

EE/CprE/SE 492 Weekly Report

3/27 - 4/09, 2026

sdmay26-20

AI Integrated Drone for Smart Crop Health and Growth Monitoring

Faculty Advisor/Client: Md Maruf Ahamed

Team Members:

- Jongmin Lee, jongminl@iastate.edu - Frontend/AI
- Z Harvey, zdharvey@iastate.edu - Frontend/Backend
- Andres Lopez, andresl4@iastate.edu - Hardware/Firmware
- Alex Pallan, apallan@iastate.edu - Cloud/Security
- Camden Senneff, csenneff@iastate.edu - Frontend/Drone SW
- Caleb Zea, calebzea@iastate.edu - Frontend/Backend
- Srdan Kopunovic, srdank@iastate.edu - Backend/Cloud

Summary of Work:

- Frontend
 - Updated Flight Data page for user-friendly interaction
 - Updated app login logic to not reveal app information until the user fully logs in
 - Met with backend to finalize API design for the final stretch of field implementation
 - Refactored frontend API to connect with our new API design
 - Added view for user to see all their fields, and then they can select a field and see all the flights for that specific field
- Backend
 - Refactored data flow to adjust to newly determined user experience
 - Edited Models to adhere to new requirements for parameter values
 - Edited Database context to handle newly determined table relationships
 - Edited Service layer to adjust for new functionality
 - Updated API layer for new service module function signatures
 - Separated FlightService and FlightData modules
 - Integrated Database Migration Stage in GitLab pipeline
 - Separated Unit and Integration tests in Gitlab pipeline
 - Completed Deployment Stage in pipeline for team server
- Cloud
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- Drone
 - Wired up the drone to the Raspberry Pi, then troubleshooted and

eventually got a working Pi <-> flight controller UART connection, also verifying that we have a working MSP communication protocol implementation.

- Registered the drone with the FAA, we can fly it legally once we have the registration number physically inscribed on it (as long as Alex presses the go button or someone else gets a Part 107 license)
- AI
 - Debugged logic errors in the auto-labeler regarding label 5 misclassifications.
 - Reprocessed 2017 and 2018th data with fixed logic for label 5.
 - Trained the model with the processed data for labels 0 and 1.

Plans for Coming Week + Action Items:

- Jongmin Lee - Prioritize resolving the corruption issues with the 2019 data files to maximize the training set. If no significant progress is made by the end of the week I will pivot to finalize the model using only the 2017 and 2018 data to maintain the project timeline. Complete the training phase for the remaining labels and begin to integrate the model with the backend architecture to make sure the model works fine through the backend.
- Z Harvey - Fully integrate the new API design changes into the frontend, test full frontend functionality and data transfer with new changes
- Andres Lopez - Simulate flight loop testing
- Alex Pallan - Make the changes to the poster that we decided on from the in-class lecture based on the guidelines given. Potentially make a separate second draft with a different layout to see if it can be improved. Also make some changes to the design document as discussed.
- Camden Senneff - Help Andres with any flight loop testing. Get the latest AI model iteration integrated into the Python image processing microservice.
- Caleb Zea - Implement field and image API in the frontend, improve frontend UI, test image transfer
- Srdan Kopunovic - Test the full integrated system with the team, following the listed steps below:
 1. Define a field and save values
 2. Upload defined parameters to drone
 3. Complete a flight and collect images and data
 4. Transfer data from drone to client device

5. Save flight with values to database
6. Forward images to AI service
7. Process Images
8. Provide results to client device

Pending Issues:

- Jongmin Lee
 - The 2019 dataset remains inaccessible due to file corruption, limiting the scope of training.
 - Potential compatibility issues between the YOLO model output and the backend data-handling system.
- Z Harvey
 - Need to change the internals of how our frontend pages retrieve data from the backend, currently stuck on how to refactor everything without it breaking
- Andres Lopez
 - Hopefully the drone does not crash
- Alex Pallan
 - Our poster / presentation / pitch is not finalized and needs some work before it is ready for the end of the semester.
 - The design doc is not ready and needs to be updated for this semester's requirements.
- Camden Senneff
 - Need to get a working AI model integrated into the backend service to make progress on any full integration tests.
- Caleb Zea
 - Need to review newly implemented field and image API connections with the backend
 - Need to acquire a formatted testing flash drive from Camden to test full image transfer flow
- Srdan Kopunovic
 - Determining how the backend file transfer will be implemented with the Python service that queues images for processing and sending them back to the backend

Individual Contributions:

Team Member	Contribution	Week Hours	Total Hours
Jongmin Lee	Focused on improving the accuracy of the automated image labeling pipeline by debugging logic errors with the auto-labeler that were causing misclassifications for Label 5, and reprocessed the 2017 and 2018 datasets to ensure data quality, and completed the model training iterations for Labels 0 and 1.	8	58
Z Harvey	Refactored frontend API calls to connect with the new backend API design. Added new page for user to see all of their fields, select one and then see all of the individual flights for that specific field.	6	44
Andres Lopez	I watched paint dry while trying to get simulation working on my laptop.	5	44
Alex Pallan	Checked on the drone registration with the FAA and went through changes needed for the design document and the poster.	6	42
Camden Senneff	Pi wiring, MSP debugging, X-Plane integration fixes and use instructions.	8	72
Caleb Zea	Flight Data page usability, login logic, Design document work, slides for prof meeting, reviewing merge requests	11	45
Srdan Kopunovic	Refactor of models and data used and collected during a flight period for analyzing field, updated service and API layers for newer functionality needed to handle newly determined data flow and user experience	14	50