

EE/CprE/SE 492 Weekly Report

2/5 - 2/12, 2026

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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
 - Integrated AWS Amplify into frontend authentication
 - Added Amplify connection to Cognito user pool
 - Added emailing a verification link to users upon sign-up in order to verify their account
 - Refactored the dashboard from one massive 1,200-line file into clean, modular components by creating an organized folder structure.
 - Completed refactoring of field creation, polygon detection, and grid line generation into one file so that having multiple fields in the future will be easier to implement.
- Backend
 - Continued implementation of end-to-end tests for the backend system
 - Revised image transfer API and implemented manual tests
 - Created CD pipeline for team test server
- Cloud
 - Edited Cognito user and identity pool settings in order to integrate with Amplify
 - Slimmed down cloud resources to optimize on cost
- Drone
 - Drone flies
 - Though not printed yet, made progress on drone mounts for the Pi and



camera

- AI
 - Analyzed V-R stage mapping feasibility; determined current model detects broad growth phases but lacks resolution for precise leaf-collar counting.
 - Audited external datasets (AI-Hub, Roboflow) and identified critical domain mismatch between available handheld macro imagery and the project's aerial drone requirements.
 - Formulated "Phase Filter" strategy to utilize the current model as a high-level growth estimator instead of a precise V-stage counter.

Plans for Coming Week + Action Items:

- Jongmin Lee - Refine Phase Filter logic to map broad model outputs (Stage 1-5) to estimated V-stage confidence windows. Download the G2F Maize UAV Data dataset from CyVerse, target the March and April 2017 RGB flight logs to isolate V1–V6 growth stages. Analyze the dataset's README and metadata.
- Z Harvey - Add pages and persistence to fields once they're generated. Hoping to have this tied to users as well. After this will figure out how specific the flight paths will be and how to transport and store them on the drone.
- Andres Lopez - Pivoted the camera work to make the drone fly, so still have to implement writing camera data to SD Card. Will try to have done by Sunday to integrate camera and drone together with flying it outside with Camden.
- Alex Pallan - Research the security aspects of this project, including on the hardware level and transferring the data between the drone itself and the server. I also plan to meet with Srdan to coordinate efforts to deploy the API on AWS.
- Camden Senneff - Finalize and print Pi and camera mounts and install to the drone. Will be working with Andres this weekend to perform some test flights. Also going to compile some documentation I've been researching for Andres to use in implementing the MSPv2 commands we need.
- Caleb Zea - Look to see what can be worked on next in the frontend, likely working on frontend -> backend calls for image transfer and figuring out how to pass authenticated user tokens to the backend once the user has signed in. Edit the merge request if needed for Amplify integration
- Srdan Kopunovic - Complete API revision so the frontend has an option to send image data as single requests as opposed to just one array of data. Complete end-to-end tests. Plan backend refactor for directory structure.

Pending Issues:

- Jongmin Lee
 - Lack of precise V-stage labels in public drone datasets remains a blocker; it likely requires self-collection or scope adjustment.
- Z Harvey
 - Nothing right now, had a whole bunch of compilation issues this week that took me ~6 hours to fix, but was able to get it working today. VS code wasn't being detected on my computer.
- Andres Lopez

- The SanDisk file class or whatever that libcamera has to write the data into file looks weird, might just be able to do manually? Who knows
- Alex Pallan
 - The security aspects of the project have not been properly documented and analyzed
 - AWS infrastructure still needs to be set up for the API backend component of our project
- Camden Senneff
 - The drone mounts will take some experimentation and a few prints to get a good fit. It'll also mess with the drone's center of mass, so tuning will be necessary.
 - The camera lens is pretty heavy. I'm looking into purchasing a smaller one at a fixed size that will work for our application to improve battery life.
- Caleb Zea
 - Need to figure out how to add the IAM user permissions for the Amplify user access to extract the JWT token from the user's current session to make the API calls
- Srdan Kopunovic
 - Refactor current architecture for more readable service layer

Individual Contributions:

Team Member	Contribution	Week Hours	Total Hours
Jongmin Lee	Refactored the app.tsx from one massive file into modular components by creating an organized folder structure. Found a possible crucial dataset from the G2F database. Set the Phase filter logic that possibly can help us use the current model with the V-R scale.	10	23
Z Harvey	Completed refactoring of field creation, polygon detection, and grid line generation into one file so that having multiple fields in the future will be easier to implement. Was stuck on compilation issues most of this week but got it resolved and the merge completed.	7	13
Andres Lopez	Worked with Camden to flash software into the drone and configure the drone to fly.	5	14
Alex Pallan	Reconfigured some AWS Amplify resources to reduce cost and investigated techniques to host the backend resources in the cloud, using ECR and ECS services in coordinations.	7	15
Camden Senneff	Drone work, first test flight. Working on modeling the custom drone mounts. Dug into INAV docs and wikis to find details on navigation modes that'll work over MSP.	6	33
Caleb Zea	AWS Amplify is functional for the frontend user authentication and account sign-in + sign-up. AWS Cognito setup and settings configuration to integrate with Amplify	4	7
Srdan Kopunovic	Created API endpoint for single image transfer to create a more scalable approach for the client to use. Continued implementing end-to-end tests to reach ≥ 70 coverage. Implemented continuous deployment for backend to team test server	6	14