SEARCH: Smart Electronic Assistance and Retrieval Companion for Home

Joe & Sons, Inc.

Joseph Yu, Tarun Eswar, Charles Tang, Nevin Thinagar

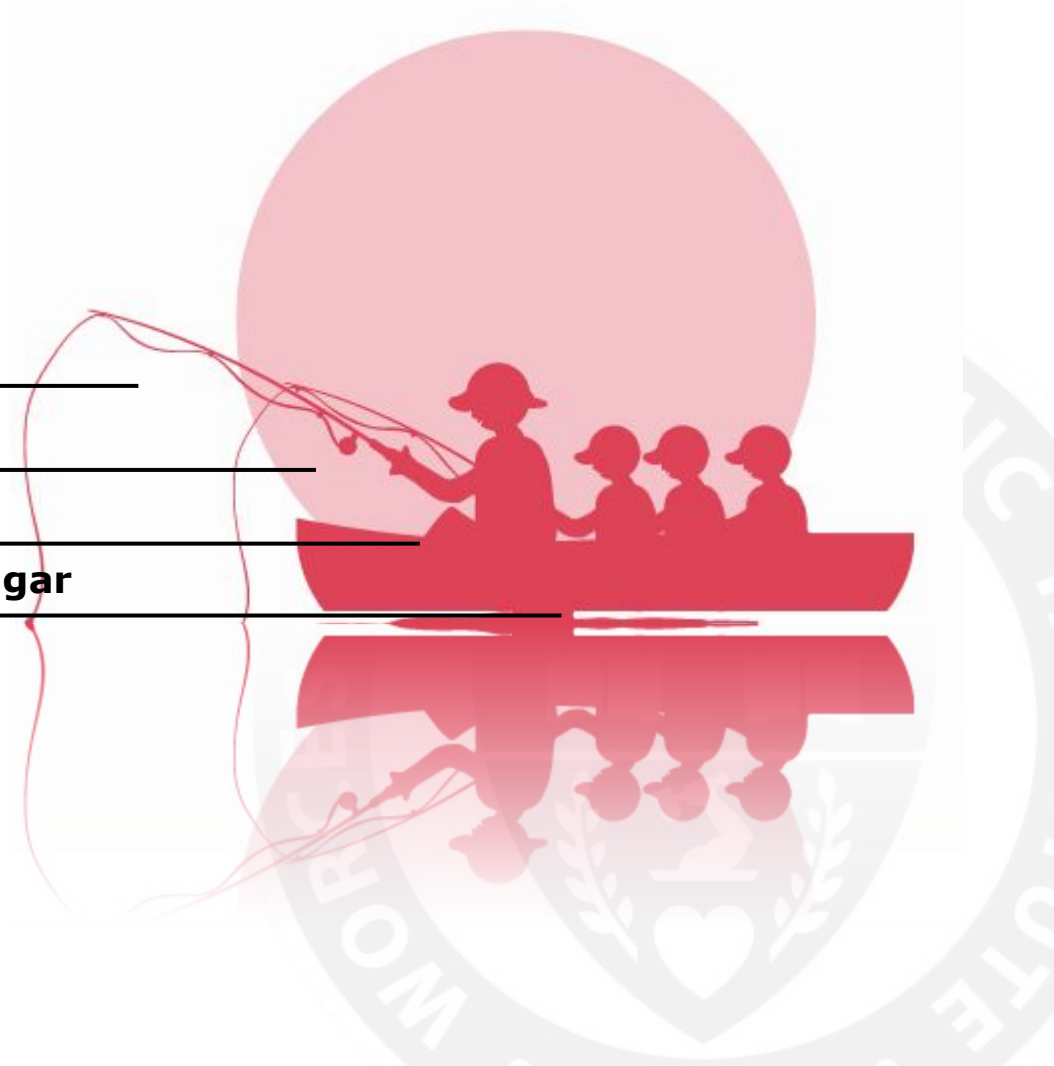*The son never sets on Joe's empire*

Our Team

Joseph Yu

Tarun Eswar

Charles Tang

Nevin Thinagar

Overview of Project

- Elderly independence — higher quality of life

- By 2030, ⅙ of population will be >60 years (WHO, 2023).

- Address the problem of **misplaced items in the elderly population**, and consequently **increase independence** in their day-to-day lives.

