# Project Progress

Group B23 | Accessible Automatic Buttons

# Overview

Context

Concepts

New concept

Future steps

# Setting standards

Customer Needs | Metrics | Benchmarking | Target Specifications

# Problem Statement

People with low-visibility require a wearable device that will help locate and press buttons remotely to prevent risks with touching public spaces.

# Customer Needs

| # | Need | Importance |
|---|------|------------|
| 1 | Is usable with one hand | 5 |
| 2 | Can be used without having to pull out phone | 4 |
| 3 | Can be used while wearing gloves | 4 |
| 4 | Provides notifications by vibration or audio cues | 5 |
| 5 | Allows pre-mapping of routes | 2 |
| 6 | Can be integrated with smart devices | 4 |
| 7 | Is affordable for everyone | 5 |
| 8 | Is easy to learn to use | 5 |

**Legend**

5 - Satisfying the need is critical

4 - Satisfying the need is highly desirable

3 - Satisfying the need would be nice, but is not necessary

2 - Satisfying the need is not important

1- Satisfying the need is undesirable

# Customer Needs

| # | Need | Importance |
|---|------|------------|
| 9 | Is affordable to replace if damaged or worn out | 3 |
| 10 | Eliminates the need to touch surfaces to locate objects | 5 |
| 11 | Resistant to damage from accidental dropping | 2 |
| 12 | Can press buttons remotely (ex/ Doors, Crosswalk) | 5 |
| 13 | Is resistant to cold temperatures so it's functional in the winter environment | 3 |
| 14 | Functions as normal in rain | 3 |
| 15 | Is a wearable device | 5 |
| 16 | Targets a range of people with disabilities | 2 |

# Core customer needs

| Usable with 1 hand | Notifies audibly or by vibration | Eliminates need to touch surfaces | Presses buttons remotely | Is a wearable device |

# Metrics

| Metric Number | Need Number | Metric | Importance | Units |
|---|---|---|---|---|
| 1 | 7, 9 | Cost | 3 | $ |
| 2 | 10, 12 | Presses buttons remotely | 5 | Y/N(Range(cm/m)) |
| 3 | 1, 2, 3, 8, 16 | Usability(1 handed, with gloves) | 4 | Y/N |
| 4 | 2, 6 | Phone integration | 4 | Y/N(# ofPlatforms) |
| 5 | 4 | Notifies user to problem | 5 | Y/N(time delay) |
| 6 | 9, 11, 13, 14 | Size and Weight(Durability) | 3 | List, lbs, pA, etc. |
| 7 | 5 | Route planning feature | 2 | Y/N |
| 8 | 15 | Wearability | 4 | Y/N(comfort) |
| 9 | 14 | Waterproofing | 3 | Y/N |

# Benchmarking

| Metric# | Key2Access | US Department of Transport. | Portal Entryways | Disability Systems | Camden |
|---|---|---|---|---|---|
| 1 | Free (app) ? (fob) | ? | $400-$600 (installation/ door) | $278 (per unit) | $240 (per unit) |
| 2 | Y | Y | Y | N | N |
| 3 | Y | Y | Y | Y | Y |
| 4 | Y | Y | Y | N | N |
| 5 | Y | Y | N | N | N |
| 6 | Similar to a car fob | App *Dependant on phone* | App + Unit on wall *Dependant on phone* | 4.538 x 4.538 x 0.675 in Recommended for interior use | 4 x 1 x 1.5 in 0.4lbs |
| 7 | N *Partnership with GPS-app* | Y *Has GPS* | N | N | N |
| 8 | Y | N | N | N | N |
| 9 | ? Probably | N/A | N/A | N/A | N/A |

# Customer Needs

| # | Metric | Units | Ideal Value | Marginal Accepted |
|---|--------|-------|-------------|-------------------|
| 1 | Cost | $ | $\leq 50$ | $\leq 100$ |
| 2 | Presses buttons remotely | Y/N | Y | Y |
| 3 | Usability (1 handed, with gloves) | Y/N | Y | Y |
| 4 | Phone integration | Y/N | Y | Y |
| 5 | Notifies user to problem | Y/N | Y | Y |
| 6 | Size and Weight (Durability) | millimeters (mm), grams (g) | weight $\leq 0.15g$ *Size and weight dependant on design.* | $0.2g \leq$ weight $\leq 0.5g$ *Size and weight dependant on design.* |
| 7 | Route planning feature | Y/N | Y | N |
| 8 | Wearability | Y/N | Y | Preferable |
| 9 | Waterproofing | Y/N | Y | N |

