

## Project Overview

Our project is an autonomous robot that can identify both plastic and real chicken eggs of a specific color, navigate to, acquire, and return them to the chosen starting position. This allows students to develop a better understanding of autonomous robotics and their applications. This is useful because technology is increasingly trending towards autonomous operation. The global Autonomous Mobile Robots market value is expected to more than double by 2026.[1]

## Subsystem Assignments

- Michael - Navigation: Codes robot to navigate as expected
- Zachary - Object Detection: Starting square and egg color/location detection
- Sammy - Sensor and User Interface: Detects boundary and simplifies user operation
- Daniel - Gripper and Power: Powers components and operates gripper

## Requirements & D2 Plans

### D1 Requirements

- Traverse the field without crossing the outer boundary
- Demonstrate capability of discerning between multiple colors of plastic eggs
- Gripper can grasp and hold an egg without breakage
- Preliminary power budget and initial current measurements

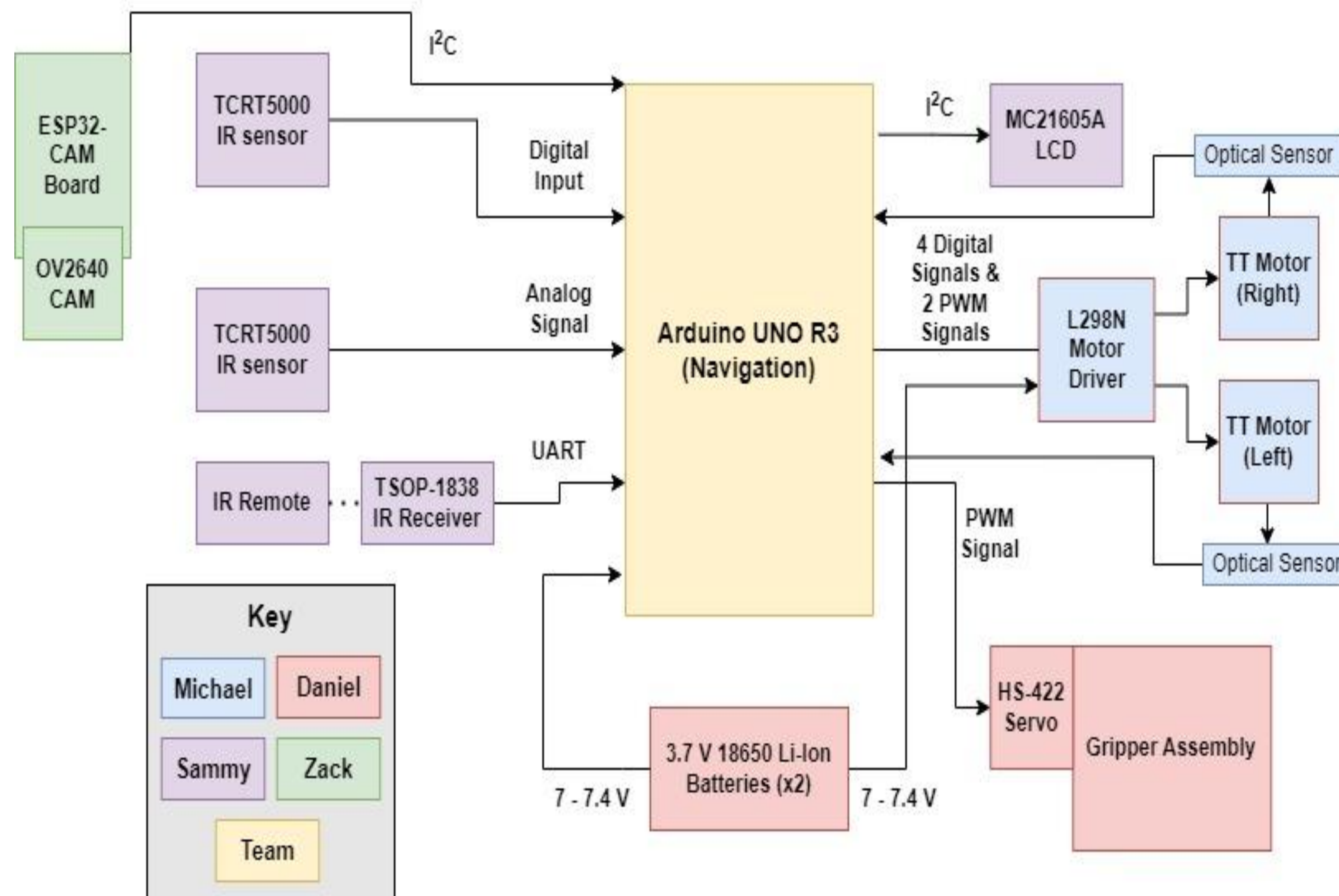
### Plans for D2

- Refine subsystem designs
- Thoroughly test all subsystems for reliability
- Integrate all subsystems
- Testing and troubleshooting
- Complete final power budget
- User Interface completed(LCD display and IR remote)

# E1.08 - Egg-Fetch Robot

Michael Black (PM), Sammy Girma, Zachary McLeod, Daniel Ontiveros

## Top Level Block Diagram



## Team Info



Michael Black, Sammy Girma, Daniel Ontiveros, Zachary McLeod

## Results of First Semester

- Gripper is functioning independently of robot.
- Motors are getting sufficient voltage and navigating the field.
- IR sensors capable of detecting the boundary.
- Battery life expected to be approximately 54 minutes when operating in max consumption conditions.
- ESP-32 CAM is capable of detecting objects and differentiating between different colors.

