

# Critical Design Review

*HotSeat: OKAA Solutions, Team 5*

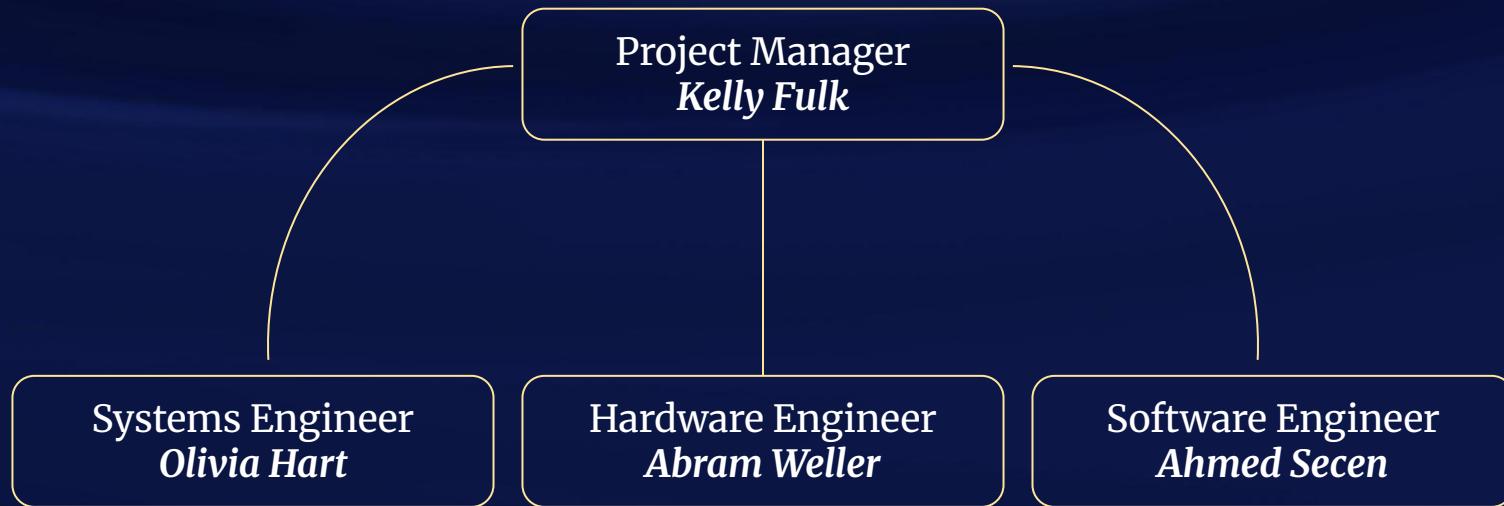
Kelly Fulk, Olivia Hart, Ahmed Secen, Abram Weller  
April 24, 2025



