MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Habitat Identification Using Drone Imaging

The Capstone Experience

Team GM

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Fall 2025

From Students…
…to Professionals

Project Sponsor Overview

- Founded in 1908 in Flint, Mi
- Largest share of American vehicle market
- Industries include Automotive, Financing, Defense, Software

BUICK

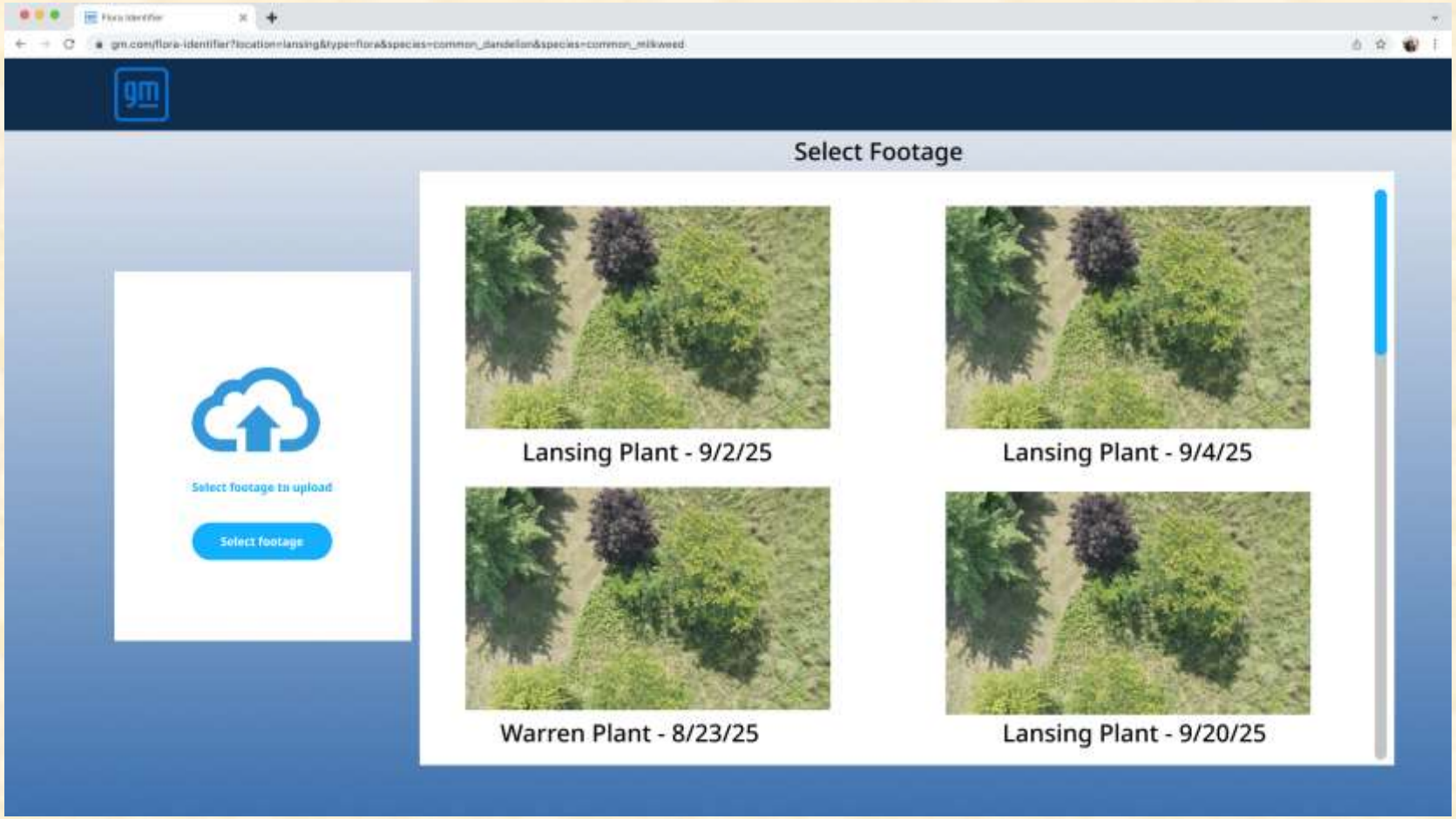
Project Functional Specifications

- Flora species Identification via Drone Footage
- Identifies species much faster than manual labelling
- Separates native from invasive species
- Can be used to single out invasive species and preserve natural ecosystem balance

