

# **Team 17: IoT Based Pet Tracker**

## **ECEN 404 Final Presentation**

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**Sponsor: Souryendu Das**

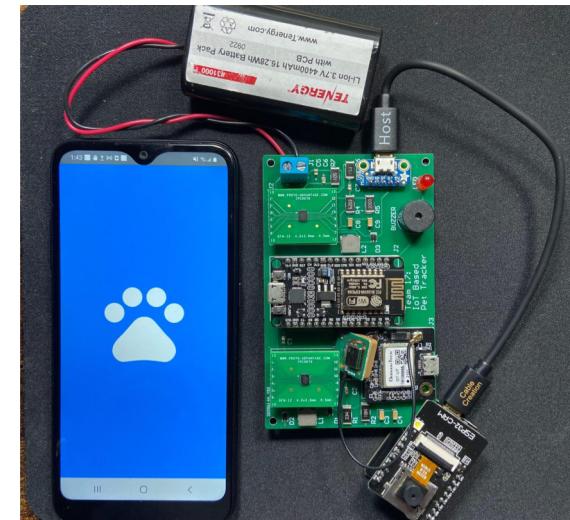
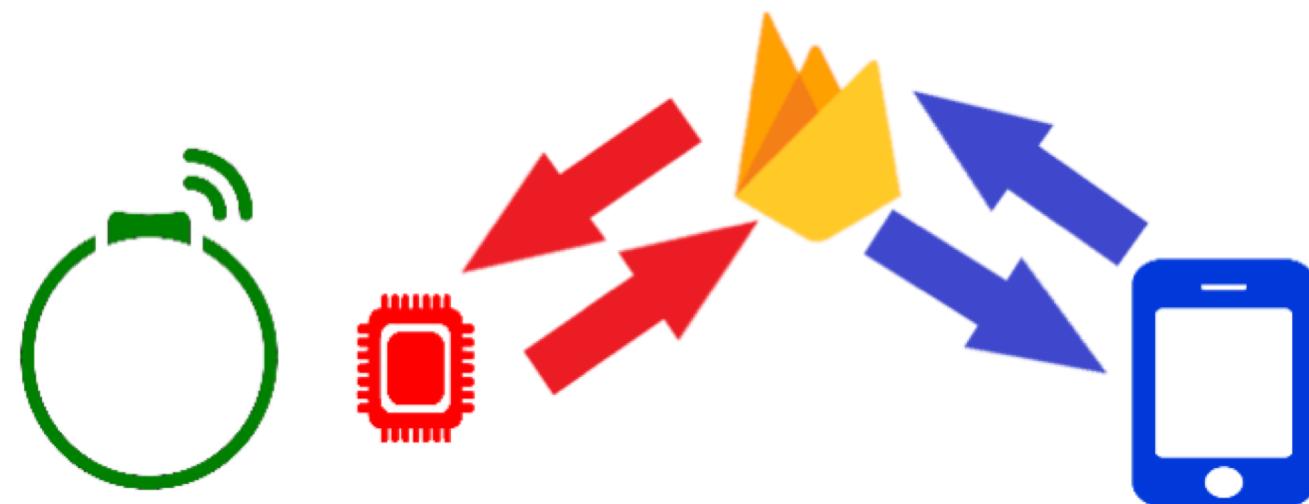
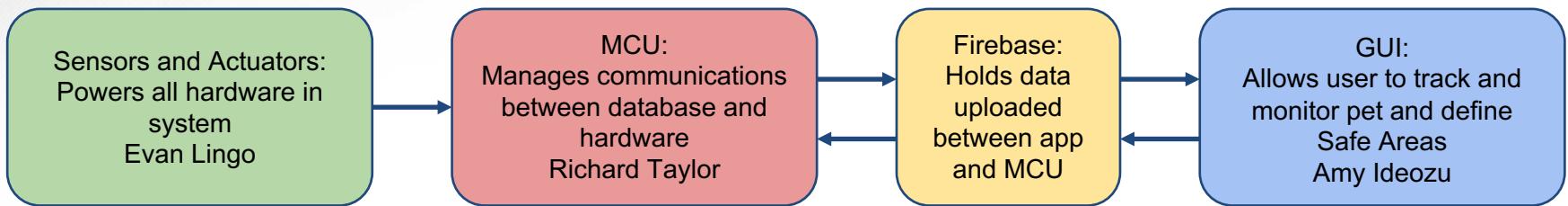
**TA: Eric Lloyd Robles**

# Project Summary

- At times it can be difficult to keep track of your pet
- $\frac{1}{3}$  of pets in the United States are reported missing in their lifetime, with more than 80% never being found
- Develop an IoT Based Pet Tracker to keep knowledge of your pets location via GPS and video feed through the use of an android app