# Team Organization

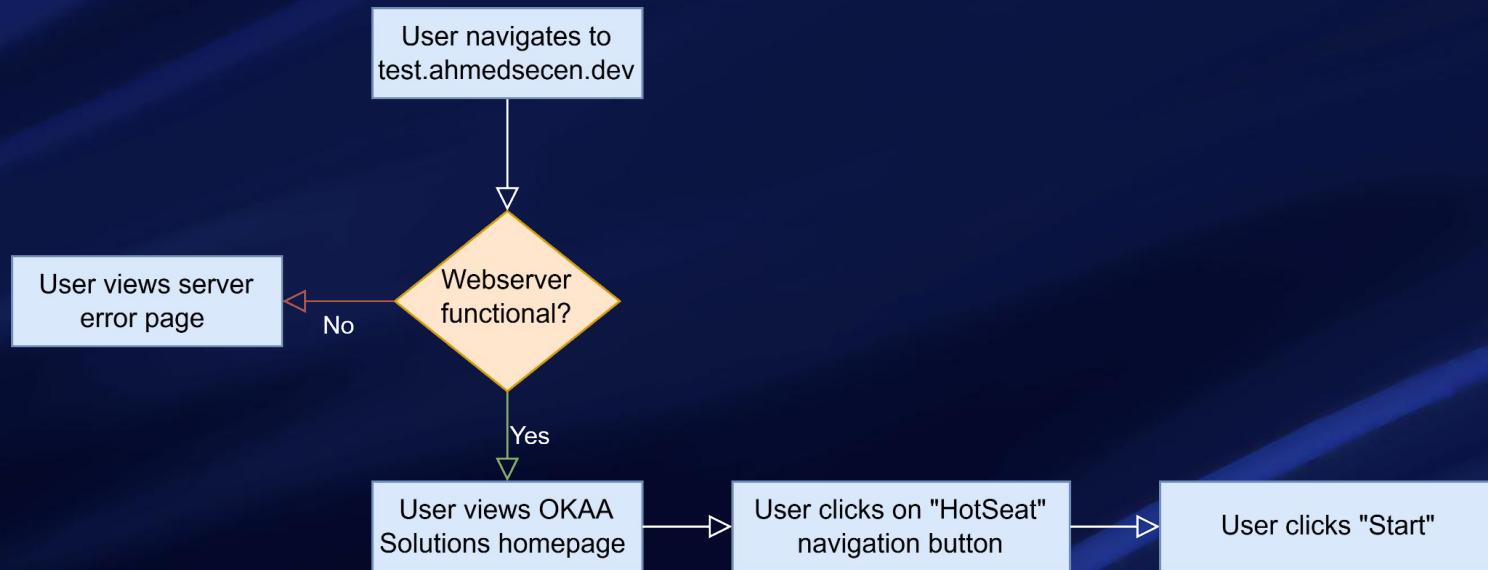
---

# Team Organization Chart

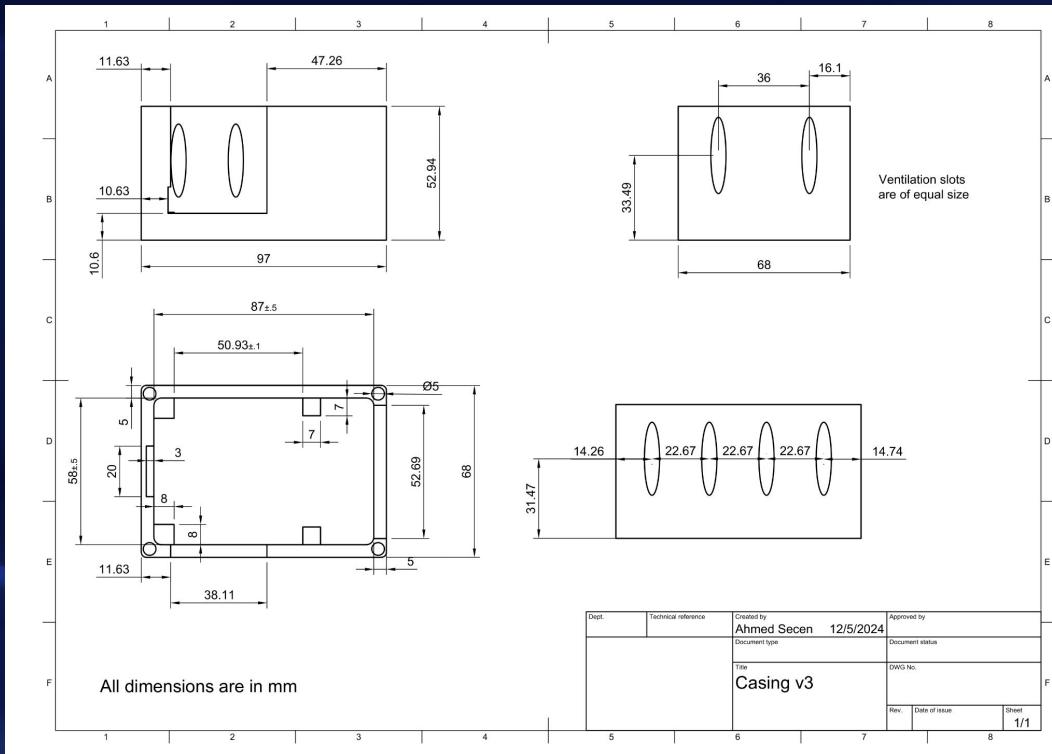


# Creating HotSeat