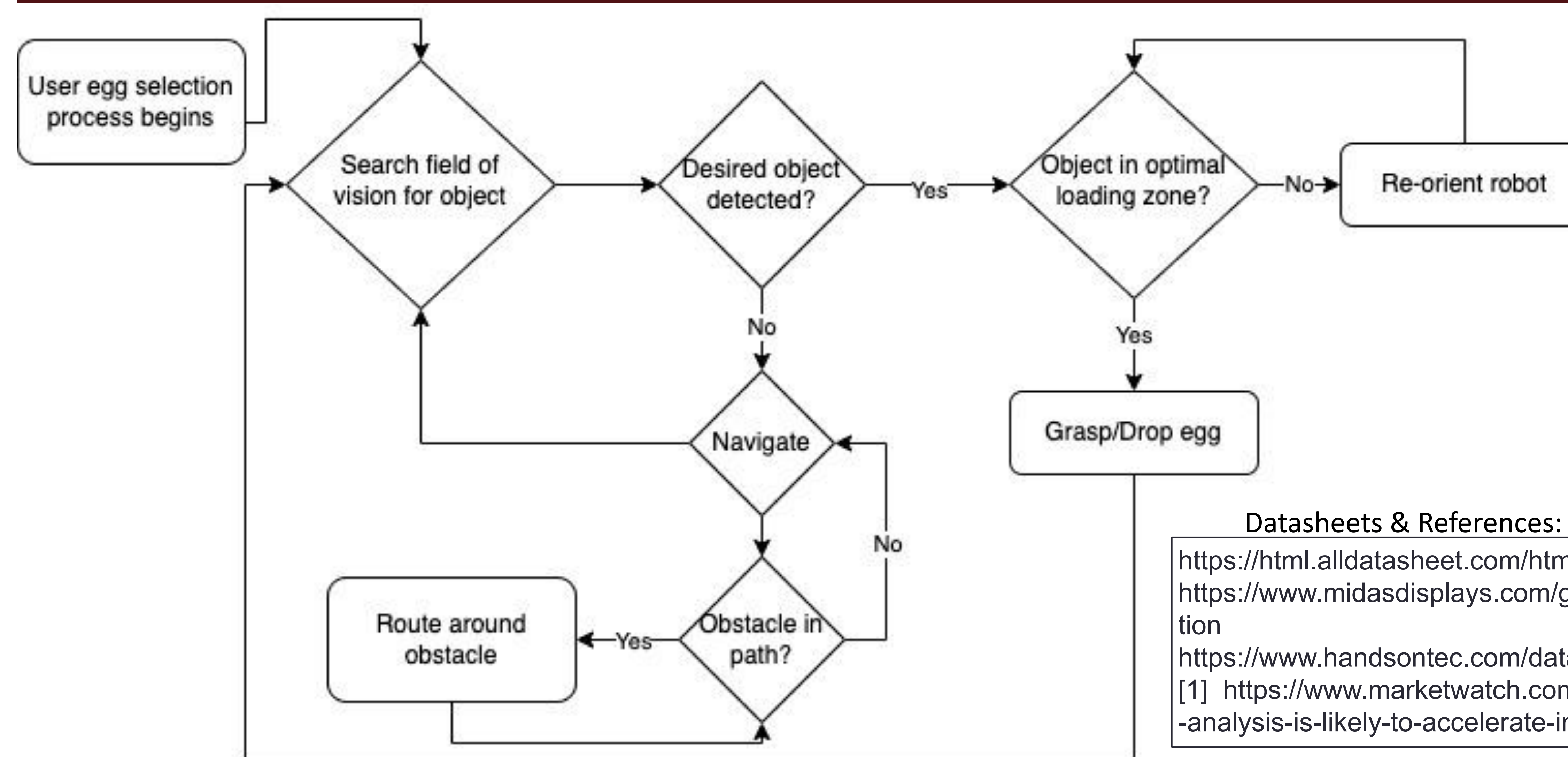
## Estimated Power Consumption

| Subsystem          | Idle          |               | Active        |               |
|--------------------|---------------|---------------|---------------|---------------|
|                    | Current (A)   | Power (W)     | Current (A)   | Power (W)     |
| Navigation         | 0.080         | 0.4           | 0.342         | 1.71          |
| Object Detection   | 0.180         | 0.9           | 0.180         | 0.9           |
| Gripper            | 0.008         | 0.04          | 0.427         | 2.135         |
| Boundary Detection | 0.083         | 0.415         | 0.091         | 0.455         |
| User Interface     | 0.0075        | 0.0375        | 0.0075        | 0.0375        |
| <b>Totals</b>      | <b>0.3585</b> | <b>1.7925</b> | <b>1.0475</b> | <b>5.2375</b> |

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## Navigation Flow Chart



### Datasheets & References:

- <https://html.alldatasheet.com/html-pdf/26604/VISHAY/TSOP1838/369/2/TSOP1838.html>
- <https://www.midasdisplays.com/getattachment/01edb5e1-6c01-4f5a-a830-9be691f59d38/specification>
- <https://www.handsontec.com/dataspecs/module/ESP32-CAM.pdf>
- [1] <https://www.marketwatch.com/press-release/autonomous-mobile-robots-market-size-with-swt-analysis-is-likely-to-accelerate-industry-growth-in-machinery-and-equipment-2022-10-29#>