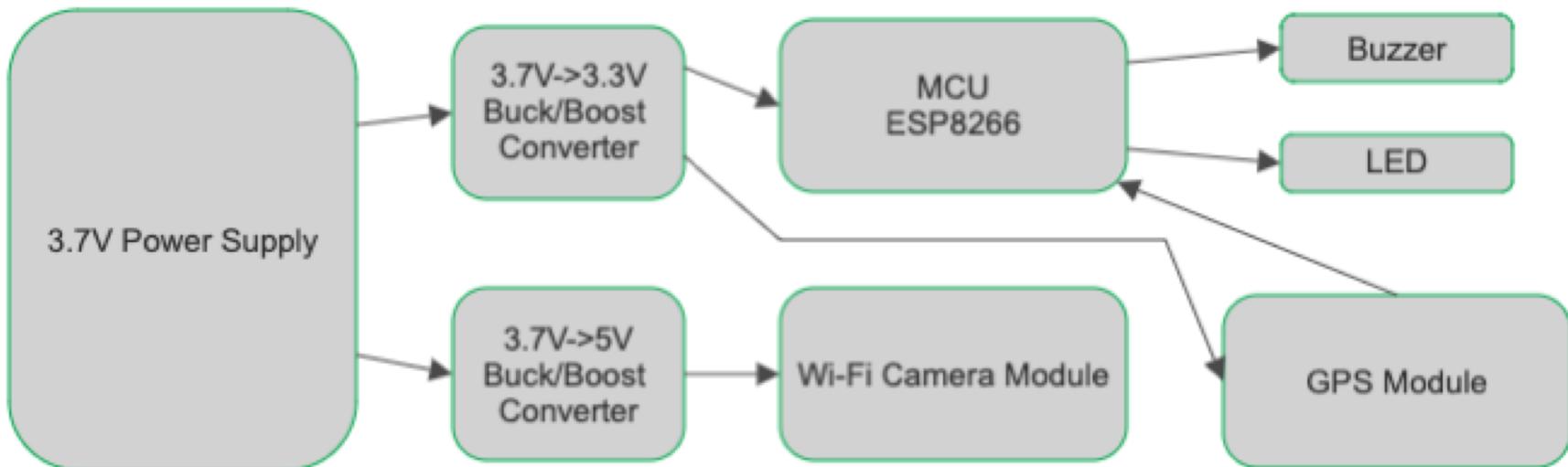
# Project Overview



# Hardware Subsystem Overview

Evan Lingo

- Powers all hardware from a 3.7V Li-Ion battery
- LED and buzzer triggered from MCU when pet is outside of safe area



# Hardware Subsystem - Major Challenges and Solutions

Evan Lingo

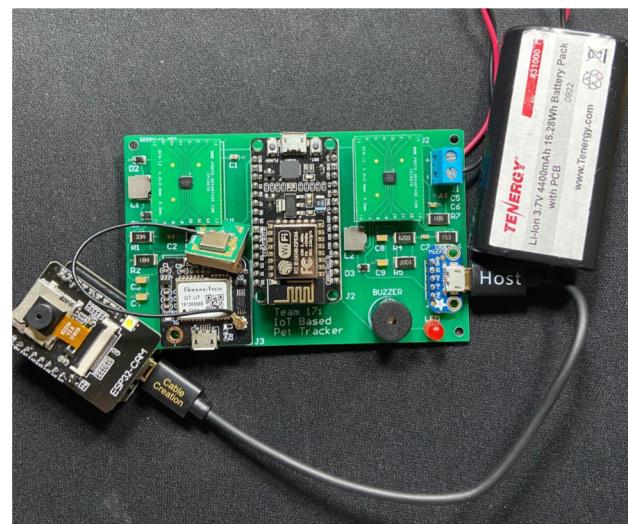
Challenges	Solutions
MCU/GPS module and camera required different voltages, 3.3V and 5V respectively.	Implemented two buck/boost converters from a 3.7V input.
Size constraints of hardware due to placement on pets collar.	Redesigned PCB to be as compact as possible.
Camera module not reliable due to a lot of noise	Added a noise filter at the voltage out of the 5V buck/boost converter

# Hardware Subsystem Results

Evan Lingo

Item	Spec	Minimum	Nominal	Maximum
Power Consumption	<4.4 W	2.75 W	3.4 W	4.07 W
Battery life	>4 hours	4 hours	4.9 hours	6.3 hours
Output Voltage (Buck/Boost #1: 3.7V->3.3V)	≥3.3 V	3.27 V	3.30 V	3.48 V
Output Voltage (Buck/Boost #2: 3.7V->5V)	≥5 V	4.89 V	5.01 V	5.17 V