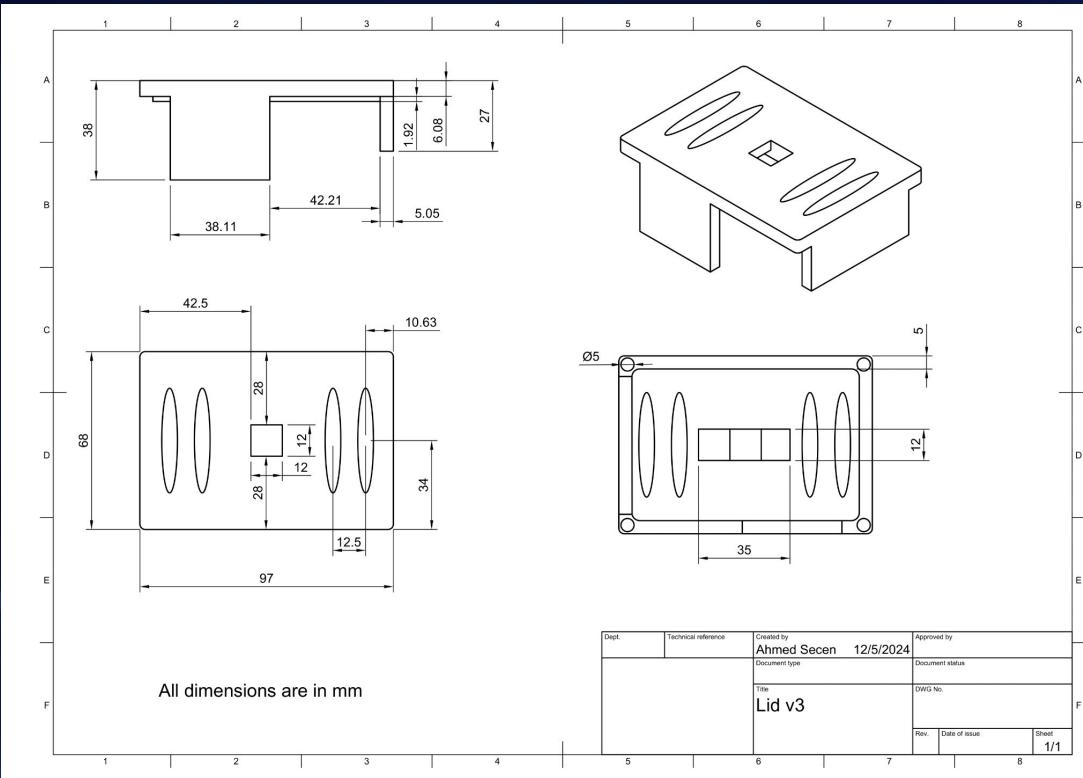
# Function Block Diagram



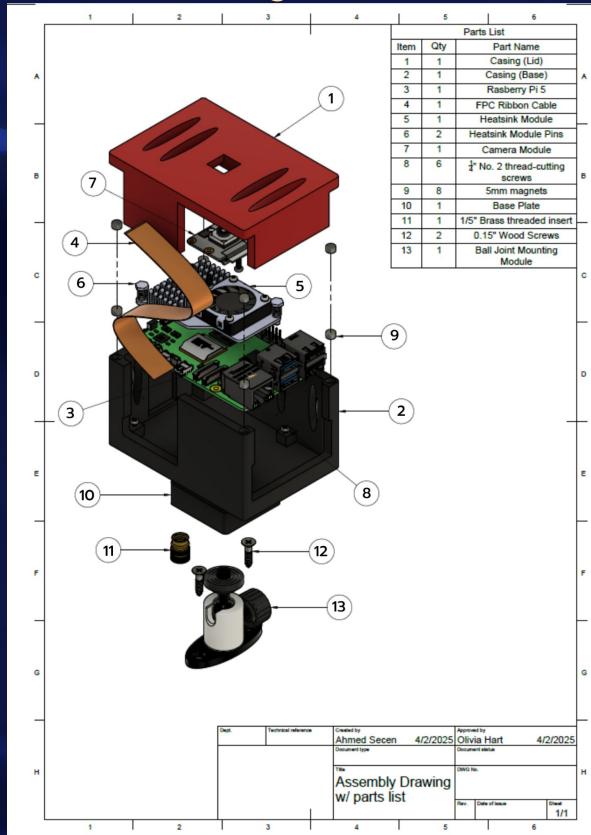
# Technical Drawings



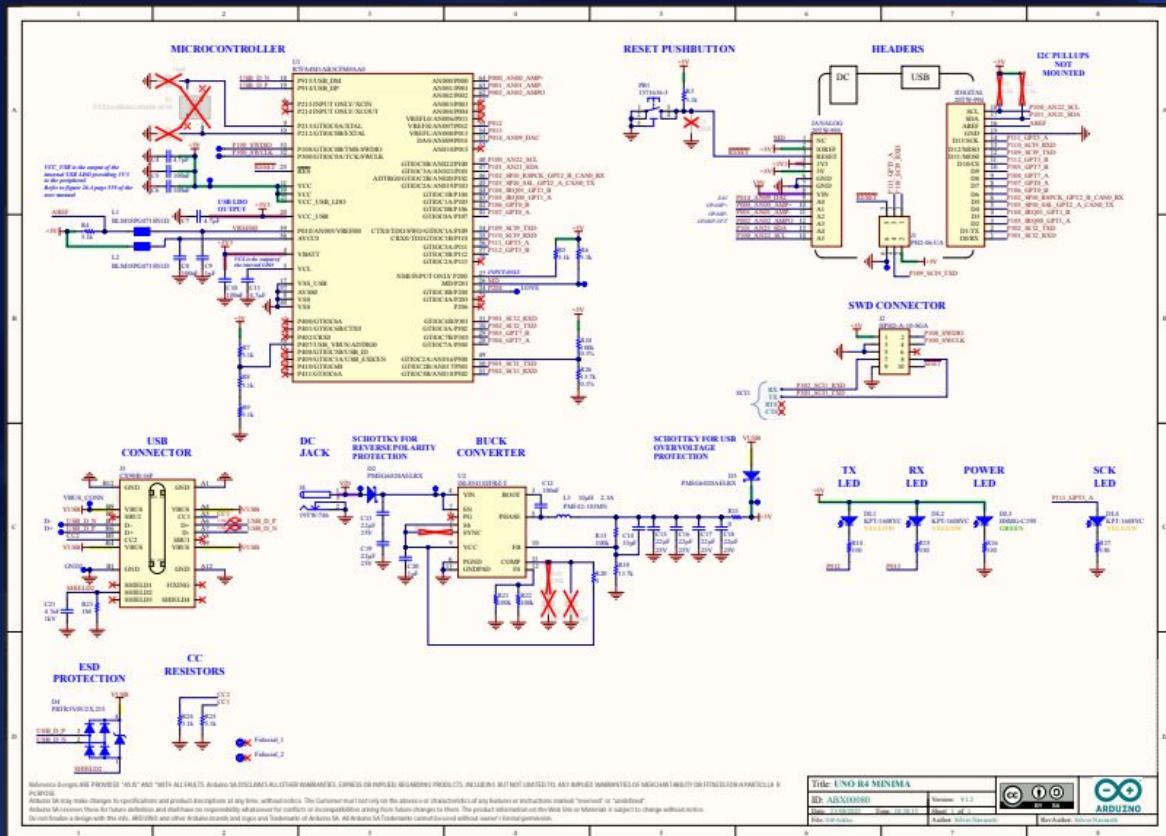
