

EE/CprE/SE 491 Weekly Report

09/17 - 10/08, 2025

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/Backend/Hardware
- Z Harvey, zdharvey@iastate.edu - Frontend/Backend/Hardware
- Andres Lopez, andresl4@iastate.edu - Hardware/Firmware
- Alex Pallan, apallan@iastate.edu - Frontend/Backend/Hardware
- Camden Senneff, csenneff@iastate.edu - Frontend/Backend/Hardware
- Caleb Zea, calebzea@iastate.edu - Frontend/Backend/Hardware
- Srdan Kopunovic, srdank@iastate.edu - Frontend/Backend/Hardware

Summary of Work:

Continued planning work, including finalizing and validating the drone build. Began individual experimentation with design languages and frameworks. Started several inquiries to secure a test dataset to begin training an AI model on. Started framework for the software that will perform the autonomous flight control and data collection on board the drone. Testing implementing microservice for AI capabilities and connecting it to the project backend and frontend. Created a mock database to map the data that will need to be collected, including a preliminary schema.

Work Period Accomplishments:

- Design Document
 - Introduction
 - Project Requirements
- Hardware parts list development
 - Finalized options to send to the client
 - Calculated flight time, power constraints, and range for an optimal build
- Software development
 - .gitignore
 - Frontend framework
 - Researching .NET documentation for the best implementation
 - Created a base project and CI for the drone controller software
- Backend Implementation
 - Set up the base backend project
 - Started the architecture design document for the backend
 - Researching how to implement microservices for AI imaging

Plans for Coming Week + Action Items:

- Jongmin Lee - Continue refining the vision model requirements section. Begin drafting the model testing and validation plan, specifying dataset verification steps and accuracy thresholds.
- Z Harvey - Respond to companies, see if there's a way to get some of their dataset for our educational purposes. Finalize frontend system design with Caleb and start development on that.
- Andres Lopez - Build drone if ordered a custom drone and ordered within the week. Flash the drone with software that aviate it.
- Alex Pallan- Deploy a test S3 bucket/dummy database to the AWS account with CI/CD through terraform, and come up with plan for account management
- Camden Senneff - Begin writing communication code for the drone controller software based on our expected setup. If parts arrive, help Andres build it.
- Caleb Zea - Learn more about .NET and C# to start on frontend system design
- Srdan Kopunovic - Work on further refining the database table relationships, research what design patterns work for implementing microservices, and gather more test data.

Pending Issues:

- Jongmin Lee
 - Need to finalize access to labeled crop image datasets for initial model validation. Determine performance metric thresholds (precision, recall) to be formally adopted in the validation plan.
- Z Harvey
 - Get a response from companies and a dataset for crops.
- Andres Lopez
 - Get a dataset for crops.
- Alex Pallan
 - Make GitLab runner for CI/CD
- Camden Senneff
 - No drone yet, so we don't know for sure what the drone communication protocol will look like exactly, and we can't test it.
- Caleb Zea
 - Need a larger knowledge base on C# and .NET MAUI
- Srdan Kopunovic
 - Gather test data for flight logs, planning, and data storing to test and better understand the database implementation we want the project to incorporate

Individual Contributions:

Team Member	Contribution	Week Hours	Total Hours
Jongmin Lee	Begin building vision model prototype with school cluster. Collecting open source image data set.	4	6
Z Harvey	Researched and reached out to companies that are similar to our project. Learned how their AI works. Hoping to hear back from them about how to gather data with winter coming. Additionally researched .NET options for frontend.	4	9
Andres Lopez	Researched more about drone parts, finalized options for approval to client. Looked more into software such as betaflyt to program the drone.	2	7
Alex Pallan	Created AWS account, started planning Terraform, reached out to ISU Digital Ag, researched GitLab runners for CI/CD	4	7
Camden Senneff	Extra research and validation on the drone build, including cost optimization and flight time calculations. CI and base project for on-board flight control software.	6	11
Caleb Zea	.gitignore, frontend framework, Design Document work	4	9
Srdan Kopunovic	Database planning, .NET mock database implementation, Design Documentation updates,	4	9