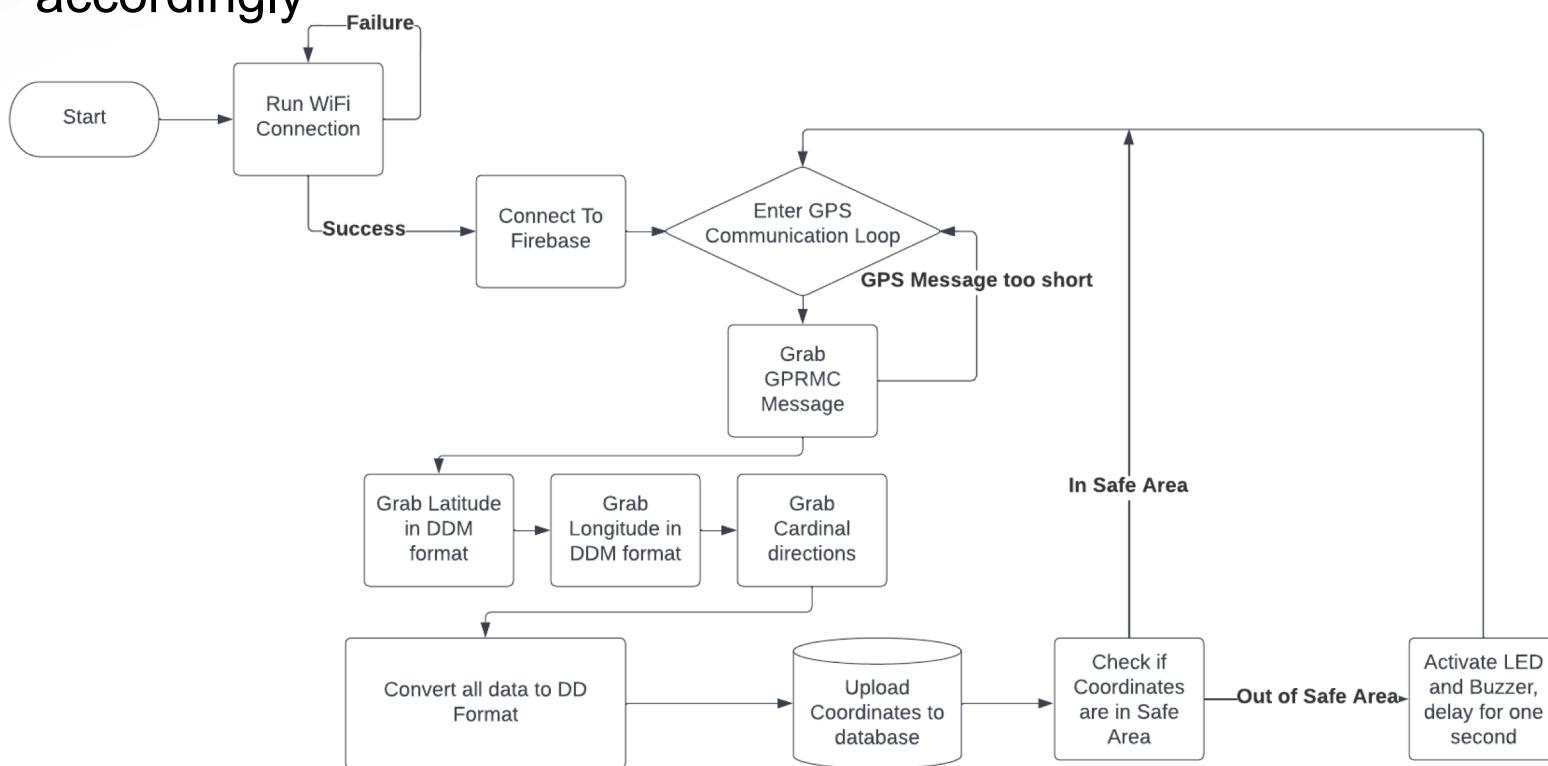
Item	Met
Physical dimension of housing unit under 5 x 3 x 3 inches (L x W x H)	Yes



# MCU Subsystem Overview

Richard Taylor

- Check for Wi-Fi connection
- Run program loop to fetch new GPS coordinates and update accordingly



# MCU Subsystem - Major Challenges and Solutions

Richard Taylor

Challenges	Solutions
Having to test the gps code outside proves to be a challenge for getting wifi signals and general workspace	Wi-Fi hotspot used to test GPS functions outside and proper locations outside are sufficient for testing
Updating database from the MCU was a challenge in updating correct values and not updating when no information is read	Change code to make sure that information is read before uploading. Also, run the update code often to catch the correct information
Camera static ip is necessary to provide a streamlined experience to the user	Create a proper code with a static ip that runs correctly and can be accessed from the app