Elderly Woman:
https://betterhealthwhileaging.net/8-things-to-check-after-fall-in-aging/

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The Problem

- Dementia and various other cognitive impairments cause **forgetfulness** in the elderly population

- Short-term memory function impairments which can have effects such as **misplacing more items**.

- Important items such as **house keys** or **mobile cell phones** are often lost

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Background of Dementia

- Memory loss is a *usual symptom* of aging

  — Varying degrees of memory loss

  — Dementia is a severe form of memory loss (Camepellone, 2021).

- Misplacing items can be **frustrating and time-consuming** for both the individual and their caregivers.
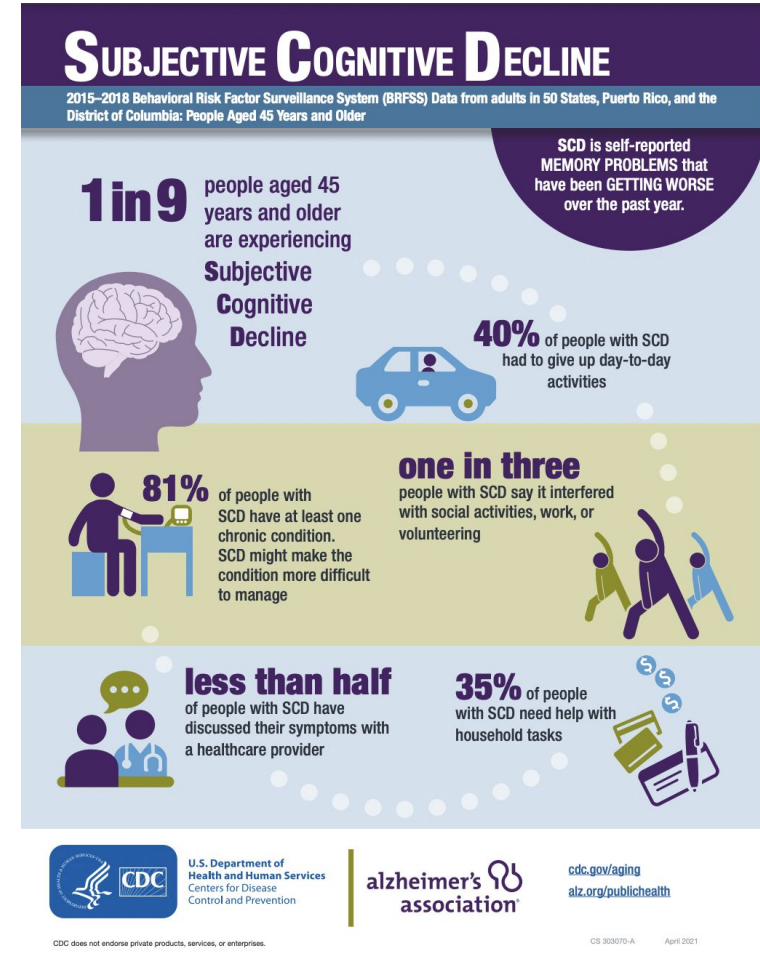
Infographic:
https://www.cdc.gov/aging/data/pdf/303070_FS_series_SCD_AGGREGATE_2015_2018-508.pdf

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The Design

Market Research

- Competitors
    1. Apple AirTags
    2. Tile
    3. Wearable Camera Design
- Main Issue: require *multiple units* for each tracked item—very high costs
- Reliant on GPS signals, which is not accurate within a home.
- Apple AirTags have a restrictive designs to be only compatible with iOS products.
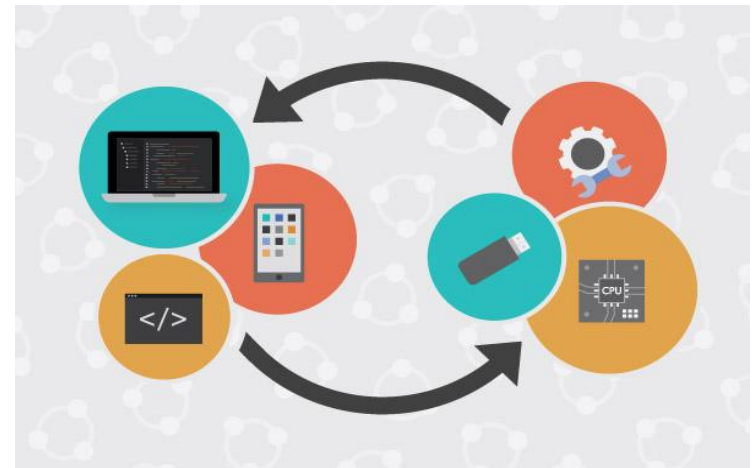
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Design Inspiration

- Combine skill sets of hardware and software capabilities
- Conducted background research on common problems, learned about memory loss and wanted to create device that alleviates some issues

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Design Ideas

1. Carpal Tunnel

- To help individuals with Carpal Tunnel Syndrome adjust their wrist position to prevent damage
- Very similar project presented by Mack & Min, 2019.