# Technical Drawings



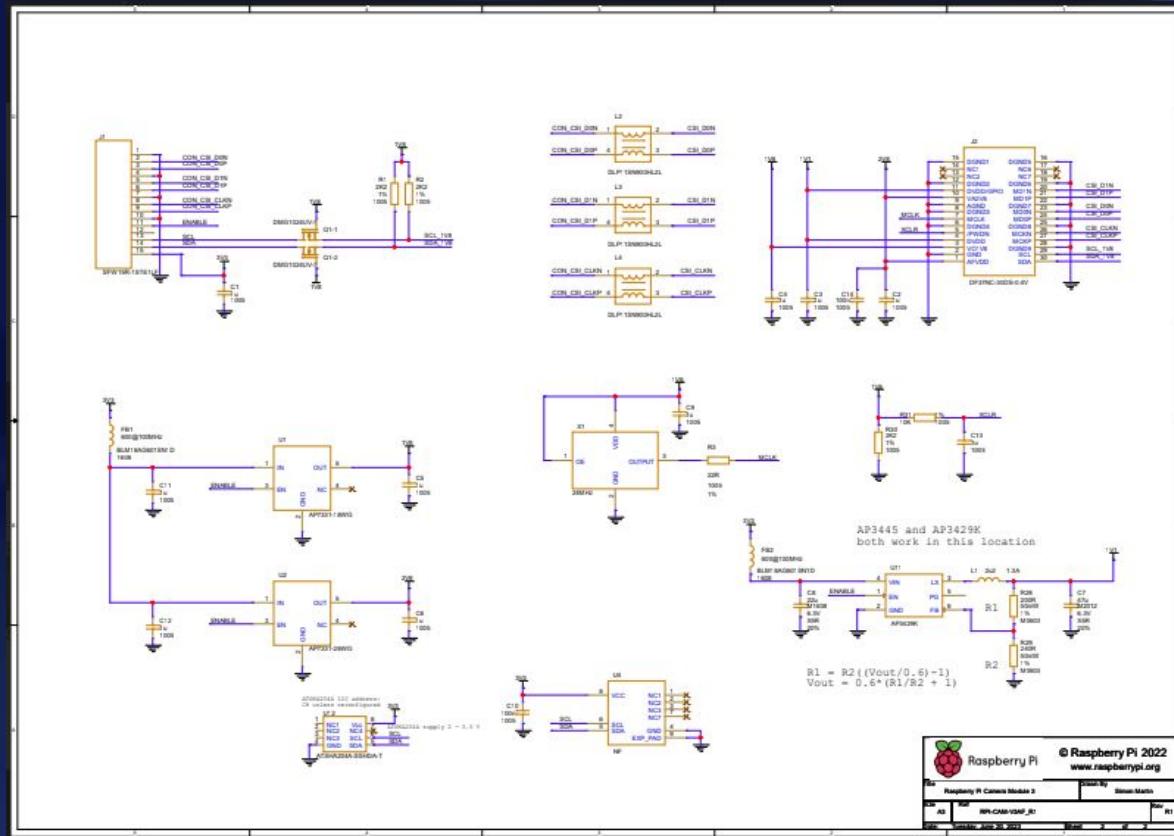
# Assembly Drawing



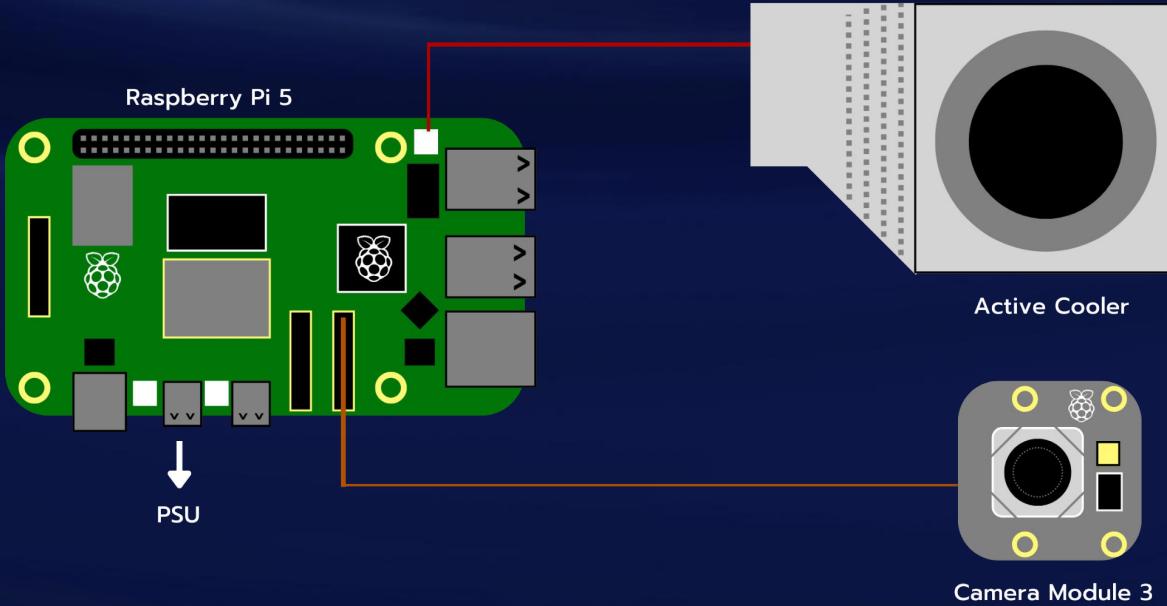
# Raspberry Pi 5 Electrical Schematic