# MCU Subsystem Results

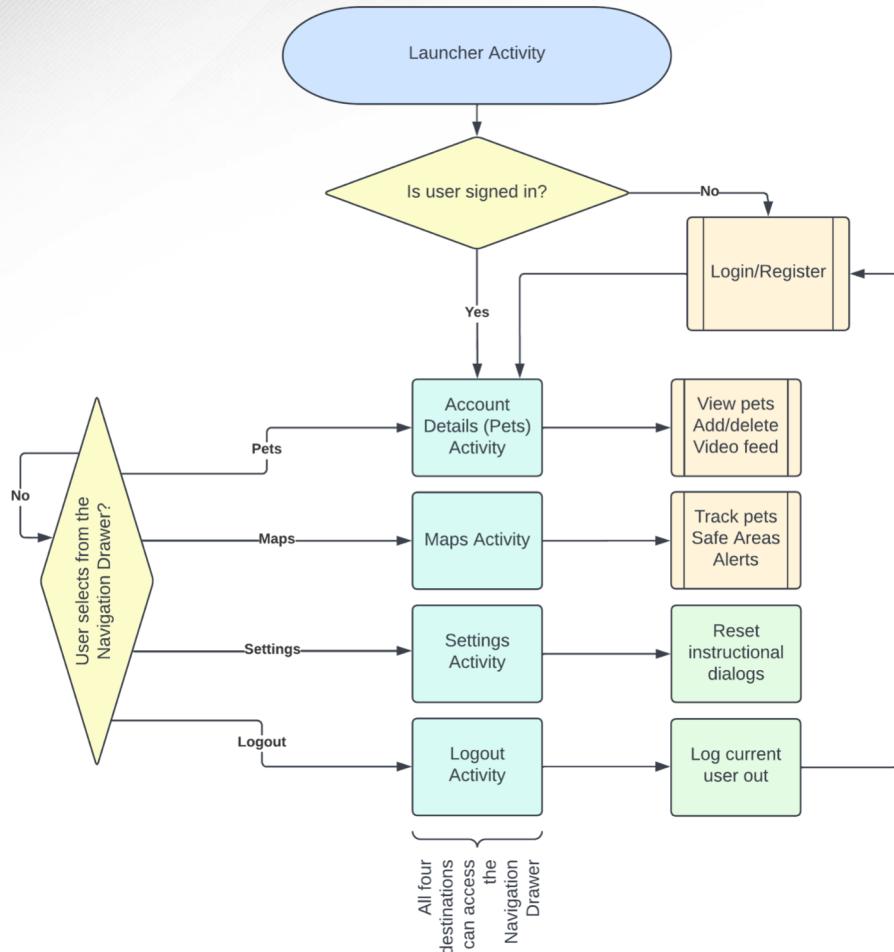
Richard Taylor

Item	Spec	Minimum	Nominal	Maximum
GPS Startup Time	<60 sec	48 sec	50 sec	52 sec
Camera Startup Time	<60 sec	9 sec	10 sec	11 sec
GPS Location Update Time	<30 sec	5 sec	10 sec	15 sec

Item	Met
Camera resolution must be 480p(640 x 480 pixels) or greater	Yes

# GUI Subsystem Overview

Amy Ideozu



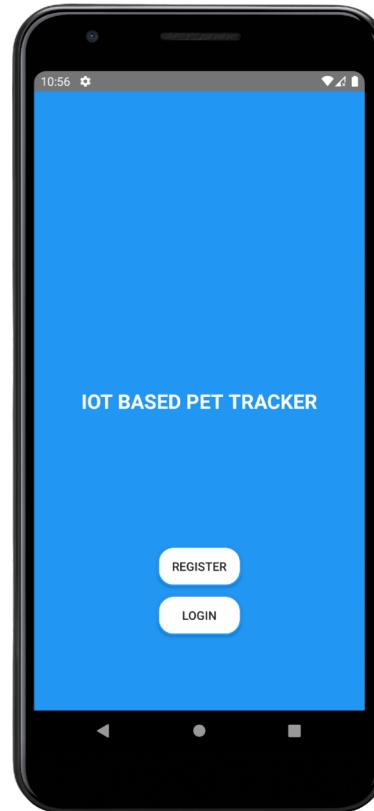
- Add pets to monitor
- View camera feed
- Track pet location
- Add Safe Areas for monitoring

