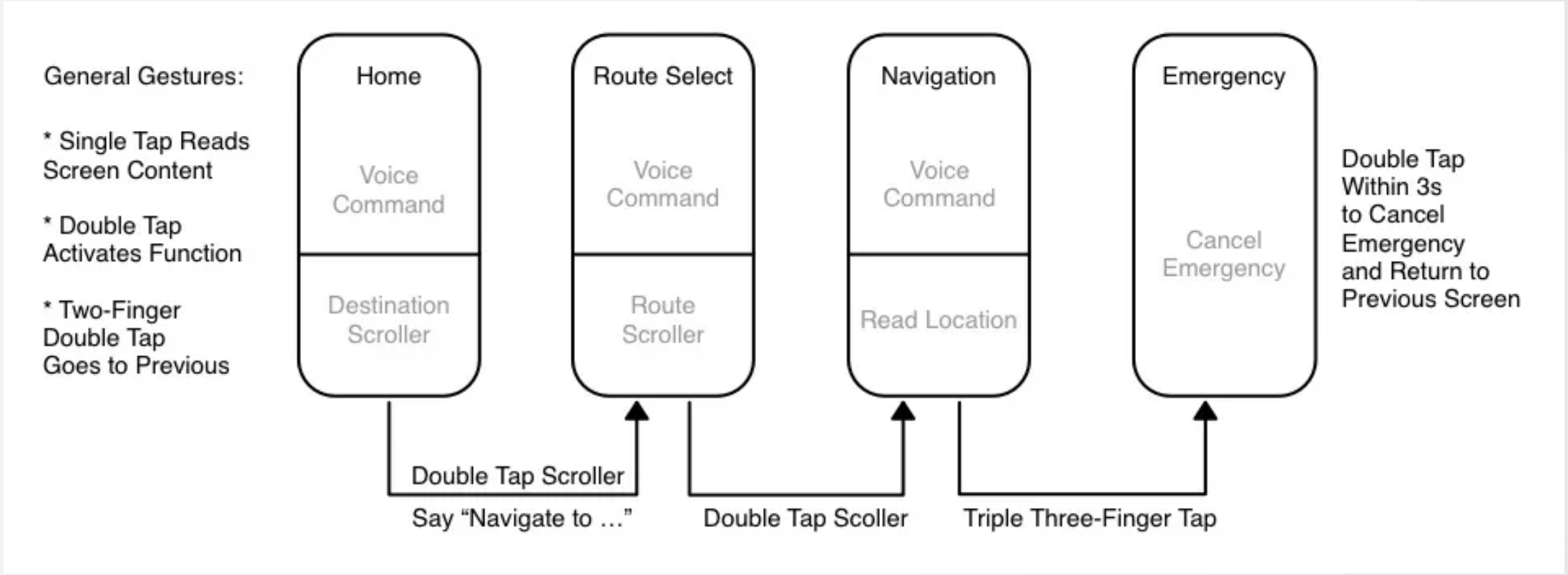
Customizable and updates dynamically

No extensive training period required outside of familiarity learning

Current Presenter: Camille Orego

Prototype

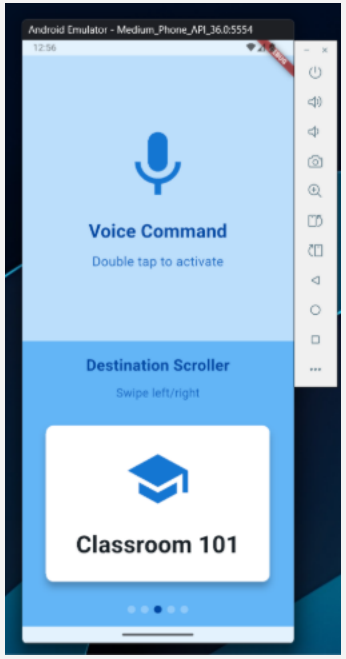
User Manual Mock-Up

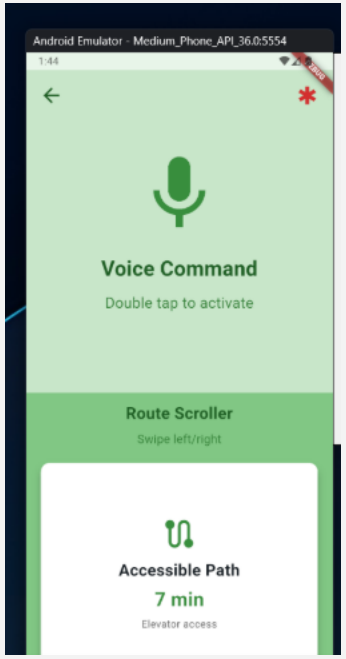


Current Presenter: Dylan Gyori

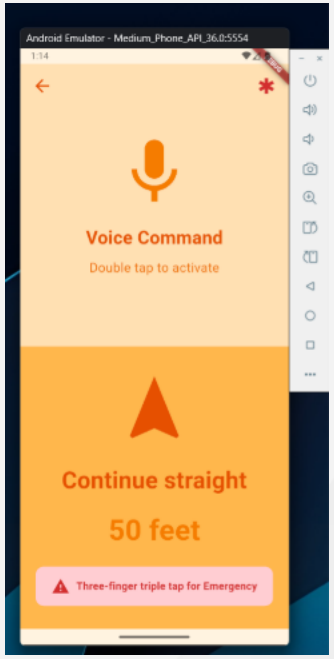
Prototype

UI Mock-Up

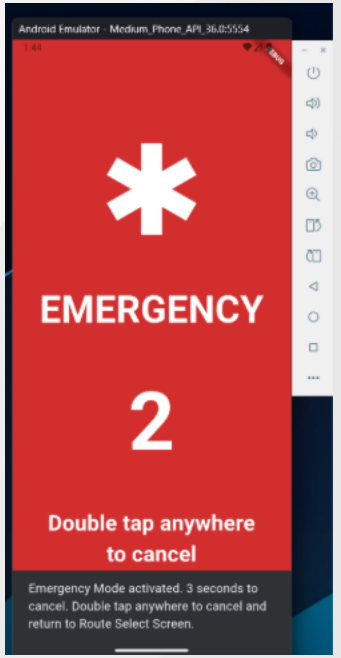




Route Selection



Navigation Screen



Emergency

Current Presenter: Huy (Harry) Ky

Comparison Tables

User + Tools

Capability Expansion/Reduction

Capability	Cane	Guide Dog	Stevie	THEIA	Stevie + Cane	Stevie + Dog	Stevie + Cane + Dog	Stevie + Dog + THEIA	Stevie + Cane + THEIA
