Senior Capstone Project Proposal

Project Team ID:

Project Title:

Team Members

Member	Name	Email
Team leader	Joshua Hanson	hansja04@pfw.edu
Member 1	Mason Lewis	lewima03@pfw.edu
Member 2	David Markowski-Goldwyn	markdk01@pfw.edu
Member 3	Eh Doh Kue Kyi	kyied01@pfw.edu
Member 4	Matthew Murphy	murpmr07@pfw.edu

Faculty Advisor

Name / Title	Dr. Hajiarbabi
Office	ET 125M
Phone	260-481-5426
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Project Sponsor (Optional)

Contact person	
Contact info	
Company name	
Address	

Project Description

Type	Application development Research-focused Information systems
Abstract	Craft a concise project summary encompassing the problem statement and outlining the desired computing solution or deliverables. We aim to create a compelling abstract as the CS department will disseminate capstone project abstracts to over 150 professionals in the Northeast Indiana region during the project presentations. Additionally, the abstract will be made accessible to the public via the course website. Problem: plant diseases, as well as other ailments, can destroy crops and

	decrease aggricultural yield. Computational Solution: By combining computer vision technology with a custom built expert model, we can design an application that will take an image of a plant, along with metadata about the plant, time and conditions when the picture was taken, and respond with any diseases that are likely afflicting the plant along with a score of the confidence of the assessment.
Requirements	Functional Requirements: 1. User Input Accept plant images (leaf, stem, fruit) from camera or file upload. Collect metadata: plant species, location, growth stage, symptoms (yellowing, spots, wilting). 2. Knowledge Base Contain descriptions of common plant diseases (fungal, bacterial, viral, nutritional deficiencies). Include visual patterns (color, shape, texture) and textual rules (e.g., "brown circular spots with yellow halo = early blight"). 3. Inference Engine Apply reasoning techniques: Rule-based logic for simple cases (e.g., deficiency vs. infection). Image-based classification using ML/CNN models for accuracy. Support certainty factors or confidence scores. Provide differential diagnosis if multiple diseases are possible. 4. Diagnosis & Recommendations Output possible disease(s) with confidence percentage. Suggest treatment: pesticide type, fertilizer adjustment, irrigation change. 5. Learning & Updating Update knowledge base with new diseases or expert input. Optionally retrain ML models when new image datasets are added. 6. Reporting & Record-Keeping Generate plant health reports (disease name, treatment

	recommendation, probability). Store history for trend analysis (e.g., recurring infections in a farm). Non-Functional Requirements 1. Usability Easy-to-use mobile interface for farmers, agronomists, and researchers. Support offline mode (basic rule-based diagnosis without internet). 2. Accuracy & Reliability Image classification accuracy and recall ≥ 85% on validation datasets (e.g., PlantVillage dataset). Robust to variations in lighting, background, and leaf orientation. 3. Security & Privacy Secure storage of farm data and images. Respect data-sharing policies for agricultural institutions. 4. Performance Diagnosis within 5 seconds for a single image. Handle batch uploads (multiple plants at once). 5. Portability Deployable as a mobile app (Android). Lightweight enough to run on low-resource devices in rural areas. 6. Explainability Show reasons for diagnosis: highlighted affected regions on leaf image, or rules applied.
Optional features	• Chatbot assistant: Guides farmers through symptom reporting and recommends best practices. • iOS app • Run CNN completely locally on the phone using MobileNet • Website for browser access • Expand scope of plants and diseases that can be identified

	• Distinguish between disease, pest attack, and nutrient deficiency. • Integration with IoT sensors: Soil moisture, temperature, humidity, and disease risk • prediction. • Disease Spread Forecasting: Uses geolocation + weather data to predict outbreaks. • Multilingual support: For accessibility in rural farming communities.
Required resources (HW/SW)	Specifics have yet to be determined, but we know we will need: Cloud computing for triaining models Cloud computing and storage for hosting the model and providing mobile access Android phones for testing
Technology disclosed? If so, what?	N/A
NDA or IP assignment agreement requested?	N/A
Other notes	

As a member of Project Team, I agree to attend project meetings regularly, participate in developing project actively, and make a full effort to complete this project as proposed.

Team Leader	Joshua Hanson	Date	9/19
Team Member 1	Mason Lewis	Date	9/19
Team Member 2	David Markowski-Goldwyn	Date	9/19
Team Member 3	Eh Doh Kue Kyi	Date	9/19
Team Member 4	Matthew Murphy	Date	9/19

As the Faculty Advisor, I agree to meet regularly with the student project team, manage their activities, and participate in the evaluation of project deliverables.

Faculty Advisor Dr. Mohammadreza Hajiarbabi Date 9/19

As the Project Sponsor, I agree to communicate with the student project team as needed to provide information related to project scope, requirements, assumptions, constraints or other items that may impact project success, and to participate in the evaluation of project deliverables.

Project Sponsor N/A Date

Technology and ECCN:
"If your project involves 'technology' that is either (a) not publicly available or (b) includes proprietary source code (not executable files), then it requires an ECCN." 'Technology,' for this purpose, is defined as "information necessary for the development, production, use, operation, installation, maintenance, repair, overhaul or refurbishing of an item. Technology may be in any tangible form, such as written or oral communications, blueprints, drawings, photographs, plans, diagrams, models, formulae, tables, engineering designs and specifications, computer-aided design files, manuals or documentation, electronic media or information revealed through visual inspection."

Interactive tool to determine ECCN:
https://www.bis.doc.gov/index.php/export-control-classification-interactive-tool

NDAs and IP Assignments:
The sponsoring company typically has NDAs and IP assignment forms that it wishes to use. Neither the NDA nor the IP assignment is an agreement with Purdue directly; these agreements are between the students and the sponsoring company. Of course, our office can review the company-provided documents to be certain it aligns with Purdue's standards. Alternatively, our office has draft agreements which we could provide for the sponsor's use. Again, as NDAs are between the student and the sponsor, Purdue cannot be a party to or advise the sponsor or the student on the NDAs, other than to outline some basic expectations as to fairness and suitability of the NDA to a student project.

Sponsor Acknowledgements:
By way of background, Purdue University professors who have senior capstone class projects involving outside sponsor companies notify our office so that we can prepare an acknowledgement form for the sponsoring company's completion. This is not a contract but an acknowledgement form signed by sponsoring companies which lays out Purdue's guidelines regarding class projects and outside company inputs, potential export control issues, and student intellectual property. Some sponsoring companies offer a monetary donation to the project, but that is not a requirement.