# GUI Subsystem Overview

Amy Ideozu



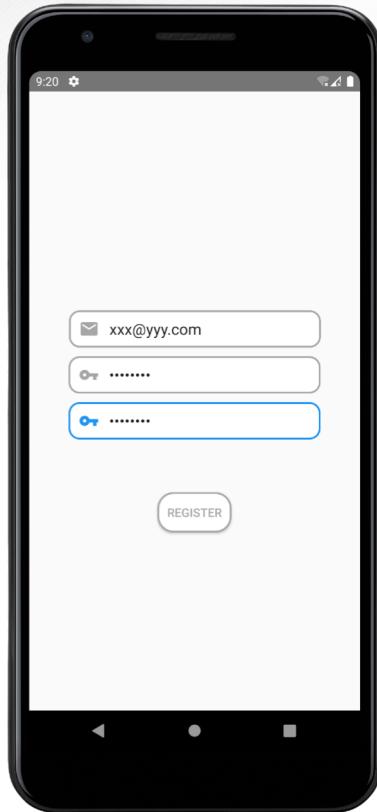
Launcher Activity



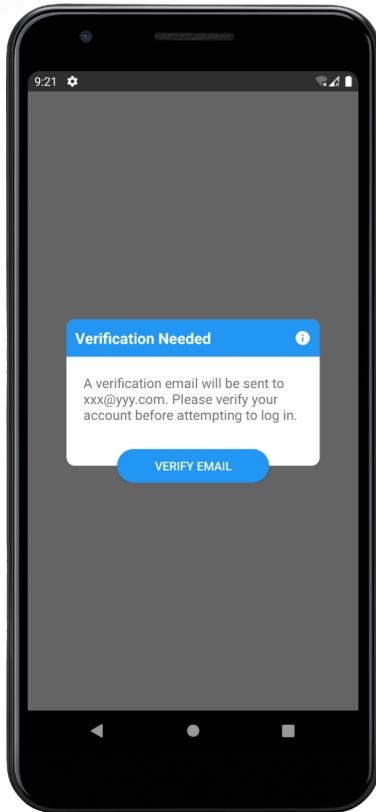
Login and Register  
Activity

# GUI Subsystem Overview

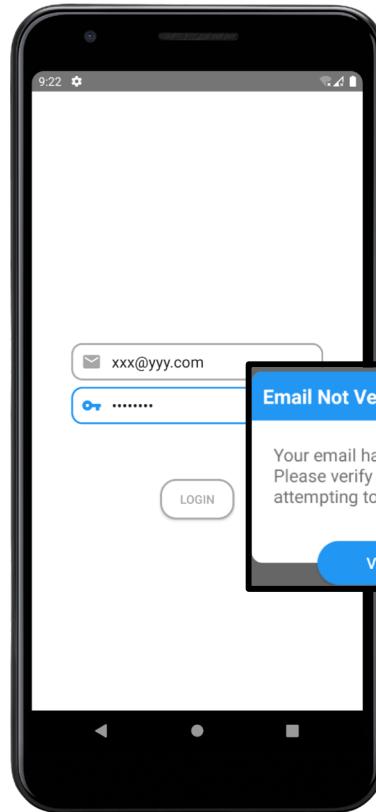
Amy Ideozu



Register Activity



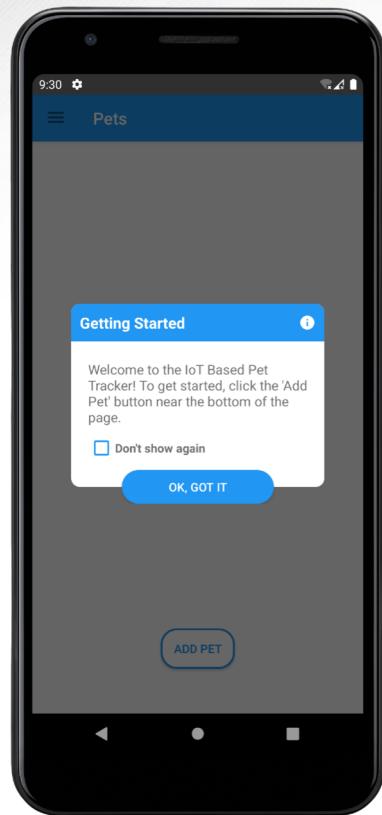
Verification Activity