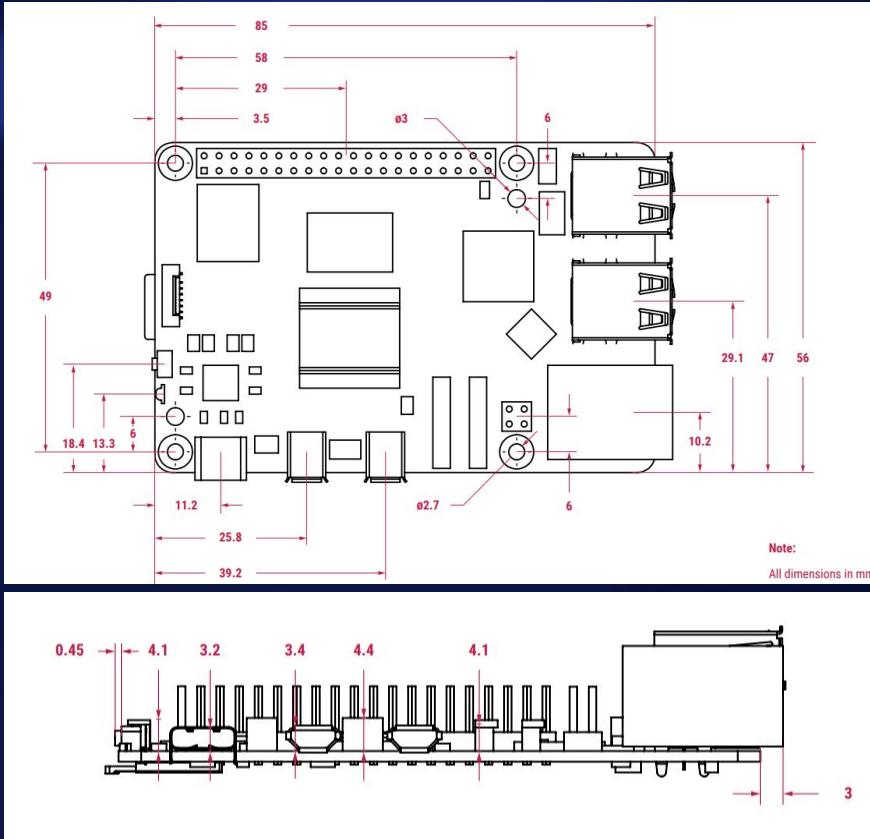
# Camera Module 3 Electrical Schematic



# Wiring Diagram



# PCB Layout



**Note:**

All dimensions in mm