2. Misplaced Item Finder

- To help individuals with memory loss find commonly misplaced items
- Issues with existing solutions

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Misplaced Item Finder

Requirements (Need #1)

- Identify the **locations of misplaced items** within an area with at least 90% accuracy

- Reduce the frequency of searching for lost items by at least 50%

- Product lifespan of at least one year

- **Respond to client requests** for misplaced items within 10 seconds

- Accept commands from natural English language

- Does not cause injury or damage to clients or their property

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Requirements (Level #2)

- Conduct searches for misplaced items at least once a day

- Not cost greater than $300.00; sustain movement and data collection for at least half an hour

- Be properly secured; finish video recording processing in less than 10 minutes

- Not capture unauthorized media

Requirements (Level #3)

- Shall be physically customizable to suit the client

- Shall have maintenance costs of less than $100.00 per year

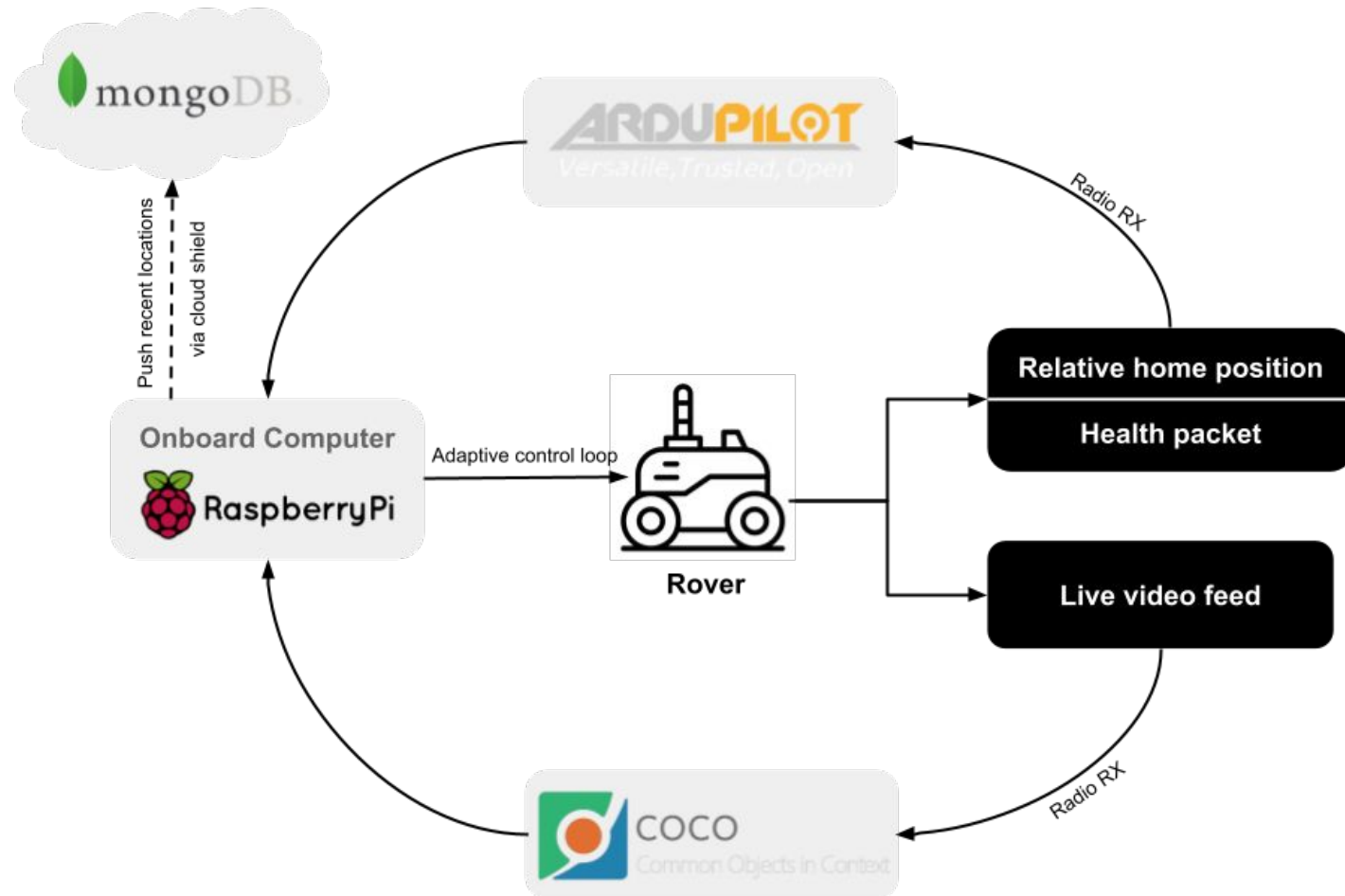- Shall be aesthetically pleasing