# Remote option

◇ Press remotely
◇ Device + Phone
◇ No need to touch
◇ Permission issues

# Guidance option

◇  Hardware + software
◇  Hardware indicates direction of button
◇  Software finds button

# Decision Matrix

| Decision Matrix | Designs | |
|---|---|---|
| Design Criteria | Reference (Key2Acces) | Combined design |
| Cost | N/A | N/A |
| Presses buttons remotely | + | + |
| Usability | + | + |
| Phone integration | - | + |
| Notifies user to problem | + | + |
| Size and Weight | N/A | N/A |
| Route planning feature | - | - |
| Wearability | - | + |
| Waterproofing | N/A | N/A |
| Total Score | 0 | 4 |

# Final Design

- App
- Audio notifications
- Bluetooth connection
- Automatically presses button with a sensor system
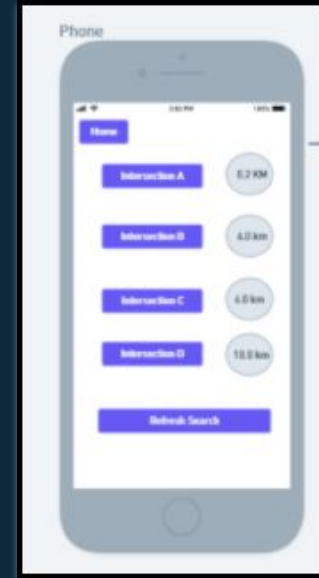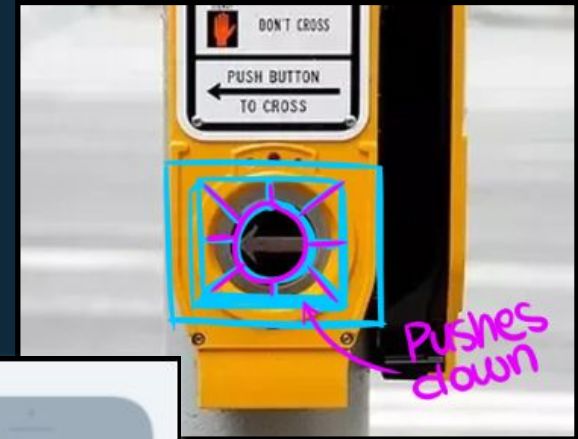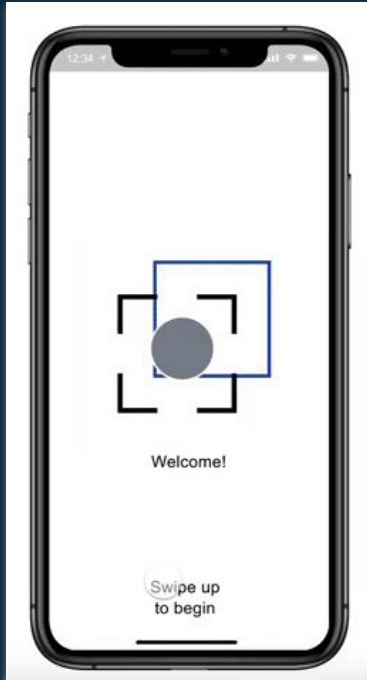
# Functional Decomposition
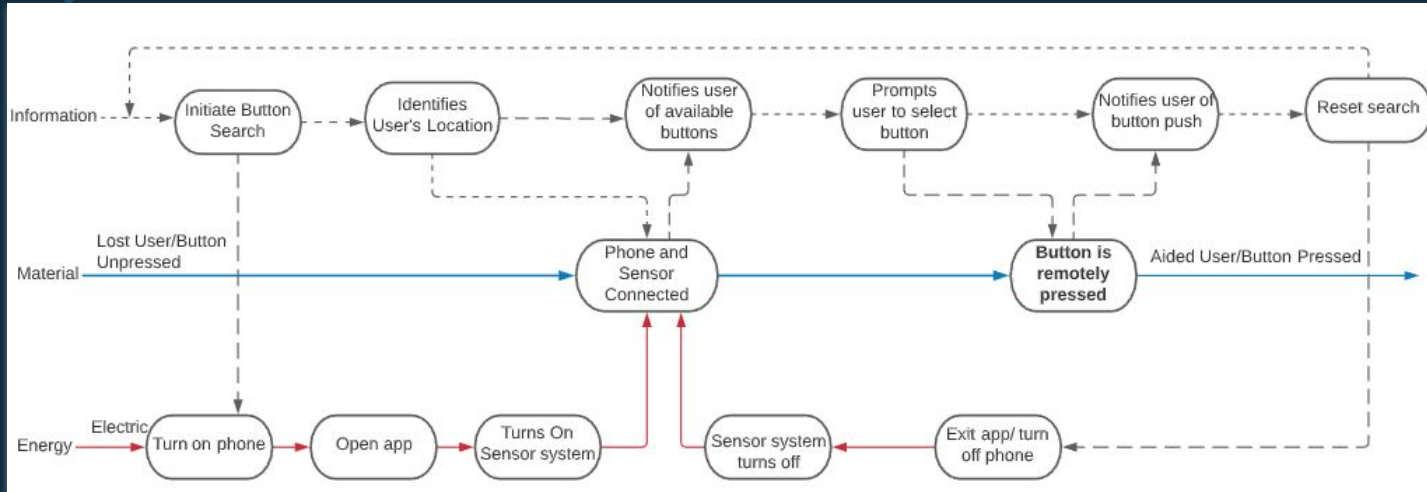
# New Concept