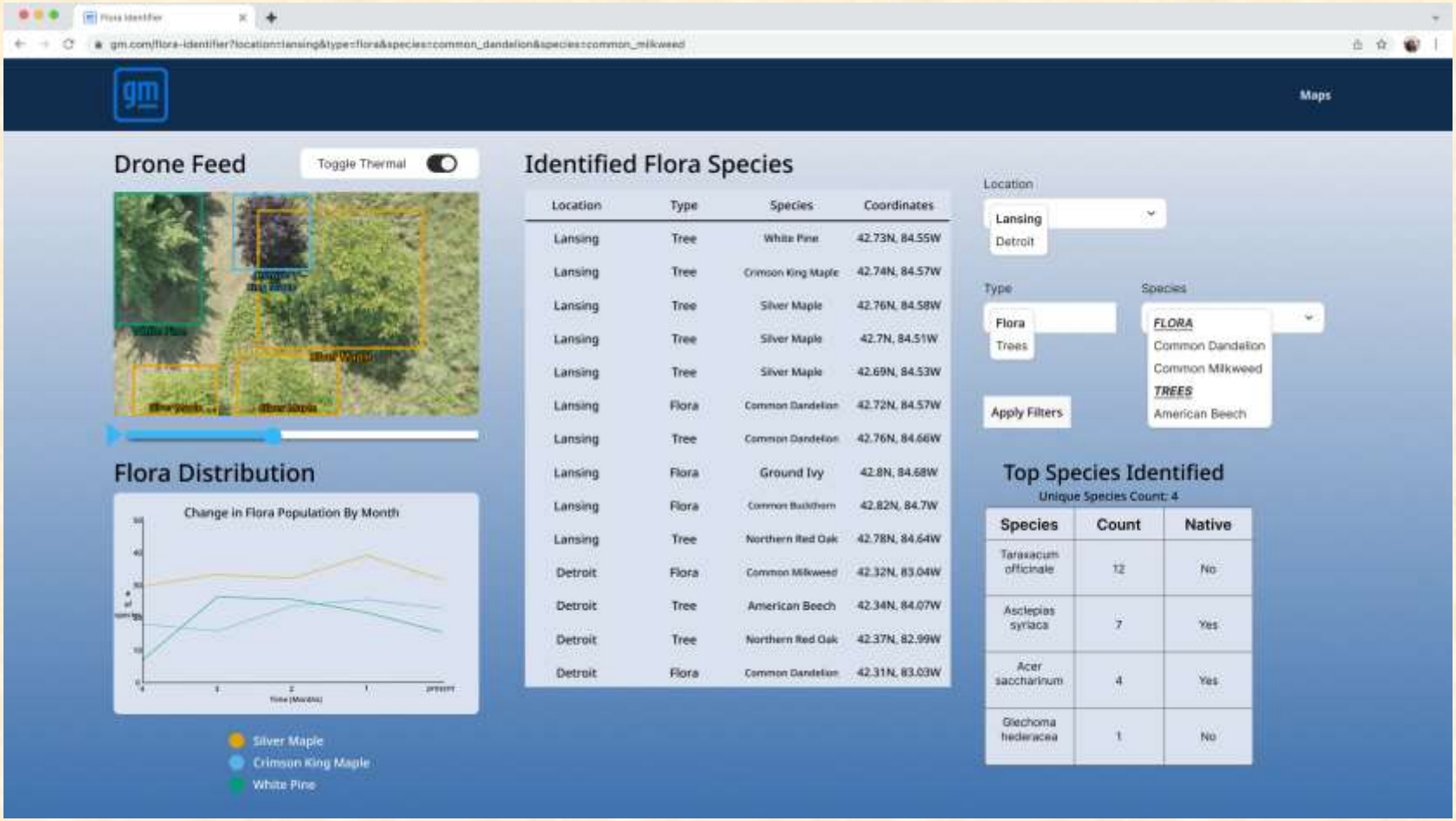
Project Design Specifications

- Standalone Web Application
- Home Page for uploading or selecting drone footage
- Analysis page shows tables and graphs displaying identified species
- Map page will allow the users to select different GM sites and review the drone data
- Review page for manual verification of uncertain model predictions