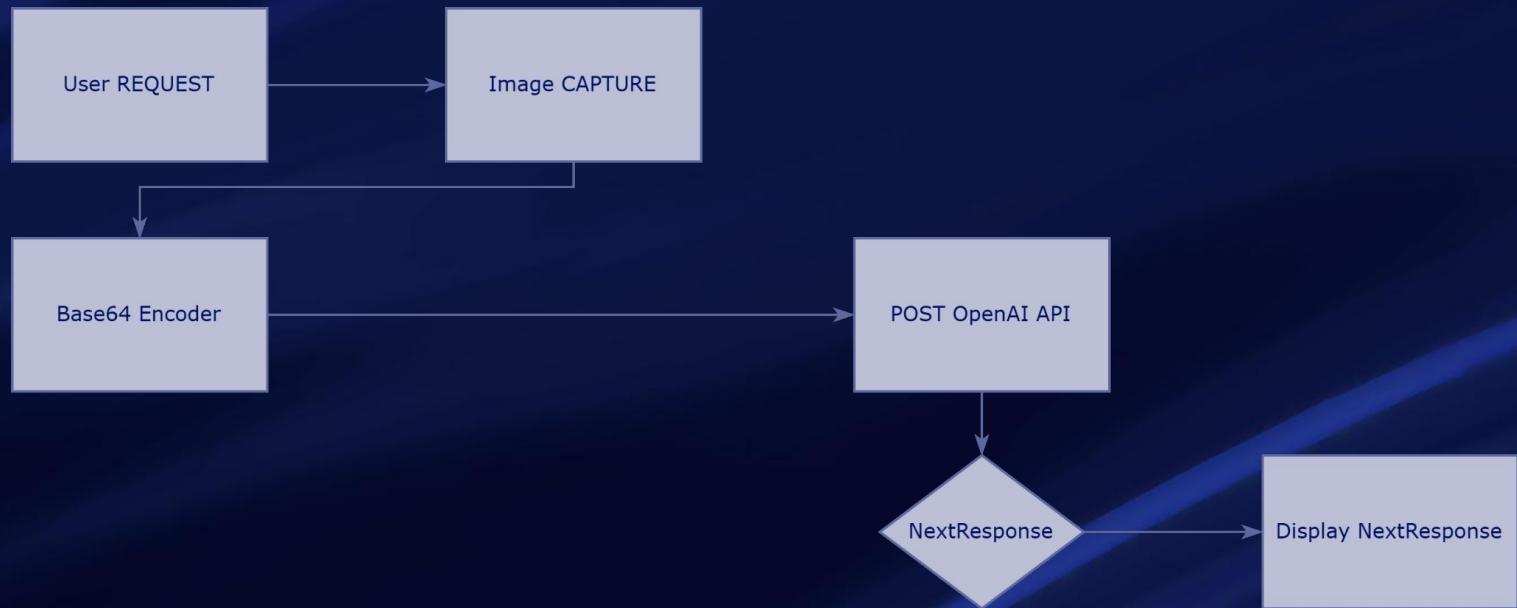
All dimensions are approximate and for reference purposes only. The dimensions shown should not be used for producing production data