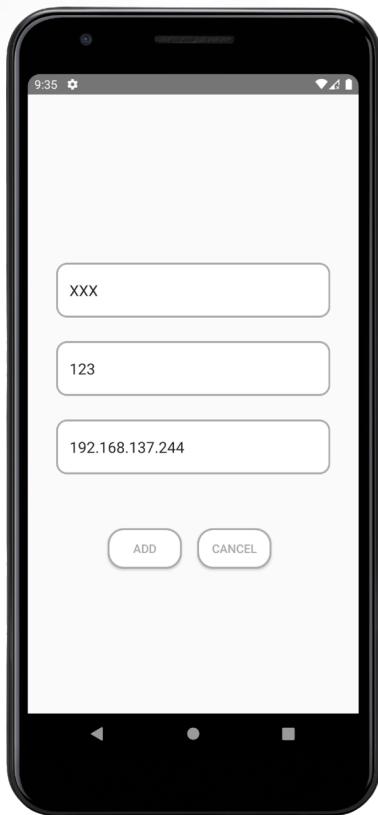
Login Activity

# GUI Subsystem Overview

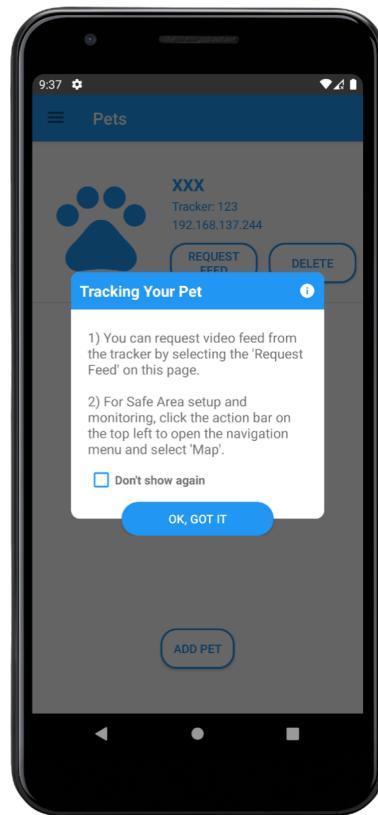
Amy Ideozu



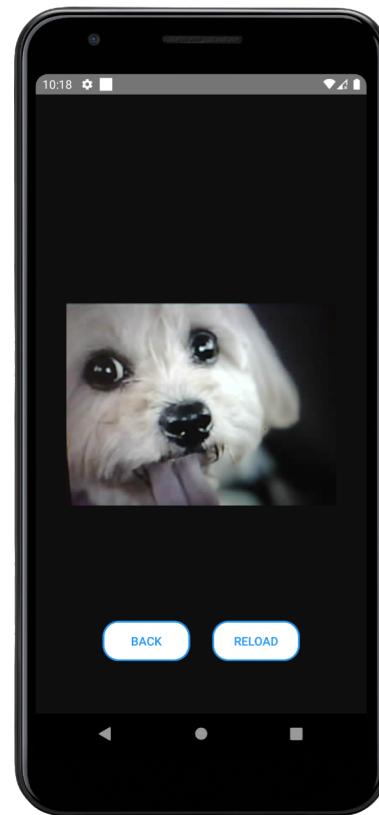
Account Details Activity  
(0 pets)



Add Pet Activity



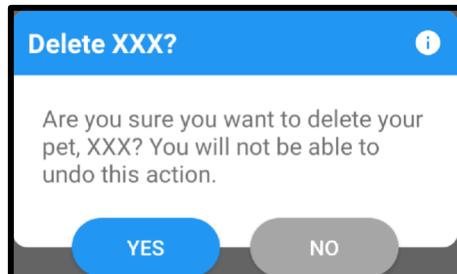
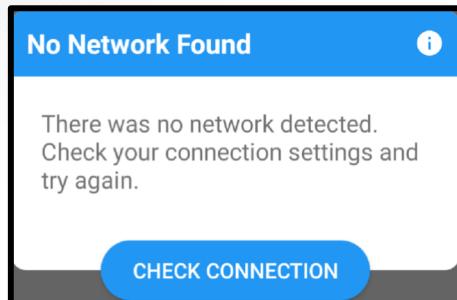
Account Details Activity  
(≥1 pets)