- Shall weigh less than 10 pounds

Project Plan

Design Concept #1

Timeline of Design Concept #1

Task	Mar 1	Mar 2	Mar 3	Mar 4	Apr 1	Apr 2	Apr 3	Apr 4	May 1	May 2	May 3	May 4
Market Research	■	■										
Client Search		■	■									
Brainstorm and Design			■	■								
Product Development and Initial Testing					■	■	■	■				
Feedback and Reiteration							■	■	■			
Final Testing and Review							■	■	■	■	■	
Delivery and Presentation										■	■	■

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Design 1 Proposed Materials & Budget

Component	Quantity	Cost	Interfaces
Motor + Wheel Kit	1	$27.00	Raspberry Pi
Raspberry Pi 4	1	$75.00*	Motors, cloud
WiFi antenna	1	$10.00	Raspberry Pi
Nav Sensor Kit	1	$10.00	Raspberry Pi
Cameras	2	$70.50	Raspberry Pi
Charging station	——————	$15.25	Rover dock
Software Costs	——————	$15.00	Raspberry Pi
Total		**$222.75**	

Group already has access to a Raspberry Pi, current prices are inflated

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Design Concept #2

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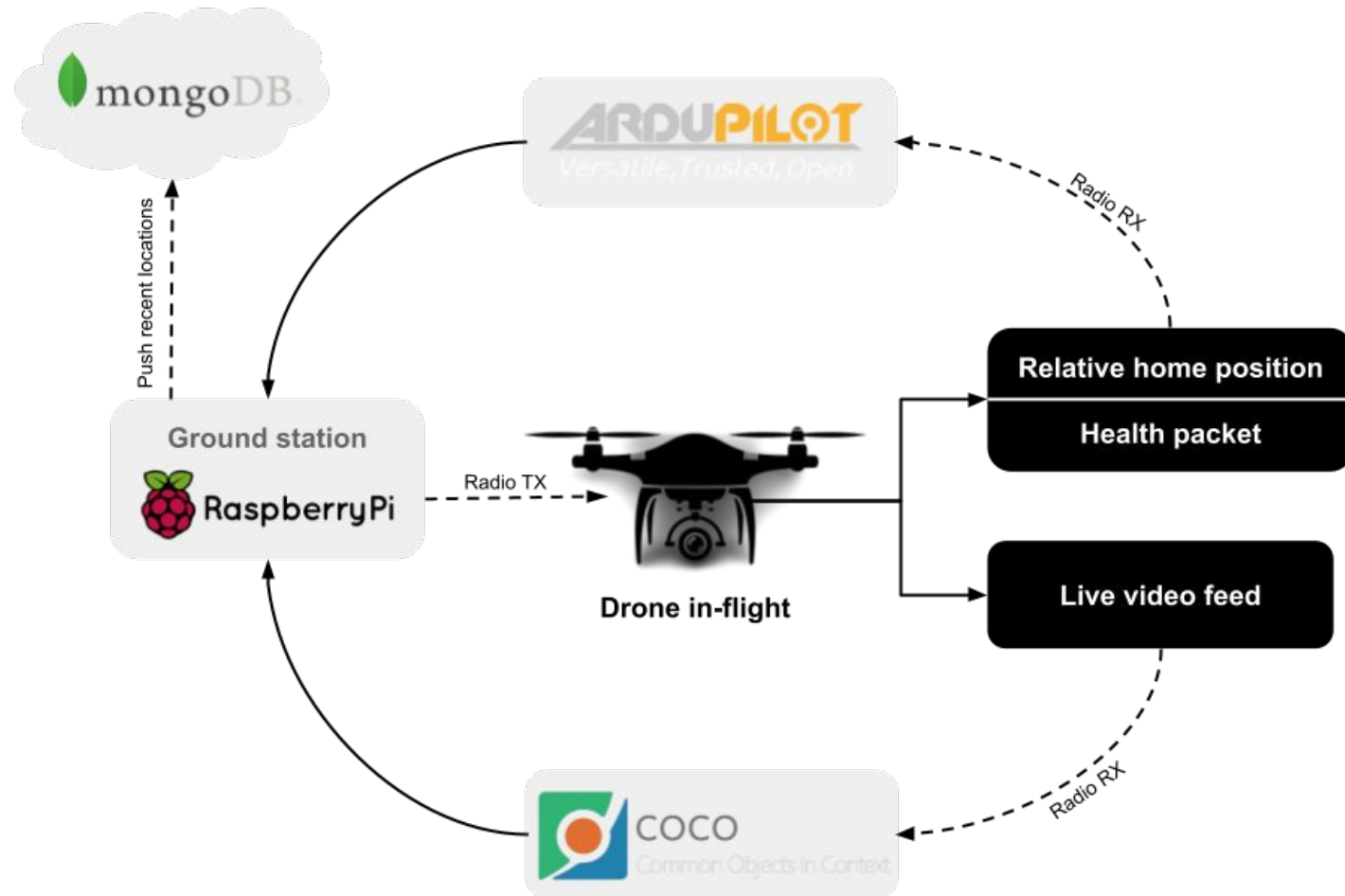
Timeline of Design Concept #2

