Automated Agriculture System: Accurate Water Management and Disease Analysis

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Our Team

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Content

Background

Develop an automated agriculture system integrating sensors, data analytics, and machine learning for optimized irrigation and disease management.

What is Automated Agriculture System: Accurate Water Management and Disease Analysis

Why are we focusing on this topic?

What are the main problems we identified?

Research Problem

01

Irregular rainfall patterns, including droughts and floods, can disrupt planting schedules, affect germination, and reduce crop yield.

02

Extreme temperatures, both hot and cold, can stress crops, disrupt flowering and fruit set, and lead to yield losses.

03

Limited water availability can lead to reduced irrigation, affecting crop growth and yield.

04

Farmers often lack awareness of crop diseases and their symptoms, hindering effective outbreak management.

Objectives

DEVELOP A DISEASE IDENTIFICATION SYSTEM

Create a model to accurately identify and diagnose three major leaf diseases and three major plant diseases using image analysis and sensor data.

IMPLEMENT ADVANCED WATER MANAGEMENT TECHNOLOGY

Design and integrate a system for real-time soil moisture monitoring and automated fertilizing to optimize water usage and nutrient

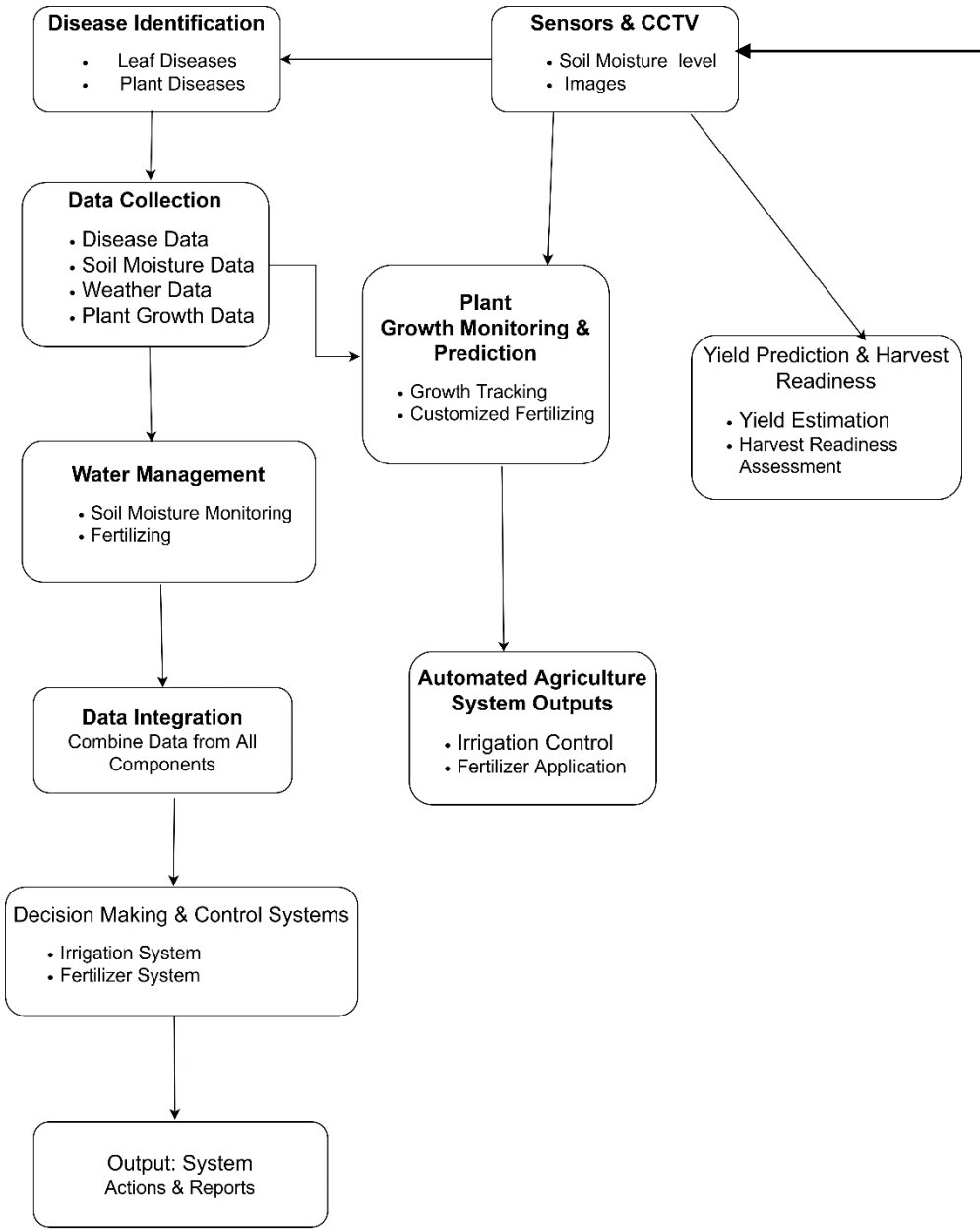
ENHANCE PLANT GROWTH MONITORING AND PREDICTION

