

EE/CprE/SE 491 WEEKLY REPORT 4

Report Details:

Timeframe: 10/15/2025 - 10/21/2025

Group number: 21 (*sdmay26-21*)

Project Title: A Smart Aquatic Ecosystem

Client &/Advisor: Md Maruf Ahamed

Team Members/Role:

Griffin Urban — Frontend Developer

Daniel Pender — Hardware

Aden Koziol — AI Population Tracking

Ryan Holden — Backend/Frontend Developer

Marina Mannan — Embedded Systems Engineer

Carson Irving — Backend/Frontend/AI

Max Purvis — Hardware

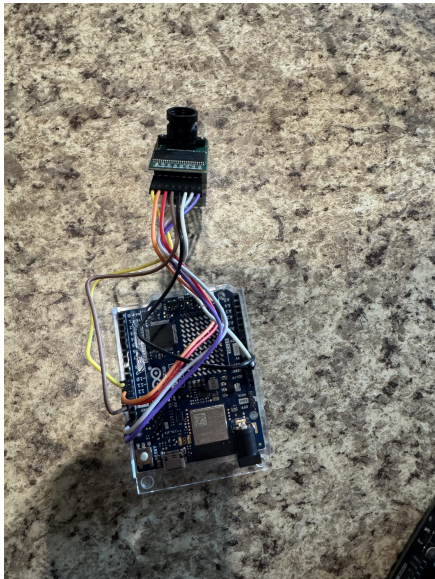
Weekly Summary

This week, the team made steady progress on both the hardware and software aspects of the project. On the software side, Aden worked on implementing object detection using Tensorflow with the help of Carson, updating the camera system to stream images to the server. Ryan and Griffin worked on developing the UI/UX of the dashboard and began testing/integrating websockets. On the hardware side, Marina began prototyping the compartment housing by getting all sensor dimensions. Max also worked on the feeder design and how it can be implemented into the dashboard. Overall, this week marked strong progress across all areas.

Past Week Accomplishments

- **Aden:** Found a useful library for object detection using Tensorflow. Created a prototype script to detect images of fish in a tank. Set up an environment with dependencies.
- **Marina:** This week, I collected dimensions for all components and set up Fusion 360 and Tinkercad to begin prototyping. I sketched and labeled zones for the Arduino and sensors on the tank lid, and explored a few potential prototype layouts.

- **Carson:** Arduino camera functionality, and camera pushing images to the database over HTTP. Had to implement a buffer to stream the images to the server, as the Arduino can't really handle pushing it all at once. I also had to adjust the camera library to work with Arduino Uno R4, as only the R3 was officially supported. Implemented more specific email notifications, and am investigating an issue with email authentication. **Picture of Arduino with a camera:**



- **Max:** Started building a prototype fish feeder. What I have right now technically works, but we need to come up with something more practical. Also, a stronger servo motor is probably needed because the one I am using currently can't support very much horizontal weight, and an external power supply to make sure the motor doesn't pull too much current through the Arduino. I also rewired everything to clean up the circuit and removed the LCD display, as it was unnecessary. We currently have the pH, temperature, and turbidity sensors up and running. The pH sensor still needs to be calibrated, but it works. I also helped Carson set up the camera.
- **Danny:** tested all of the sensors. Worked with Max and Carson to get the camera wired up and transmitting data. The next step is to work with Aden in order to get the AI to start interpreting data from our camera. Since Max has gotten a workable fish feeder up and running, I will be working on a way to house the whole system.
- **Ryan:** I continued developing the frontend user interface along with Griffin. I wrote unit tests for a few of the HTTP requests that we currently have set up.
- **Griffin:** Continued work on the frontend user interface, created an interface for testing websockets, but was unable to receive notifications through the websocket. Created a branch for the chart and researched different libraries for plotting data.

Pending Issues

- N/A

Individual Contributions

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Aden	- Found object detection library - Created a prototype script - Set up the dependency environment	8	25
Marina	- Collected dimensions of all components - Set up Fusion 360 and Tinkercad to begin prototyping - Sketched and labeled zones for the Arduino and sensors on the tank lid	10	25
Carson	- Arduino Camera Functionality - Streaming image to the backend from Arduino - Implemented more email notifications - Adjusted the camera library to work with Arduino Uno R4	8	29
Max	- Fish Feeder Prototype - Tested Sensors - Arduino Camera Functionality	10	27
Danny	- Camera wiring - pH and oxygen sensors set up	11	27
Ryan	- User interface updates - Wrote unit tests for HTTP requests	8	23
Griffin	Worked on Frontend design, page layout, and Websocket notifications	8	23

Comments and Extended Discussion

- N/A

Plans for Upcoming Week

- **Aden:** Create a Docker container so that other team members can easily run my code. This could also be a good idea, as we can run it either on the Linux server or through a cloud provider. Start looking into fine-tuning and background subtraction for when we get fish in the tank.
- **Marina:** Continue prototyping in Fusion 360 and Tinkercad, aiming for a finalized CAD layout with accurate dimensions and component placement.
- **Carson:** Continue to work on email notifications. Work with the frontend to decide if we need WebSocket for anything other than notifications. Work with the frontend for HTTP requests for graphing data.
- **Max:** Combine the Arduino code with the code for the camera, as well as the circuitry, so it's all one piece. Continue developing the fish feeder, look into stronger servos. Work on getting the UNO R4 connected to wifi. Figure out the current draw of all components. Continue research on the dissolved oxygen sensor.
- **Danny:** Help compress all of our circuitry into a single board so that it isn't so unwieldy. Try to get the R4 to work with the camera by integrating some new Arduino code. Make sure that we have adequate power for all the sensors for what we're working with.
- **Ryan:** Work with Carson to set up HTTP requests for graphing data. Use websockets or HTTP requests to implement live data updates on the frontend.
- **Griffin:** Dive into graph libraries and decide which one would be best to use for the project. Start building a prototype on a new branch to plot data trends. Continue to work on getting websocket functionality up and running.

Summary of Weekly Advisor Meeting

- N/A