	Mar.				Apr.				May			
	1	2	3	4	1	2	3	4	1	2	3	4
Market Research	■	■										
Client Search		■	■									
Brainstorm and Design			■	■								
Product Development and Initial Testing				■	■	■	■					
Feedback and Reiteration						■	■	■	■			
Final Testing and Review									■	■	■	
Delivery and Presentation										■	■	■

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Design 2 Proposed Materials & Budget

Component	Quantity	Cost	Interfaces
Drone avionics	————	$100	RX/TX System
Flight hardware	————	$75.00	Avionics
Charging station	1	$50.00	RX/TX System
Software Costs		$20.00	Content
Total		**$245.00**	

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Design Concept #3

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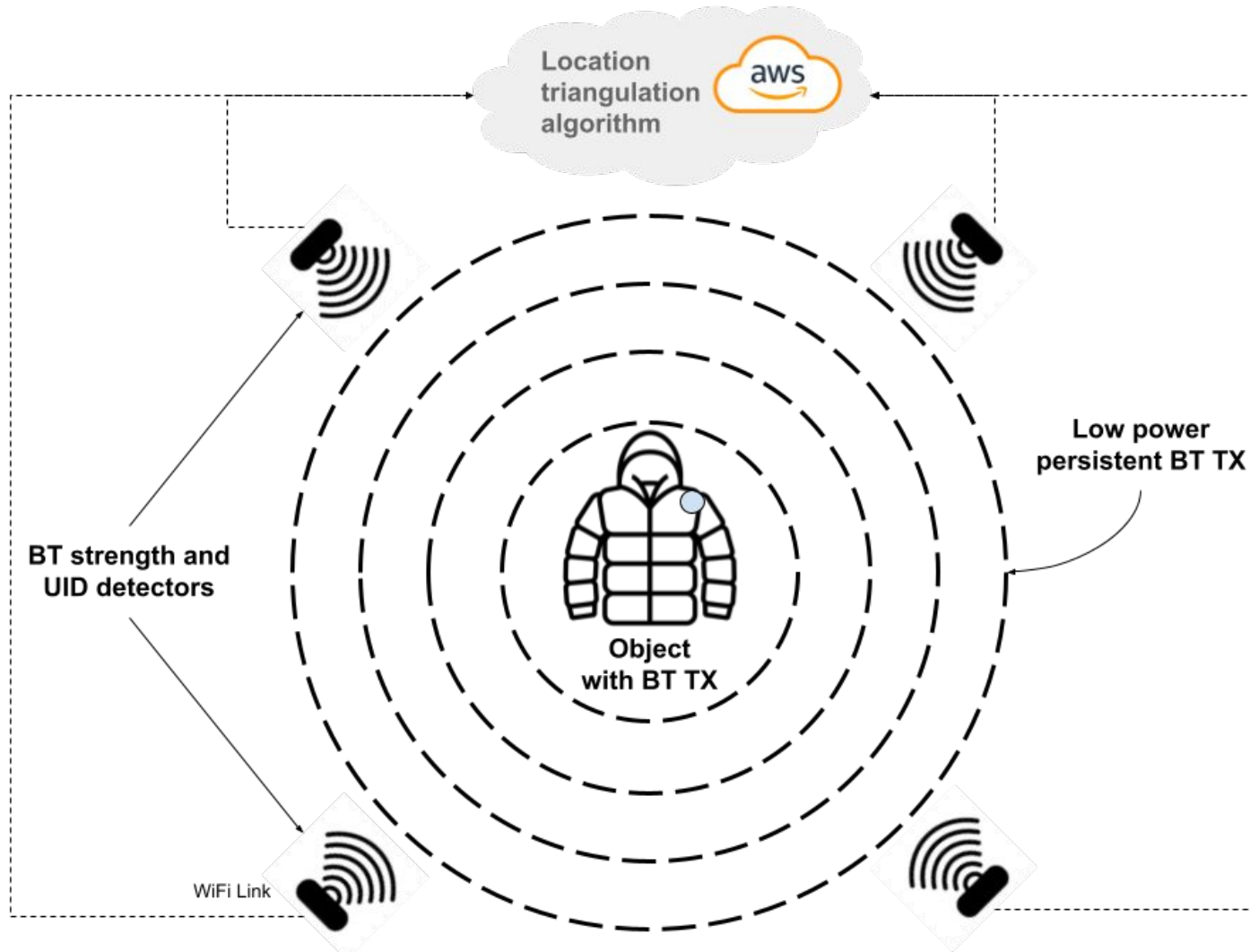
Timeline of Design Concept #3