Develop methods to monitor plant growth and predict future growth patterns using customized fertilizing strategies and growth

OPTIMIZE YIELD PREDICTION AND HARVEST READINESS

Create algorithms to predict crop yield and assess the readiness of crops for harvest to maximize efficiency and reduce losses.

Overall System Diagram



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Water Management Technology

Introduction

01 Background

02 Research Problem

03 Objectives

Background

Effective water management is vital for sustainable agriculture, ensuring optimal soil moisture levels and nutrient availability

Research Problem

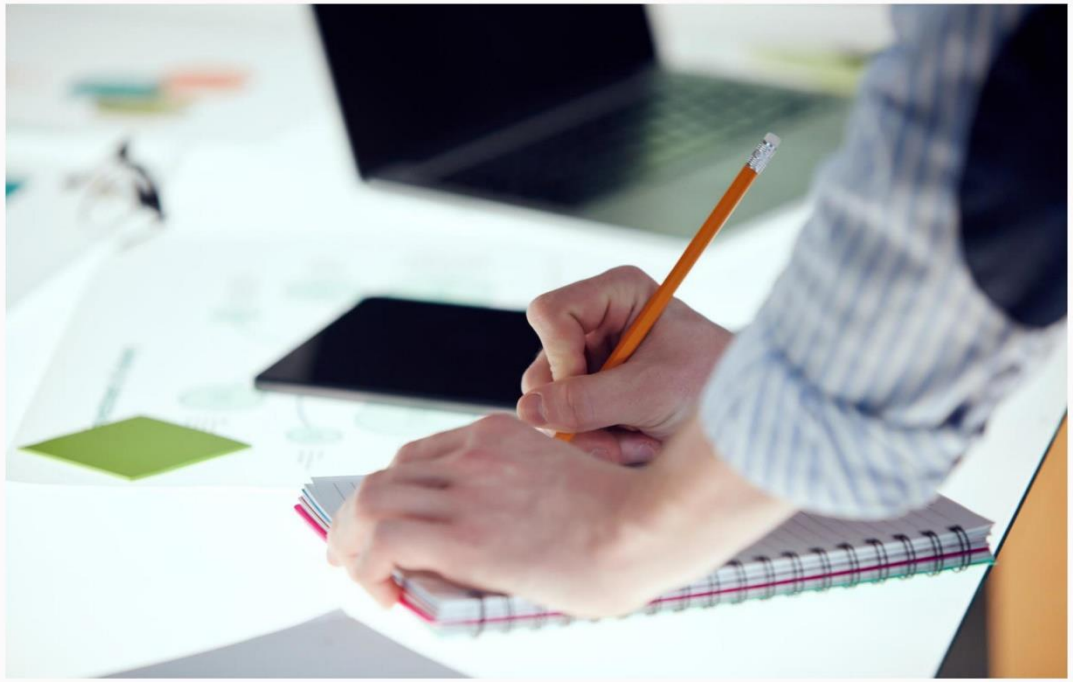
Inconsistent watering practices can lead to over- or under-watering, affecting crop health and yield

OBJECTIVES

Implement soil moisture monitoring systems.

Optimize fertilization processes based on moisture levels.