Camera Activity

# GUI Subsystem Overview

Amy Ideozu

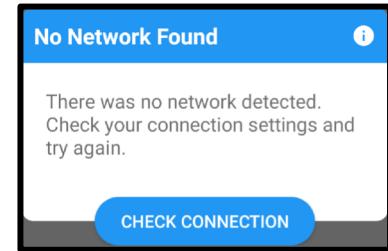
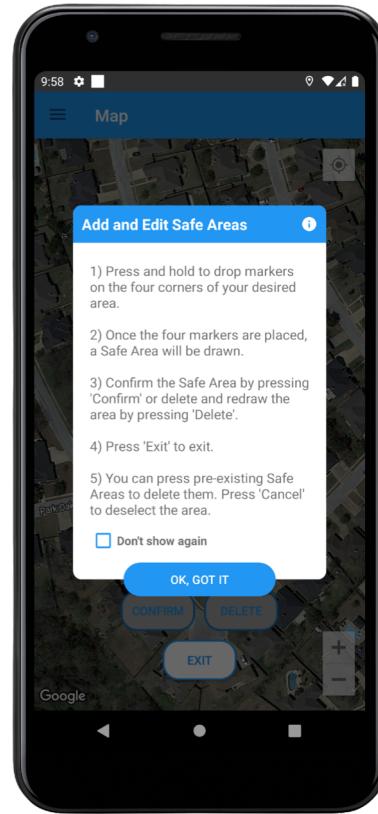
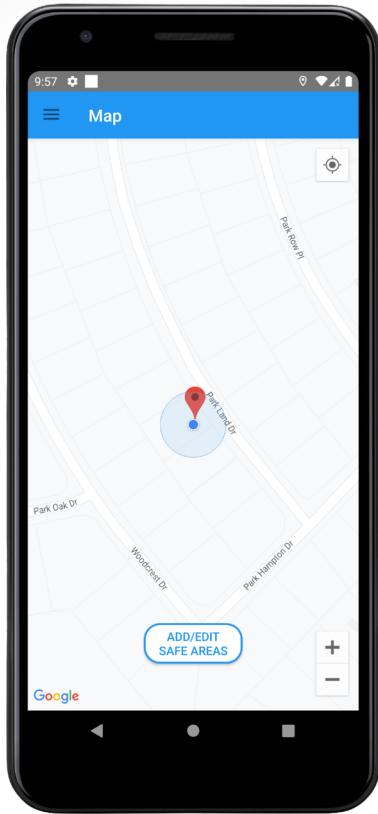
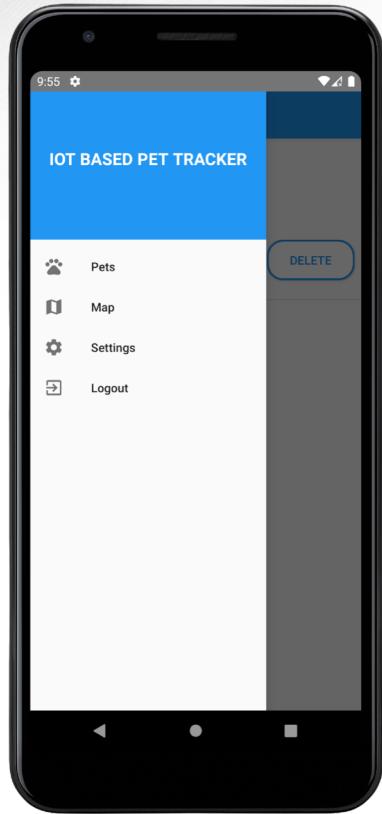


- **Network:**
  - No network found
  - Account Details, Add Pet, Maps
  - Disappears on network connection
- **Delete Pet:**
  - Asks user to delete pet