	Mar.				Apr.				May			
	1	2	3	4	1	2	3	4	1	2	3	4
Market Research	▮	▮										
Client Search		▮	▮									
Brainstorm and Design			▮	▮	▮							
Product Development and Initial Testing						▮	▮	▮				
Feedback and Reiteration								▮	▮			
Final Testing and Review									▮	▮	▮	
Delivery and Presentation										▮	▮	▮

Design 3 Proposed Materials & Budget

Component	Quantity	Cost	Interfaces
Bluetooth Tracker	20	$75.00	——
Bluetooth Hub + Amplifiers	5	$50.00	Cloud
Software Costs	——	$20.00	——
Total		**$145.00**	

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User Interface

Proposed Design

Key
- Black = hardware
- White = demarcation point
- Grey = client side

Hardware interface → Raspberry Pi → mongoDB

Rest API w/ Node & Express

Flutter Frontend → JWT/Oauth

miro

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Application Design

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Application Design

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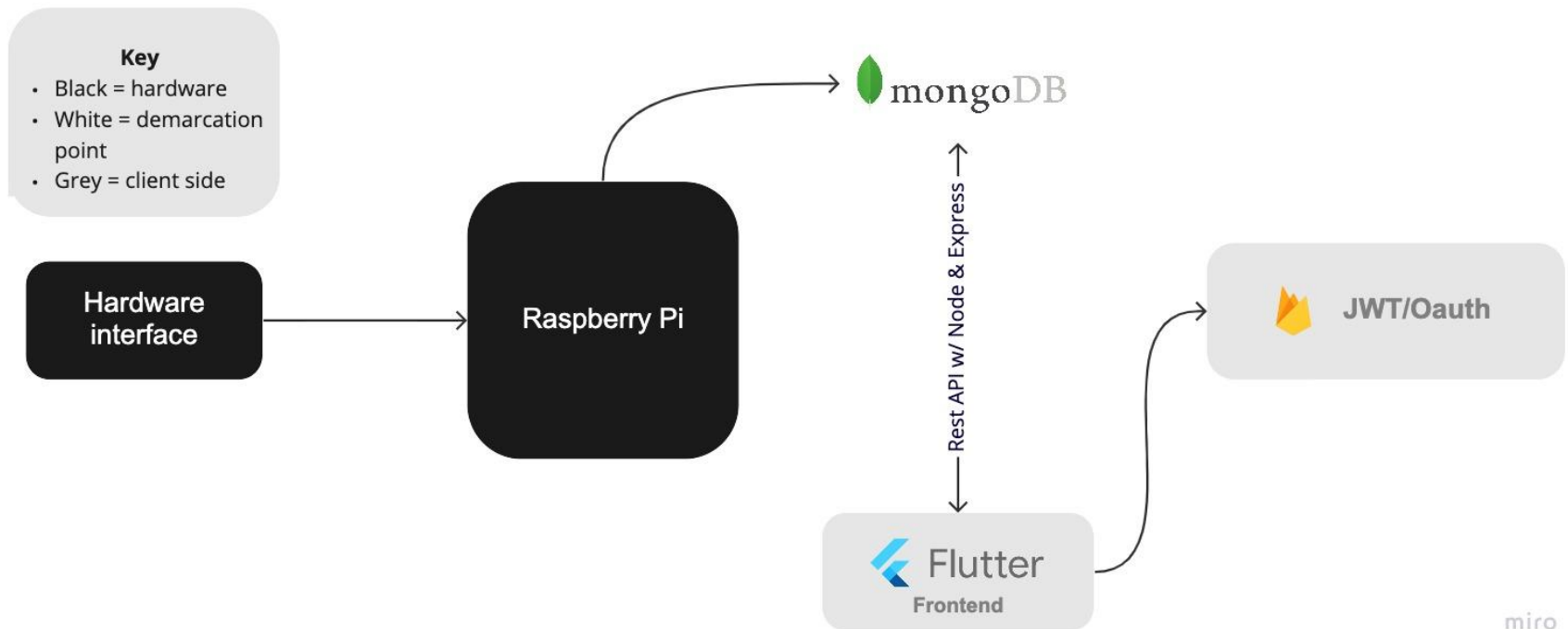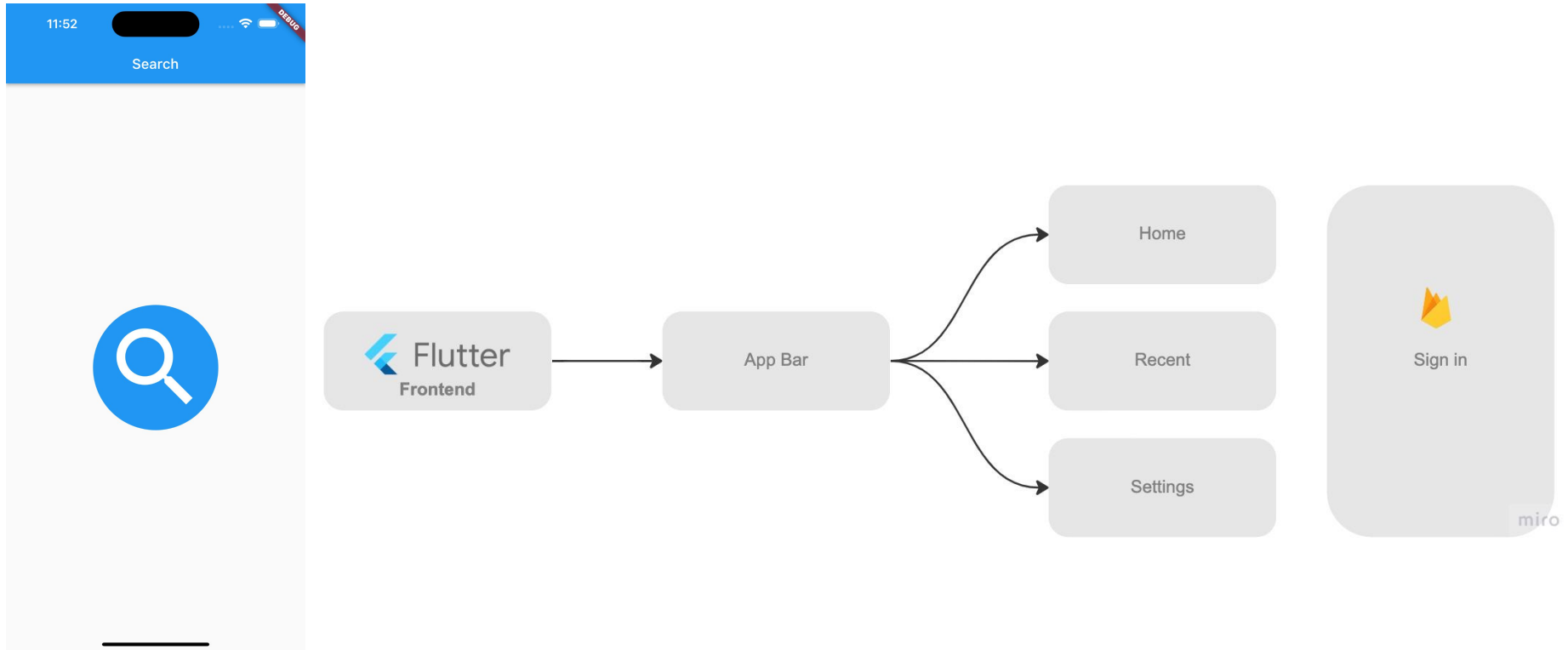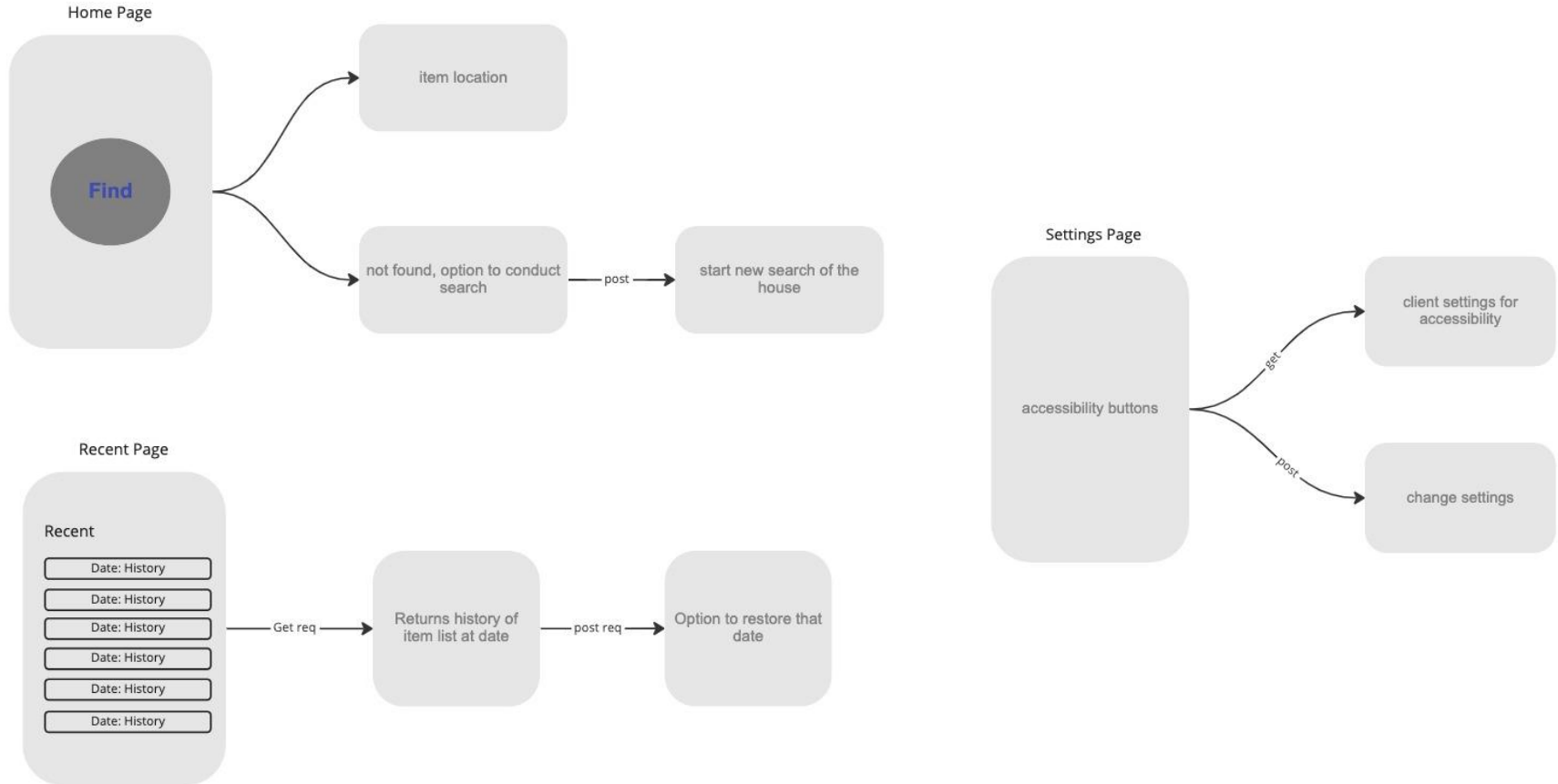
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