Methodology

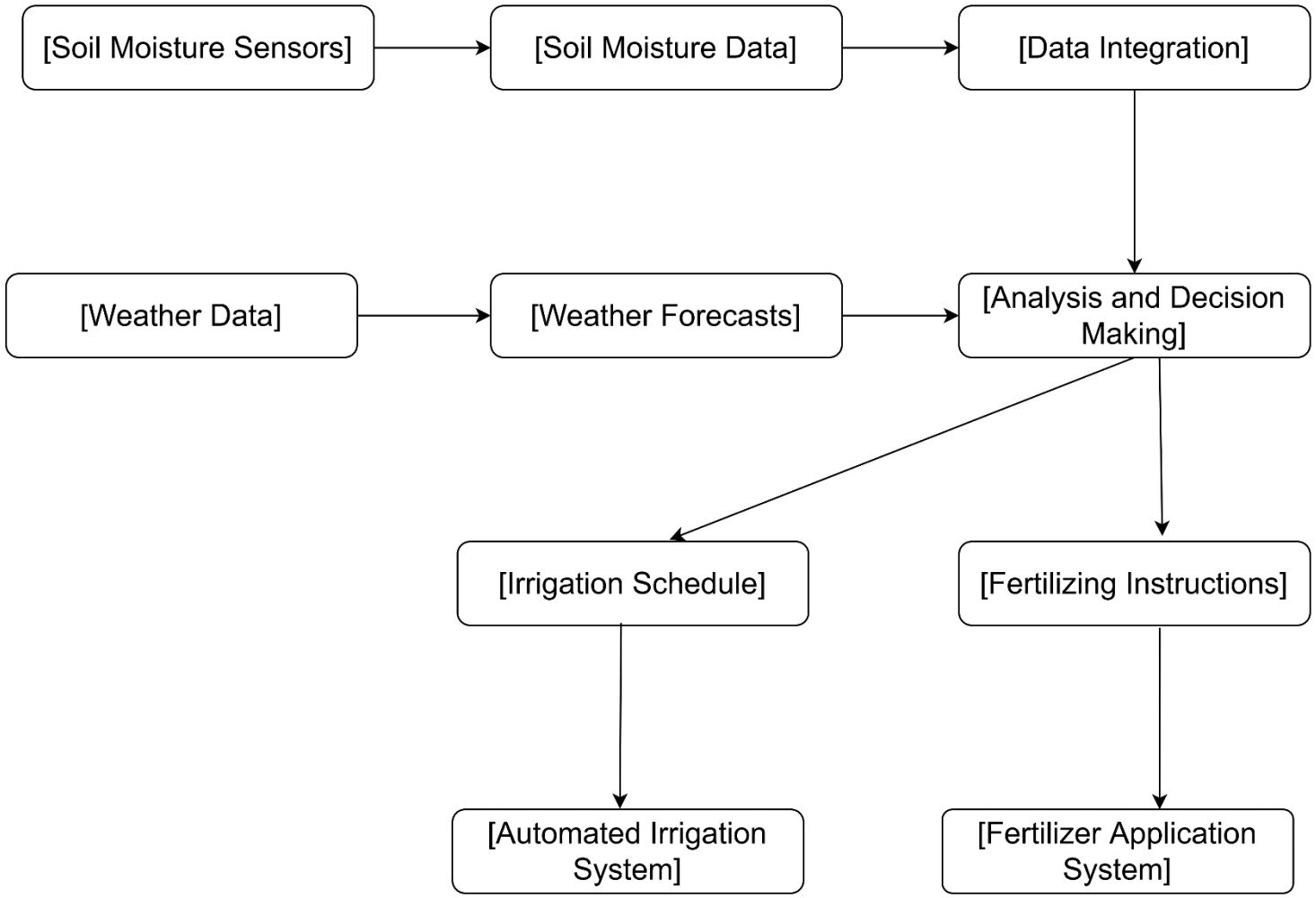


01 System Diagram

02 Technologies

03 Requirements

System Diagram



Technologies

PROGRAMMING LANGUAGES

- React Js
- Python

FRAMEWORKS

- Opencv
- Keras / Tensorflow

DATABASE

- MongoDB

PROJECT MANAGEMENT

- Ms Planner

OTHER TOOLS & TECHNOLOGIES

- Soil Moisture Sensors
- Automated Irrigation System

Requirements

Functional

- Installation of sensors
- Irrigation systems

Non Funcational

- Accuracy
- Performance
- Availability
- Usability

References

[1] https://www.researchgate.net/publication/372523323_Automated_Pest_and_Disease_Identification_in_A griculture_using_Image_Processing

[2] https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2024.1356260/full

[3] https://www.researchgate.net/publication/374505378_An_Automated_System_to_Detect_Plant_Disease_ using_Deep_Learning

[4]

https://ieeexplore.ieee.org/document/9754145

[5]

https://www.sciencedirect.com/science/article/abs/pii/S2214785321042115

[6] Hillel, D. (2004). Introduction to Environmental Soil Physics. Academic Press.

[7] Allen, R. G., Pereira, L. S., Raes, D., & Smith, M. (1998). Crop Evapotranspiration: Guidelines for Computing Crop Water Requirements. FAO Irrigation and Drainage Paper 56.

