

EE/CprE/SE 492 Weekly Report

2/27 - 3/12, 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
 - Working on updating frontend UI so that it looks nice and is usable for end users
 - Refactored frontend page design to have separate files for each page, rather than a monolithic page design
 - Added final UI for the functionality for field saving and creation
 - API connection established, and fields are tied to users
 - Field naming and editing added
- Backend
 - Updated API to store polygon vertex data for field persistence
 - Updated pipeline to a more robust 3-stage build
 - Tested functionality of image and data transfer for unified system:
Drone -> Client -> Backend <-> AI Service
- Cloud
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- Drone
 - Set up X-Plane 11 flight simulator and connected to the INAV simulator, debugged and verified that drone software can communicate with INAV while connected
 - Implemented a virtual controller (pending MSP implementation completion) in the drone software to allow changing drone states from the terminal while this is active
- AI
 - Investigating and debugging logic errors in the auto-labeler regarding label

5 misclassifications.

- Researched alternative methods to resolve auto-labeler edge cases.
- Troubleshooting the data ingestion pipeline to integrate the 2019 dataset.
- Investigating corrupted zip file errors occurring during the automated 2019 data download process.

Plans for Coming Week + Action Items:

- Jongmin Lee - Resolving the outstanding issues with our data preparation pipeline. Plan to finalize research on the best method to fix the auto-labeler's logic for the "label 5" misclassification and implement a working solution. Additionally, prioritize debugging the 2019 data download process to identify the root cause of the corrupted zip file error. Resolving these two blockers will allow me to successfully ingest the historical data and move forward with training the vision model.
- Z Harvey - Find how to take a picture of the Google Maps field & polygon to show to the user as a thumbnail. Develop new APIs that enable connection with the back end for all fields and all functions. By next week all of the field functionality should be done.
- Andres Lopez - Working on MSP functions for needed data between FC and Pi
- Alex Pallan - Monitor completion of drone registration with the FAA and complete any following steps with that process. Additionally reviewing the contents of the poster for the Senior Design course so it adheres to the requirements. Finally establishing a timeline for having our required course materials completed on time with a high level of quality.
- Camden Senneff - Once MSP code from Andres is merged in, begin testing in the X-Plane flight simulator. Wire up a physical UART channel so we can test real MSP communication outside of the simulator.
- Caleb Zea - Test image transfer between drone -> frontend <-> backend, update flight data page to make it usable for users
- Srdan Kopunovic - Add any additional REST API's that the frontend team determines are needed after unified system test, focusing on different image transfer and storage processing. Quality of life improvements for the backend, including more robust error handling, removing stack trace from responses for security, as well implementing more test functions for greater coverage.

Pending Issues:

- Jongmin Lee
 - A definitive solution for the "label 5" misclassification is still pending; the optimal approach is under active research.
 - The auto-labeler code is currently unable to process the 2019 dataset due to the unresolved zip file corruption error, preventing access to that historical data.
- Z Harvey
 - Getting a picture to appear as a thumbnail in the UI elements I'm using is proving to be a major undertaking
- Andres Lopez
 - Finish MSP functions and look into flight loop
- Alex Pallan
 - Poster for the ISU Symposium on Undergraduate Research and Creative Activity is possibly missing some required components. Waiting on instructor feedback.
 - API is still not hosted in cloud yet, unsure if we still want to go in that direction moving forward. I'll have to speak with Srdan about that after they do some testing between frontend and backend.
- Camden Senneff
 - Full simulator testing is pending the completion of the MSP functions and flight loop.
- Caleb Zea
 - Image needs to be reviewed and merged before integration testing can really occur
- Srdan Kopunovic
 - Starting to train a model that can be as accurate as the available data allows, depending on what kind of data I am able to find, as well as test the data transfer between the backend system and the independent AI service

Individual Contributions:

Team Member	Contribution	Week Hours	Total Hours
Jongmin Lee	I focused on debugging the auto-labeler's logic, specifically researching alternative methods to address a persistent error that causes incorrect "label 5" classifications. I also encountered a recurring issue with corrupted zip files. I investigated the root cause of this download error, though a solution is still pending.	8	50
Z Harvey	Added final UI for field creation and saving. API connection established, and fields are tied to the user with full persistence. Field naming and editing added; need to make an API to save the naming conventions.	5	38
Andres Lopez	Wrote a few MSP functions, spent more time parsing what I needed to do than actually doing it :P	5	39
Alex Pallan	Outlined requirements for the Senior Design course, and created the posters both the course and also the ISU Symposium on Undergraduate Research and Creative Activity. Also signed up our team for a time slot to present our project during that event.	8	36
Camden Senneff	Implemented virtual controller for SITL simulation in drone software Got and set up X-Plane 11 Configured INAV SITL plugin for X-Plane, debugged connection issues, and got a full connection between X-Plane <-> INAV <-> our drone software	8	64
Caleb Zea	Fixing old frontend API errors, updating frontend UI, refactoring frontend routing and pages, fixing login/out logic due to refactor	7	34
Srdan Kopunovic	Deployed latest backend build to team server, incorporating full API needs for client app. Updated Field Model to handle polygon vertices needed to store latitude and longitude for users to save created fields. Configured a more robust development pipeline for the .NET program, utilizing a 3 stage test and deployment job.	8	36