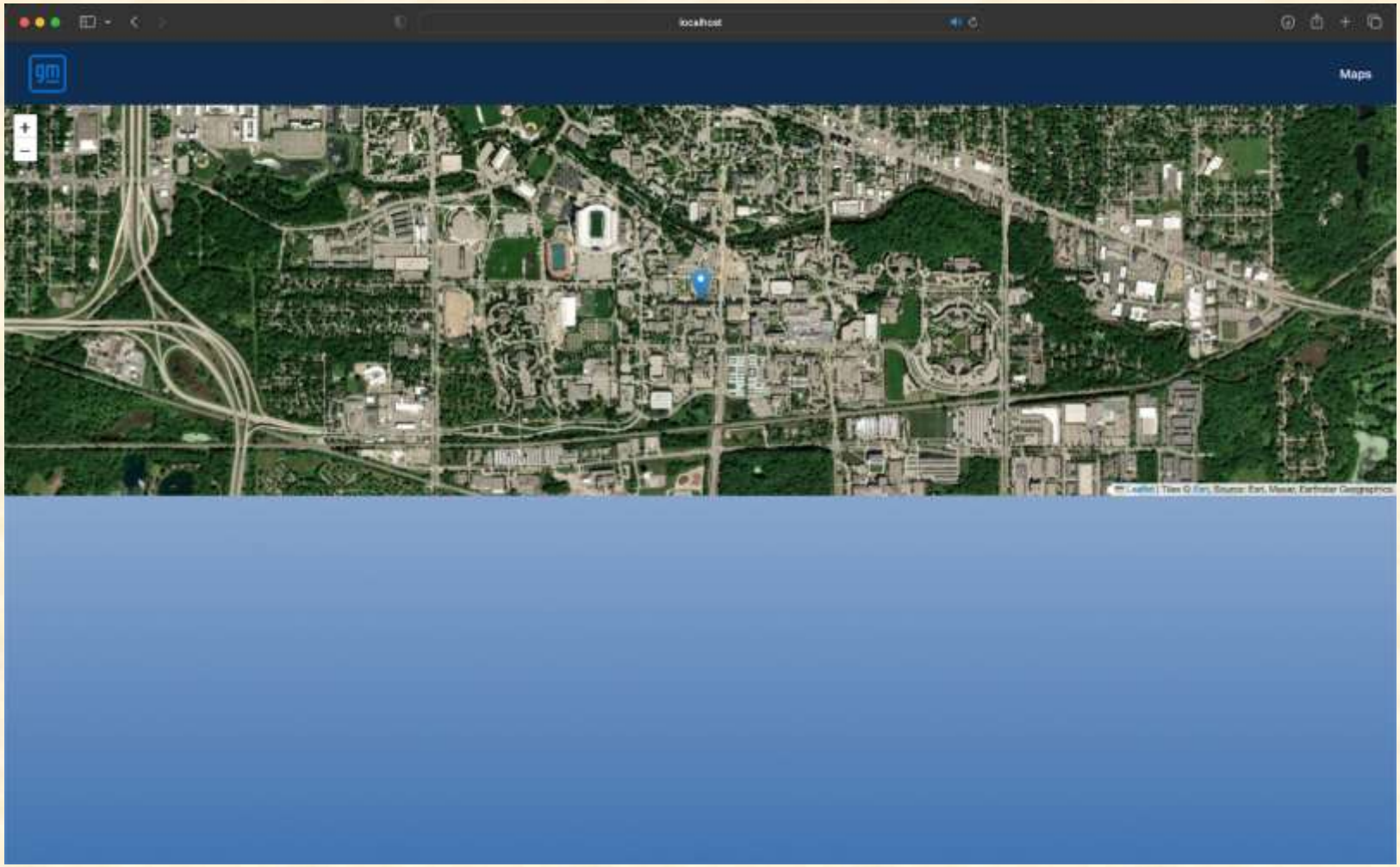
Screen Mockup: Home Page



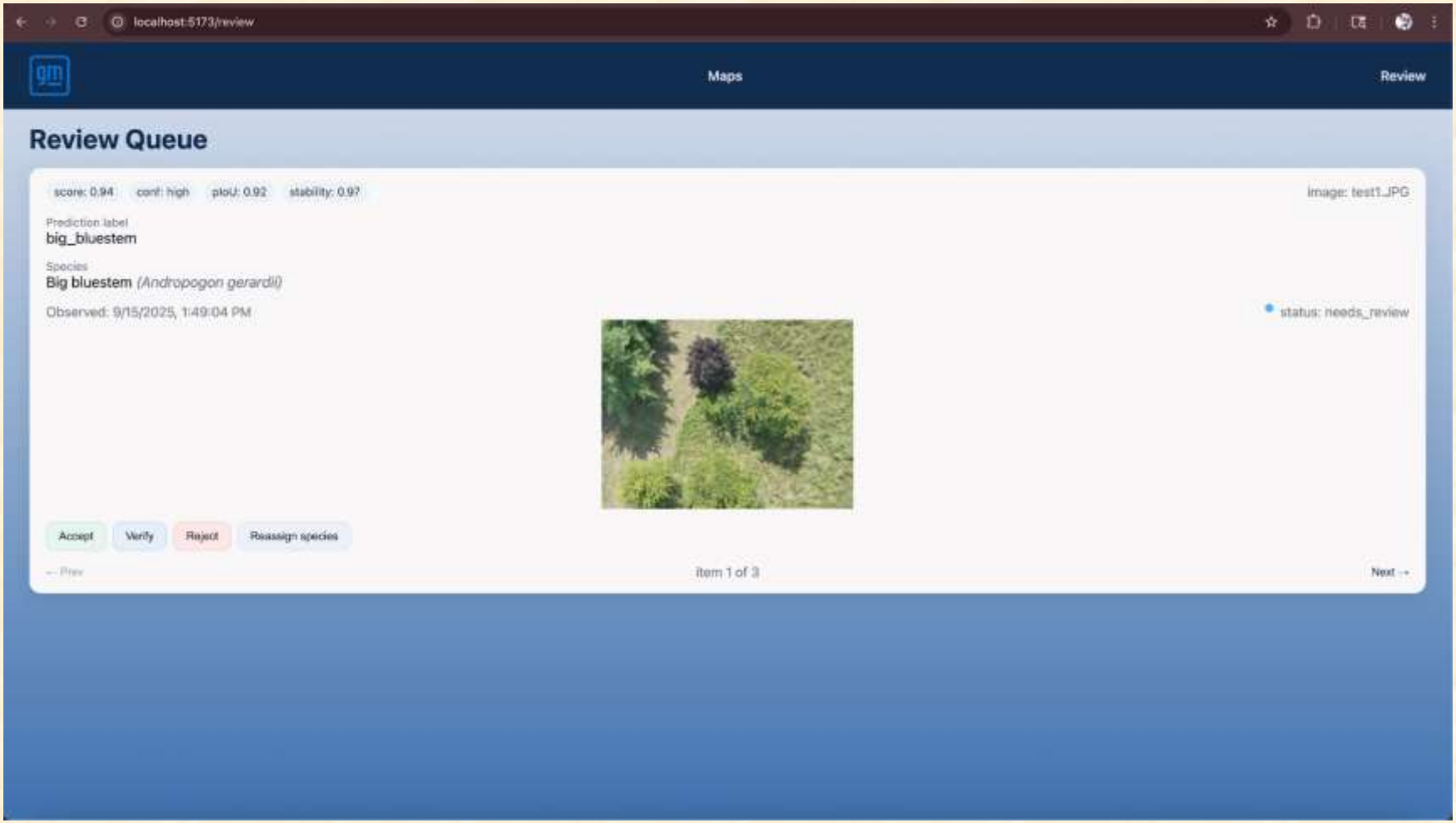
Screen Mockup: Analysis page



Screen Mockup: Map page



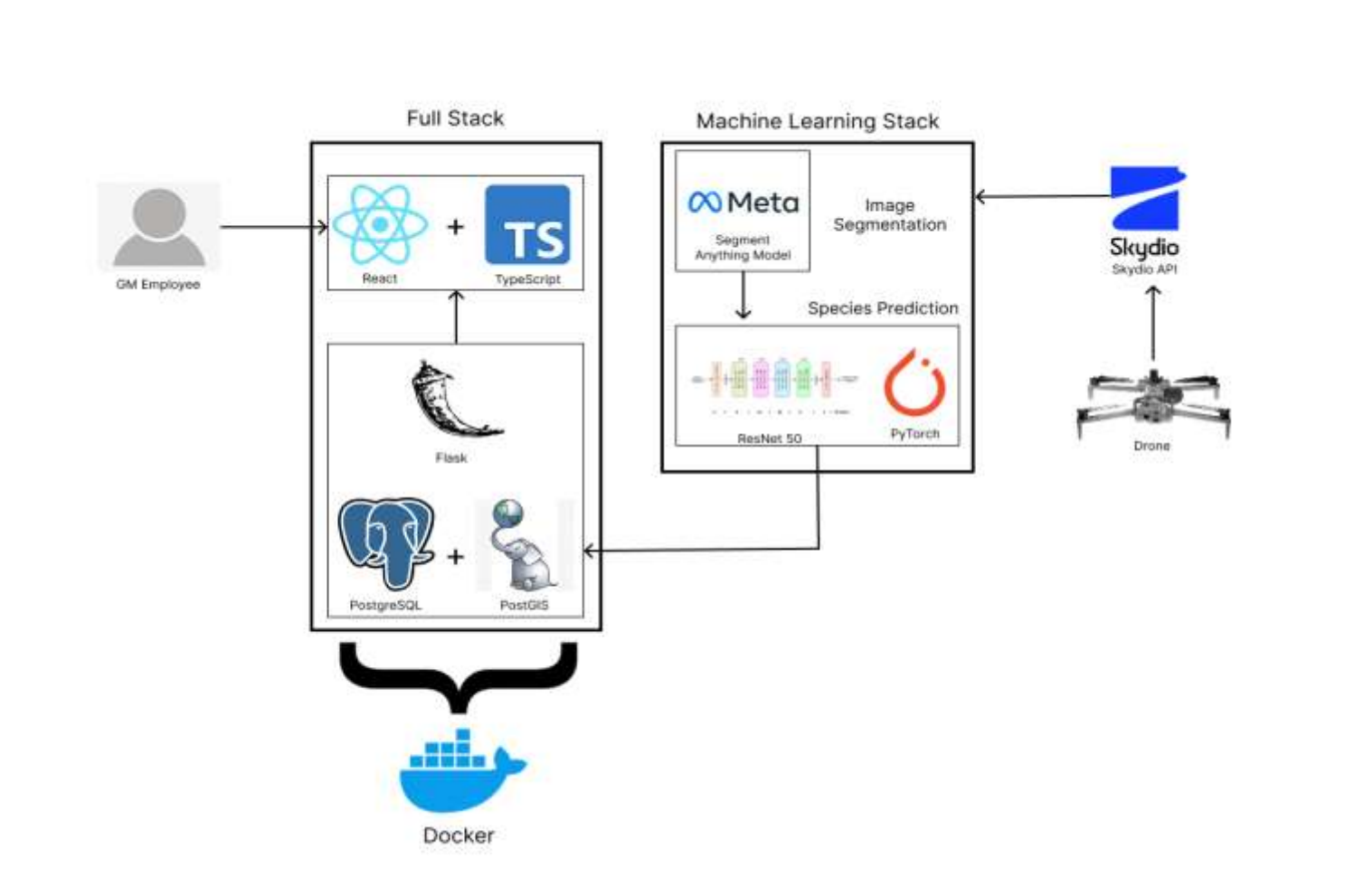
Screen Mockup: Review page



Project Technical Specifications

- Front end user interface to display data and drone footage
- Backend to query data and connect to front end
- Database to store flight, image, and floral data
- Flora localization and identification will be performed
- Map to highlight invasive and native species in the site

Project System Architecture



Project System Components

- Hardware Platforms
  - Deployed web on MSU server
  - SkyDio X10
- Software Platforms / Technologies
  - Flask
  - React + TypeScript
  - Segment Anything Model + ViT
  - Docker

Project Risks

- Machine Learning Algorithm to Identify Flora Species
  - Difficult to accurately identify flora species because of similar features
  - Research image recognition models and open-source plant datasets
- Handling Large Volumes of Image Data
  - Slow to process large volumes of high-resolution images
  - Look into efficient algorithms and MSU hardware
- Distributing and Sharing data to GM
  - No efficient way to transfer data between GM and our team
  - API and documentation to allow the extraction of data from DB
- Poor Image Quality may Hurt Model accuracy
  - Identifying small flora is difficult because of poor image quality
  - Communicate with GM about closer drone fly-bys

Questions?