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Plant Growth Monitoring and Prediction

Introduction

01 Background

02 Research Problem

03 Objectives

Background

Monitoring plant growth is essential for optimizing crop management and improving yield

Research Problem

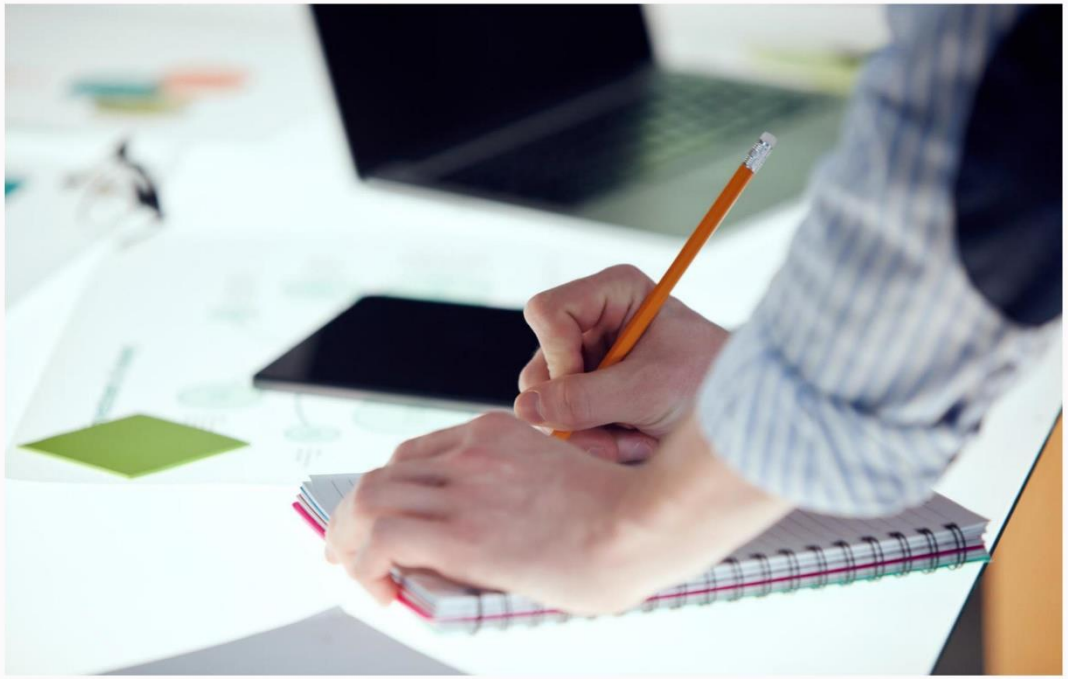
Farmers need accurate predictions of plant growth to make informed decisions about fertilization and other interventions.

OBJECTIVES

Develop a system for monitoring plant growth.