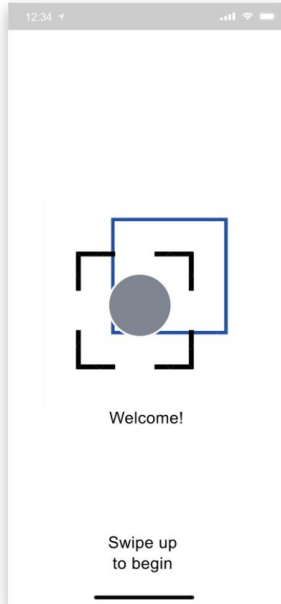Current concept | Wireframe | User flow chart
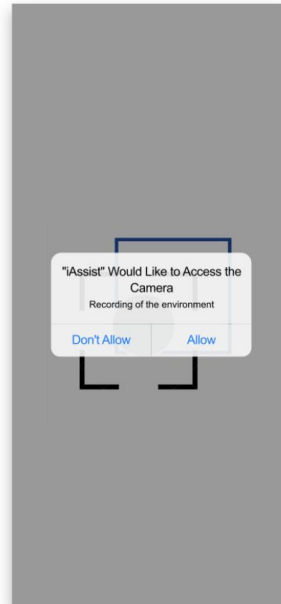
# Current Concept