See	✗	✓	✗	✓	✗✗	✓	✓✓	✓✓✓	✓✓
Feel	✓	✓	✓	✗	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓
Hear	✗	✓	✓	✓	✓	✓✓	✓✓	✓✓✓	✓✓
Talk	✗	✓ (Bark)	✓	✓	✓	✓✓	✓✓	✓✓✓	✓✓
Think	✗	✓ (Dog Brain)	✓	✓	✓	✓✓	✓✓	✓✓✓	✓✓
Smell	✗	✓	✓	✗	✓	✓✓	✓✓	✓✓✓	✓✓

Comparison Tables

Tools

Capability Expansion/Reduction

Capability	Cane	Guide Dog	THEIA	Cane + Guide Dog	Cane + THEIA	Guide Dog + THEIA
See	✗	✓	✓	✓	✓	✓✓
Feel	✓	✓	✗	✓✓	✓	✓
Hear	✗	✓	✓	✓	✓	✓✓
Talk	✗	✓ (Bark)	✓	✓ (Bark)	✓	✓✓
Think	✗	✓ (Dog Brain)	✓	✓ (Dog Brain)	✓	✓✓
Smell	✗	✓	✗	✓	✗✗	✓

Thank You!

Team LagZilla

THEIA

Indoor Navigation for Visually Impaired Users

Phase 1 Presentation