Predict growth outcomes based on customized fertilization

Methodology

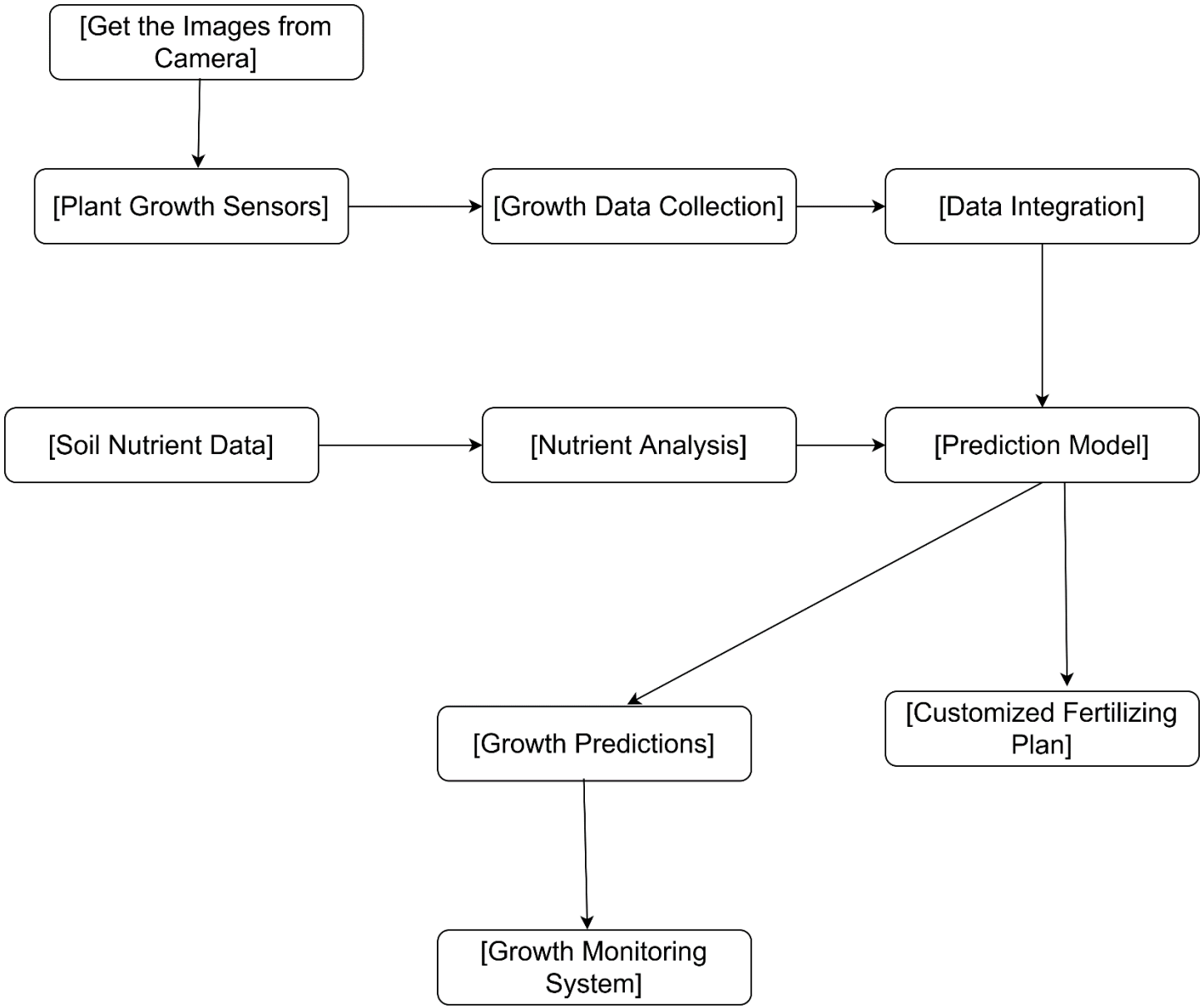


01 System Diagram

02 Technologies

03 Requirements

System Diagram



Technologies

PROGRAMMING LANGUAGES

- React Js
- Python

FRAMEWORKS

- Opencv
- Keras / Tensorflow

DATABASE

- MongoDB

PROJECT MANAGEMENT

- Ms Planner

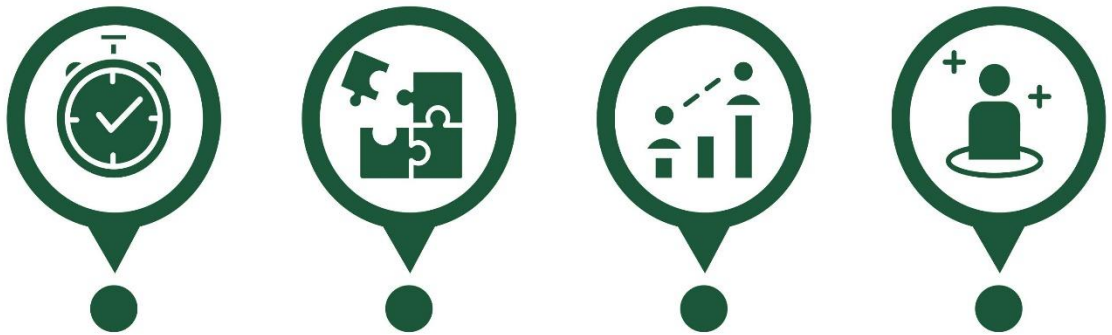
Requirements

Functional

- Growth monitoring software
- Machine learning models for prediction
- Analytical software for growth predictions

Non Funcational

- Accuracy
- Performance
- Availability
- Usability



References

[1]https://ieeexplore.ieee.org/document/9754145

[2]https://www.sciencedirect.com/science/article/abs/pii/S2214785321042115

[3] Pettorelli, N. (2013). The Normalization of Vegetation Indices. Springer.

[4] Rouse, J. W., Haas, R. H., Schell, J. A., & Deering, D. W. (1974). Monitoring Vegetation Systems in the Great Plains with ERTS. NASA.