Network Notification &  
Delete Pet Notification

# GUI Subsystem Overview

Amy Ideozu



Navigation Drawer

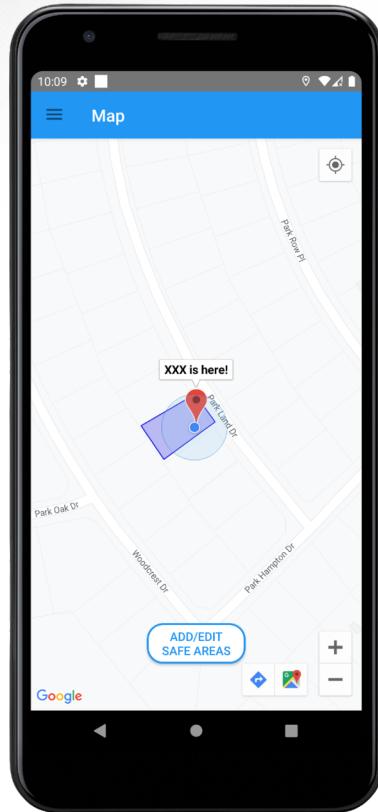
Maps Activity

Add and Edit  
Safe Areas Mode

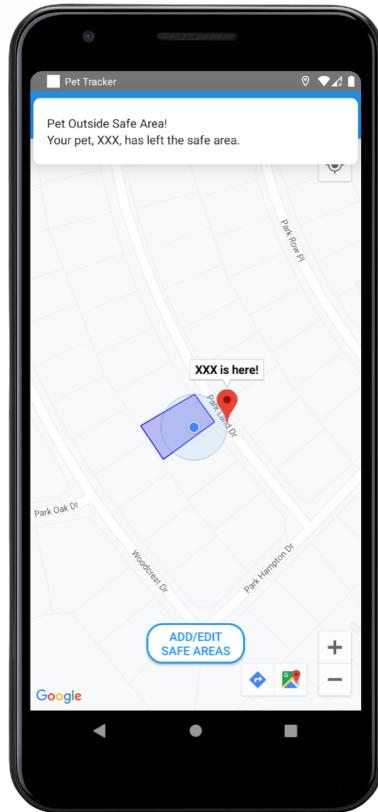
Network Notification

# GUI Subsystem Overview

Amy Ideozu



Pet Inside Safe Area



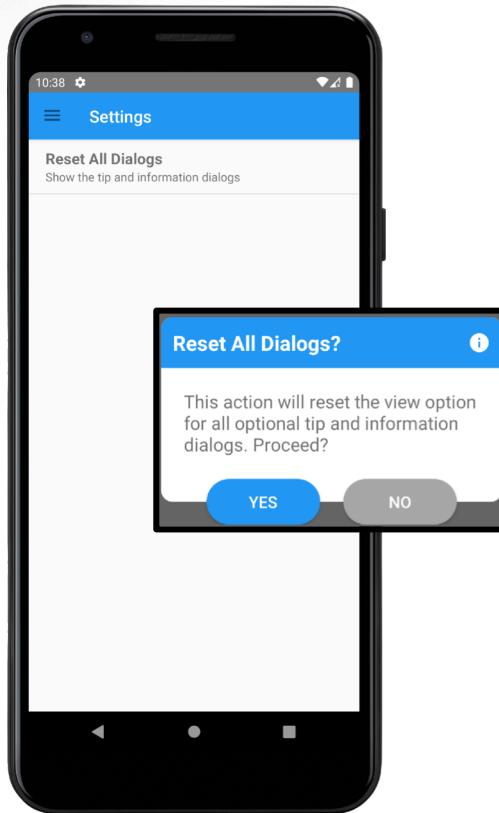
Pet Outside Safe Area



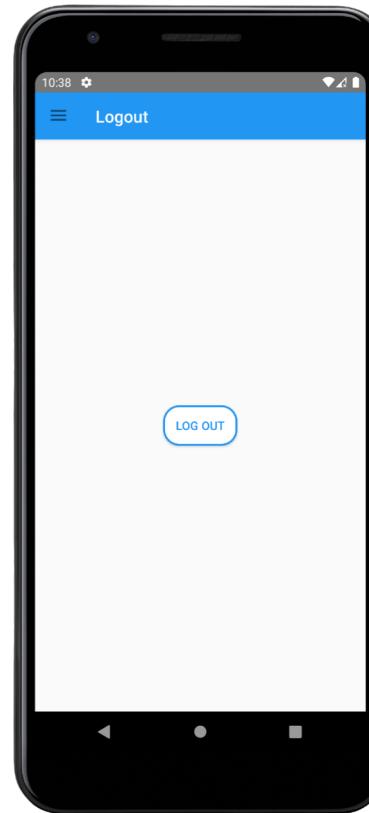
Pet Outside Safe Area  
(App in background)

# GUI Subsystem Overview

Amy Ideozu



Settings Activity



Logout Activity

# GUI Subsystem - Major Challenges and Solutions

Amy Ideozu

Challenges	Solutions
Errors in user input and mismatch with database entries would cause app to crash and/or make app unusable	Add additional checks to ensure that user input was in correct format and matched database entries if applicable
Back button navigation causes app to crash, tabbed activities too clunky	Disable back button navigation and use a navigation drawer to switch between activities
MCU unable to read some of the Safe Area data in database from app	Restructure the Safe Area data in database and perform Safe Area operations from app

# GUI Subsystem Results

Amy Ideozu

Item	Spec	Minimum	Nominal	Maximum
Application Size	<500 MB	8.37 MB	8.41 MB	25.05 MB
Time to Location Update from Database Update	<1 min	0.1 s	2.24 s	4.24 s
Time to Notification from Database Update	<1 min	0.1 s	1.38 s	5.87 s
Time to Video Stream from Video Feed Request	<2 min	0.1 s	3.68 s	10.34 s
Time to Reconnect to Video Stream from Network Reconnection	<2 min	3.2 s	5.91 s	16.74 s

Item	Met
User is notified when network connection is lost	Yes
Safe Area size is between 100 and 36000 sq ft (inclusive)	Yes

# Conclusions

- Issues:
  - MCU changed from MSP430 to ESP8266
  - GPS changed from EM506 to GT-U7
- Current Status:
  - Integration complete. Testing and validation of all possible scenarios to be completed in 1 week.
- Tasks Left
  - Hardware: 3D print housing unit that will be attached to the collar
  - MCU: Camera program optimization
  - GUI: App icon

**Thank you for your time.  
Questions?**