The dimensions are subject to part and manufacturing tolerances

Not all of the board components are shown. Please reference a physical board for representation of componentry

Dimensions may be subject to change

# Programming Algorithm Flowchart

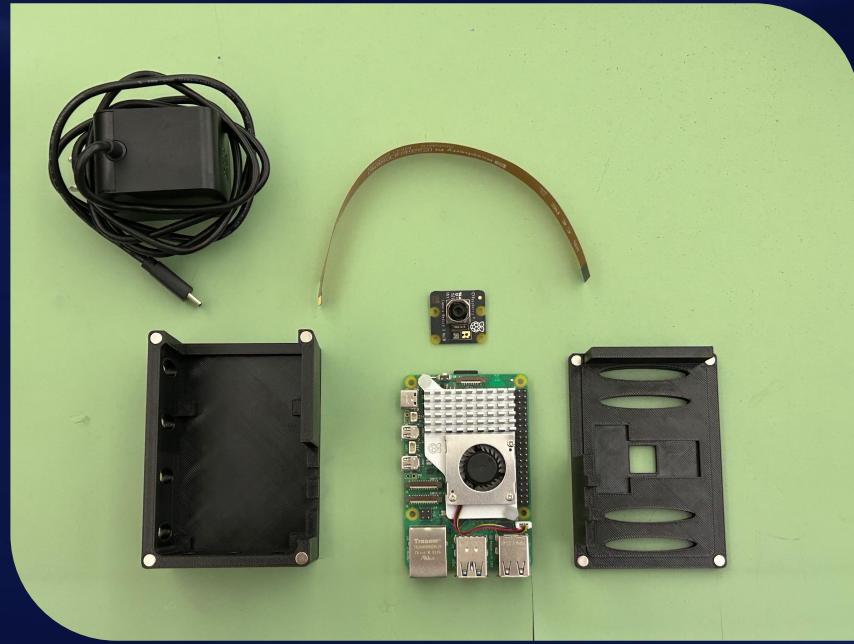
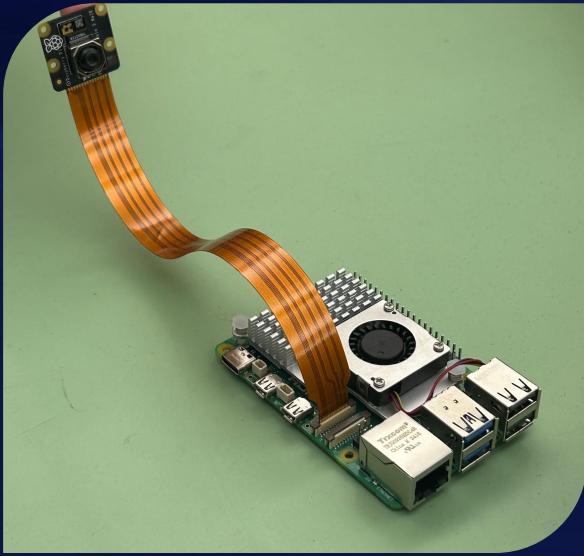


# Bill of Materials- Semester Two

Item	Category	Unit Cost	Total Cost
Cerpourt Threaded Inserts	Hardware	\$3.66	\$3.66
Camera Swivel Joint	Hardware	\$8.90	\$8.90

