

EE/CprE/SE 4920 WEEKLY REPORT 1

Report Details:

Timeframe: END of 4910 - 2/5/2026

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

Despite being in the first couple of weeks back from break, the group has made significant progress. For a short summary Marina was able to start and finish printing the Lid (now waiting for assembly), Aden was able to get his python API setup to run the uploaded images through his AI model, Griffin was able to get testing coverage for the frontend up to his desired goal of ~80%, Max recalibrated and repaired the pH sensor and looked into camera placement, Ryan was able to look into everything else we needed to get the tank fish ready and place the order through ETG, Danny started designing the automatic fish feeder in Fusion360, and Carson was able to implement authentication and host API Documentation. Overall, the group has made great progress since changing our processes at the start of the semester, and we aim to keep the pace of progress going.

Past Week Accomplishments

- **Aden:** Deployed Python scripts on the server. Added to the image API endpoints so that images are automatically sent through Python scripts, and fish are detected.
- **Marina:** Modified the lid prototype design and printed the 3D model over the first two weeks. Looked into camera mount considerations and modeled an initial design.
- **Carson:** Implemented authentication for our web app using Microsoft Identity Model to generate JWT tokens. I then implemented an account creation and login endpoint, using one-way hashing and salting to securely store credentials. I created a basic login page on the frontend to support this. I then changed almost all the models and controllers to support per-user data and to return only the data for the user making the request. I installed a fisheye lens on the camera and calibrated it. I wrote a simple Python program that reads the Arduino's serial output to make this a little easier. I created a network diagram to show which ports all of our services run on, how they communicate, and which ports are open on the virtual machine. I updated all unit tests to support JWT authentication, providing fake user IDs and usernames. I started working on implementing the feeder control into the Arduino script. I will need to finish this up once we get a more

solidified design. I added API Documentation hosted at <https://fishtankisu.duckdns.org/Docs/>, which is automatically updated via CI/CD whenever changes are made.

- **Max:** I rehydrated the pH sensor probe using the KCL storage solution, then calibrated it. I also looked into wiring options for the camera, because it will be placed far away from the rest of the circuit. For now, we are just going to daisy chain Arduino jumper wires from the Arduino to the camera. If that causes issues, I'll look into an alternative method. I also discussed general tank setup with the team, including camera placement.
- **Danny:** Over the past week, I met with my team to develop and refine the design of a feed holder that meets all project specifications. This involved evaluating design constraints, discussing multiple concepts, and converging on a solution that is refillable, adjustable, and capable of supporting a large feed capacity. The design process emphasized practicality, ease of use, and adaptability to ensure the final solution integrates effectively with the overall system and meets operational requirements.
- **Ryan:** I researched how to create a safe environment for fish and ordered the necessary materials through ETG. I got a substrate of mixed sand/gravel for the bottom of the tank. I got a water conditioner solution to dechlorinate the water, and a bacterial starter to begin the process of filtering out ammonia and nitrate from the water. In the same order we got fish food, aquarium lights, and other hardware accessories that we needed.
- **Griffin:** Created more unit tests for the web app, created a test suite for the graphing application built in, and created unit tests for JWT and login pages to ensure functionality. Brought overall test coverage up to 80% across the frontend. Began work on the frontend software diagram.

Pending Issues

- [work here]

Individual Contributions

<u>NAME</u>	<u>Individual Contributions</u> (Quick list of contributions. This should be short.)	<u>Hours this week</u>	<u>HOURS cumulative</u>
Aden	● Deployed scripts on the server ● Changed the image controller to work with scripts	10	10
Marina	● 3D printed the lid ● Designed a basic camera mount in Fusion 360	10	10
Carson	● JWT Authentication Implemented ● Basic Login Page ● Tied Almost All Objects With the UserID and Updated Controllers to only return user-specific information	12	12

	● Created Network Diagram ● Password Hashing and Secure Storage ● Installed the Fisheye Lens and made a Python Program To Calibrate more easily ● Added basic feeding functionality to Arduino Program (Incomplete) ● Updated Almost All Unit Tests with Mock JWT Token ● Added API Docs that are hosted on our URL and are updated on changes with CICD		
Max	● Rehydrated and calibrated the pH sensor probe ● Looked into wiring options for the camera ● Discussed Ideas for tank setup	4	4
Danny	● Discuss overall lid design and feeder mechanism ● Design Feed holder to specifications	7	7
Ryan	● Researched proper water care techniques ● Placed ETG order for all the necessary materials to prepare the tank for fish	5	5
Griffin	● Created more unit tests for existing functions on the web app ● Created tests for graphing library ● Created tests for JWT and the Login page ● Brought overall frontend test coverage up to 80% ● Began work on the frontend software diagram	8	8

Comments and Extended Discussion

- N/A

Plans for Upcoming Week

- **Aden:** Create a tool that uses the Image API endpoints and converts from base64 to help with future testing.
- **Marina:** Assemble the lid with Carson. Verify and finalize the camera mount design for 3D printing.
- **Carson:**
Updating Image and Feed Objects/Controllers to respect UserID.
(Update Unit Tests As Well)
Prepare Fishtank For Fish (Assuming Shipment Arrives)
Add local storage support to the Arduino to move feeding times to the SD Card (Assuming Shipment Arrives)
- **Max:** Test the dissolved oxygen sensor to see if it needs recalibration, as it hasn't been used for an extended period. Reassemble/tidy up the entire circuit because things have been unplugged or tangled up from being moved around or used separately.
- **Danny:** Finalize the dimensions of the device. Share with the team what the plan for the feeder is as of now, then begin modeling on fusion 360 if design is accepted.
- **Ryan:** Write comments to create the documentation for our API.
- **Griffin:** Finish frontend software diagram and share with the group for improvements. Possibly edit the login page aesthetically. Begin work on an Account page/menu where the user can log out and view additional account information

Summary of Weekly Advisor Meeting

The meeting began with a review of expectations for the project, including individual responsibilities and overall team accountability. The team discussed the plan moving forward, with an emphasis on preparing the tank and purchasing fish as soon as possible to enable live testing. An update was provided on the current state of the project and overall progress to date. The team also confirmed that individual expectations are being met and that regular weekly team meetings have been maintained to ensure coordination and continued progress.