

Report Details:

Timeframe: 10/22/2025 - 10/28/2025

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 solid progress on both the hardware and software fronts. On the software side, we developed a Docker container to streamline running AI detection scripts, configured a new, more powerful Oracle server, added unit tests for models and the Image Controller, and set up systemd service integration. On the hardware side, Marina designed a preliminary fish tank lid in Fusion 360, Max researched power requirements for sensors, cameras, and servos, and began an Arduino sketch for the dissolved oxygen sensor. Danny focused on consolidating sensors into a stable power system and began planning PCB development for long-term reliability. Overall, the team made great progress toward a more integrated and efficient system.

Past Week Accomplishments

- **Aden:** Worked on making a Docker container so that groupmates can run my AI detection scripts without installing a bunch of dependencies.
- **Marina:** This past week, I focused on conceptualizing and developing a preliminary design for the fish tank lid using Fusion 360. The design includes a 60x80 mm enclosure to house the Arduino, sensors, batteries, and servo, along with a hole for the automatic feeding mechanism, ventilation holes to prevent overheating, and wire routing holes for organized cabling. I also considered future PCB integration and 3D printing, and identified that finalizing the design will require access to the actual hardware components.
- **Carson:** Configured a new Oracle server with much more compute power. Created Unit Tests for all models and the Image Controller. Configured the application to build for ARM, and configured the application to run as a systemd service.
- **Max:** Looked into external power supplies for the sensors, camera, and servo, so we don't pull too much from the Arduino. Researched the operating currents for each of the components. Looked into the dissolved oxygen sensor a bit more, started the Arduino sketch for it.

- **Danny:** Working to consolidate the many sensors we have into a more manageable system. Ensure that all components are going to have the necessary power for stable operations for sustained periods of time. Once that gets situated, many start developing a PCB for the components and the power converter.
- **Ryan:** Created unit tests for all controllers other than the image controller. Minor fixes to frontend user interface components.
- **Griffin:** Researched graph solutions for data display on the dashboard. Debugged user interface HTTP methods that were not dealing with errors effectively.

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	• Work on the Docker container	6	31
Marina	• Designed a preliminary fish tank lid in Fusion 360 • Considered PCB integration and 3D printing for future assembly	6	31
Carson	• Set up XUNIT for Unit Testing the backend • Created Unit Tests for All Models and For the Image Controller. • Set up a new, more powerful Oracle server • Configured the server with the backend as a systemd service that will auto-run • Configured the application to build for ARM, as that is what the Oracle server is based on	8	37
Max	• Power supply • Research	6	33
Danny	• Stable power design • Implementation of a power converter?	7	34
Ryan	• Created unit tests for all controllers • Updated frontend user interface	8	31
Griffin	• Researched graph solutions • Debugged HTTP request methods	7	30

Comments and Extended Discussion

- N/A

Plans for Upcoming Week

- **Aden:** Continue working on the Docker container. I will try and finish it. Look into background subtraction and confidence levels.
- **Marina:** Continue refining the Fusion 360 lid design by exploring alternate layouts, ventilation patterns, and wire-routing options. Prepare documentation for mounting and assembly considerations, and research 3D printing materials and tolerances so the design is ready to finalize once component measurements are confirmed.
- **Carson:** Set up a GitLab CI/CD pipeline to test and deploy the backend automatically. Make sure the frontend can communicate with the WebSocket.
- **Max:** Measure current draw from each component, connect Arduino to WiFi, and continue research.
- **Danny:** Work with Max to ensure that the long-term operation is stable. Talk with Max and Marina about possible PCB architecture.
- **Ryan:** Implement live data updates on the frontend using HTTP requests to the server.
- **Griffin:** Implement more comprehensive testing and unit testing of the frontend. Work with Carson to get notifications up and running.

Summary of Weekly Advisor Meeting

- N/A