Total:  
\$12.56

# Build and Assembly Record

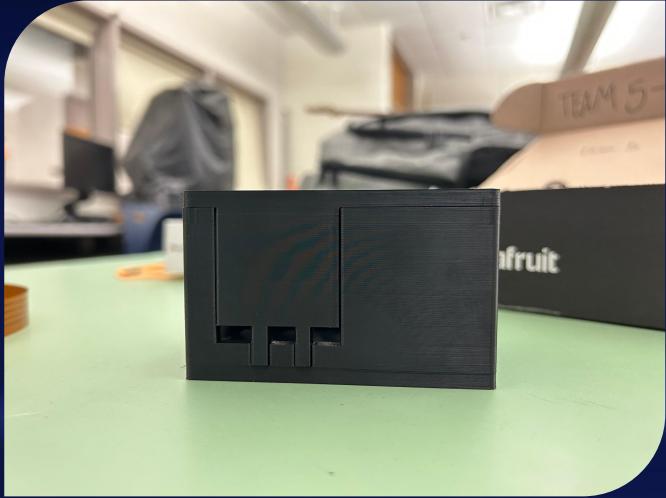


# Build and Assembly Record



# Form

- **SYSTEM HOUSING** should be printed with PETG filament
- **SYSTEM** should not exceed 200 grams
- **SYSTEM** should be contained in a 3d printed **HOUSING**  $97\text{mm}\pm3\text{mm}$  x  $67\text{mm}\pm3\text{mm}$  x  $59\text{mm}\pm3\text{mm}$   
(Length x Width x Height)



# Fit

- **SYSTEM** should be mounted semi-permanently to the wall via self tapping screws.
- **SYSTEM** should remain mounted for at least 3 years.



# Function

- **SYSTEM** should detect an **OCCUPANT** in a chair from 15 ft away
- **SYSTEM** should detect chair data upon **USER** request with a maximum latency of 1 second.
- **SYSTEM** should be able to detect 2 **OCCUPANTS** with an accuracy of  $\pm 1$
- **SYSTEM** should be powered via wired 5.1V 5A power.

# Prototype Test Result and Evaluation

3.1.2 Weight: Pass

3.1.3 Housing: Pass

3.2.1 Range: Pass

3.2.2 Latency: Pass

3.2.3 Quantity Detectable: Pass

4.1.1 Operating Temperature: Pass

4.1.3 Lifetime: Pass

4.2.1 Failure Rate: Pass

4.10.1 Environmental Impact: Pass

# Demonstration

The screenshot shows a web browser window for 'OKAA Solutions' at localhost:3000. The interface includes a sidebar with icons for file operations like Open, Save, Print, and a search bar. The main header has 'OKAA Solutions' and navigation tabs for 'Home', 'HotSeat', and 'Admin'. Below the header, a banner reads 'OKAA Solutions' and 'Working to solve workplace problems with innovative AI/ML applications'. A central callout box says 'Discover Our Latest Project' with a subtext about an AI-powered occupancy detector and a 'Learn More' button. To the right is a screenshot of a software interface titled 'HotSeat' showing a complex code editor and various toolbars. At the bottom, there's a 'Testimonials' section with three cards: one from John Doe praising the platform's transformation, one from Jane Smith highlighting features and support, and one from Chris Johnson noting time savings.

OKAA Solutions

Working to solve workplace problems with innovative AI/ML applications

Discover Our Latest Project

A real-time AI-powered occupancy detector that helps you find an empty seat in a crowded space.

Learn More →

HotSeat

This platform has transformed the way I work. Highly recommended!

— John Doe

Amazing features and exceptional support from the team!

— Jane Smith

I've saved so much time and effort thanks to this solution.

— Chris Johnson

542 PM  
4/23/2025

# Demonstration



## Chair Occupancy Detection

**Progress**

- ✓ Image Capture
- ✓ Image Analysis

Complete

**Analysis Result**

3 out of 3 chairs are currently occupied (100.00%).

Occupied

Unoccupied

Chair	Status
Chair 1	Occupied
Chair 2	Occupied
Chair 3	Occupied

**Start Again**

# Demonstration



**Chair Occupancy Detection**

**Progress**

- ✓ Image Capture
- ✓ Image Analysis

Complete

**Analysis Result**

2 out of 3 chairs are currently occupied.

Occupied	Unoccupied
Chair 1	Chair 2
Chair 3	

**Start Again**

# Demonstration



The screenshot shows the 'Analysis Result' screen of the app. At the top, it says '0 out of 3 chairs are currently occupied (0.00%)'. Below this is a legend with a teal square labeled 'Occupied' and a white square labeled 'Unoccupied'. A grid below shows the occupancy status for three chairs: Chair 1 is 'Occupied' (teal), Chair 2 is 'Unoccupied' (white), and Chair 3 is 'Unoccupied' (white). At the bottom is a green button labeled 'Start Again'.

# Reflection

- Development of mounting system
  - Streamlined design from PDR
    - Keyhole mount replaced with screws
  - Issues with threaded inserts
    - Purchased wrong thread width
- Reprint of housing
  - Accommodation for mounting system
- Finalized test procedure documentation
  - Maintaining references between documents

# Thank You

Any Questions?