An app that locates the general vicinity of elevator buttons using object tracking technology.
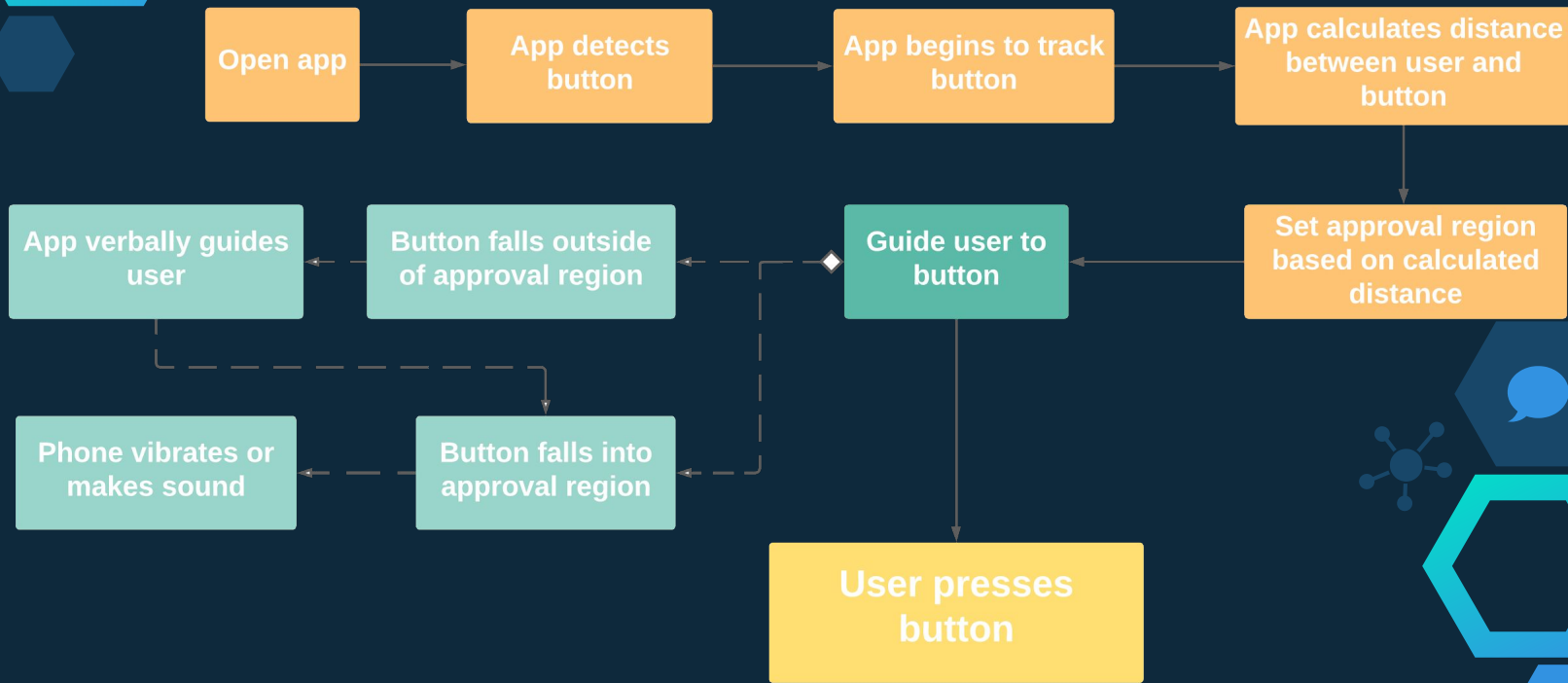
# Wireframe



MainView

Access

CameraView

CameraView_Load

# Updated User Flow Chart

```
Open app → App detects button → App begins to track button → App calculates distance between user and button
                                                                                              ↓
App verbally guides user ← Button falls outside of approval region ← ◇ ← Guide user to button ← Set approval region based on calculated distance
        ↓                                                              ↑                ↓
Phone vibrates or makes sound ← Button falls into approval region ←────┘         User presses button
```

# New Metrics

| # | Need # | Metric | Importance | Units |
|---|--------|--------|------------|-------|
| 1 | 7, 9 | Cost | 3 | $ |
| 2 | 1, 2, 3, 8, 16 | Usability | 4 | 1- Very user friendly<br>2- Moderately user friendly<br>3-Not user friendly |
| 3 | 2, 6 | Phone integration | 4 | # of platforms |
| 4 | 4 | Time to notify user | 5 | Time delay (s) |
| 5 | 4 | # of notification systems | 5 | # of ways to notify |
| 6 | 5 | Route planning feature | 2 | Y/N |

# New Target Specifications

| Target specification | Unit | Expected (marginal) |
|---|---|---|
| Cost | $ | ≤ 100 |
| Usability | 1- Very user friendly<br>2- Moderately user friendly<br>3-Not user friendly | 1 |
| Phone integration | # of platforms | 1 |
| Time to notify user | Time delay (ms) | ≤ 15s |
| # of notification systems | # of ways to notify | ≥ 1 |
| Route planning feature | Y/N | N |

# Future steps

| Designing the app | Coding the software | Training the image recognition software | Testing |
|---|---|---|---|

Questions?