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Yield Prediction and Harvest Readiness

Introduction

01 Background

02 Research Problem

03 Objectives

Background

Optimizing yield and ensuring timely harvest in greenhouse tomato farming.

Research Problem

Manual methods for yield prediction and harvest readiness are labor-intensive and prone to errors.

OBJECTIVES

Yield Prediction: Develop a model to predict tomato yield using image analysis.

Readiness Identification: Create an algorithm to determine the optimal harvest time.

Implementation and Testing: Validate the system in a greenhouse setting.

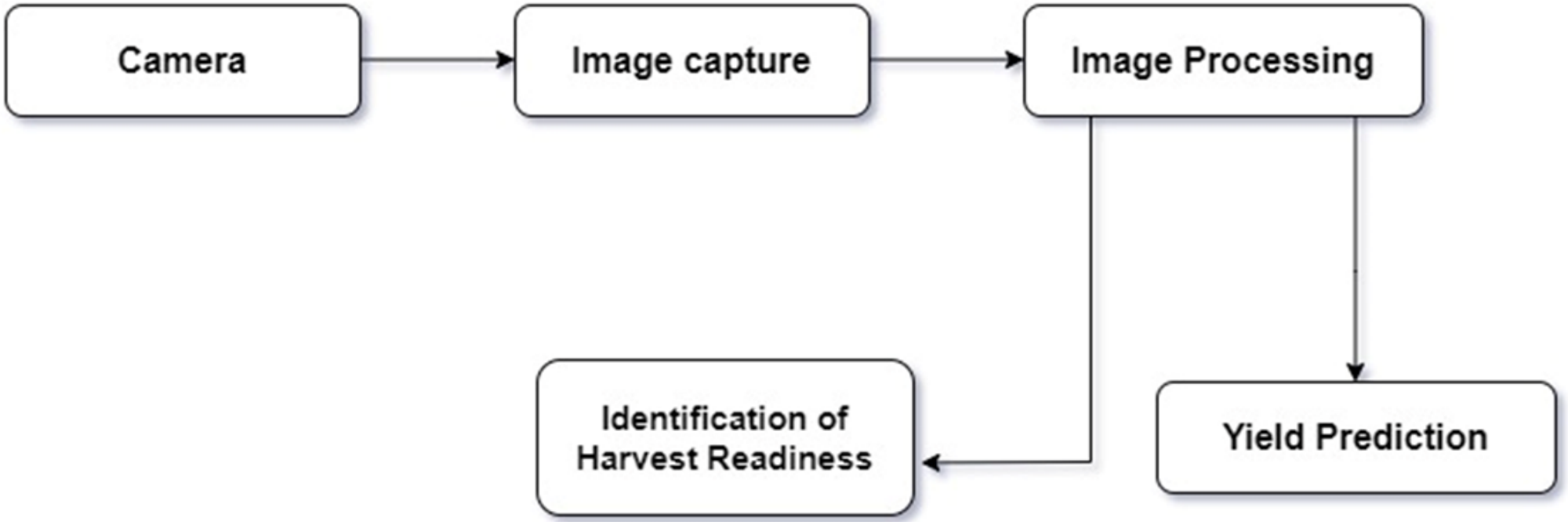
Methodology

01 System Diagram

02 Technologies

03 Requirements

System Diagram



Technologies

PROGRAMMING LANGUAGES

- React Js
- Python

FRAMEWORKS

- Opencv
- Keras / Tensorflow

DATABASE

- MongoDB

PROJECT MANAGEMENT

- Ms Planner

Requirements

Functional

- Image Capture & Image Processing
- Machine learning models for prediction
- Analytical software for harvest predictions

Non Funcational

- Accuracy
- Performance
- Availability
- Usability

References

[1]
https://ieeexplore.ieee.org/document/9754145
[2]
https://www.sciencedirect.com/science/article/abs/pii/S2214785321042115
[3] Tsaftaris, S. A., & Blomberg, S. (2018). Machine Learning for Crop Yield Prediction. Springer.
[4] Yang, X., & Li, H. (2018). Remote Sensing for Precision Agriculture: Yield Prediction and Harvest Management. Wiley.

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Disease Identification

Introduction

01 Background

02 Research Problem

03 Objectives

BACKGROUND

What are the diseases and how we are going to identify the diseases

What is object Tracking

What is Deep CNN

Research Problem

How to track or identify what are the disease in the tree

How can we notify about the disease for the farmers

Objectives

01 Early Detection

Detect diseases at an early stage to prevent their spread and minimize damage.

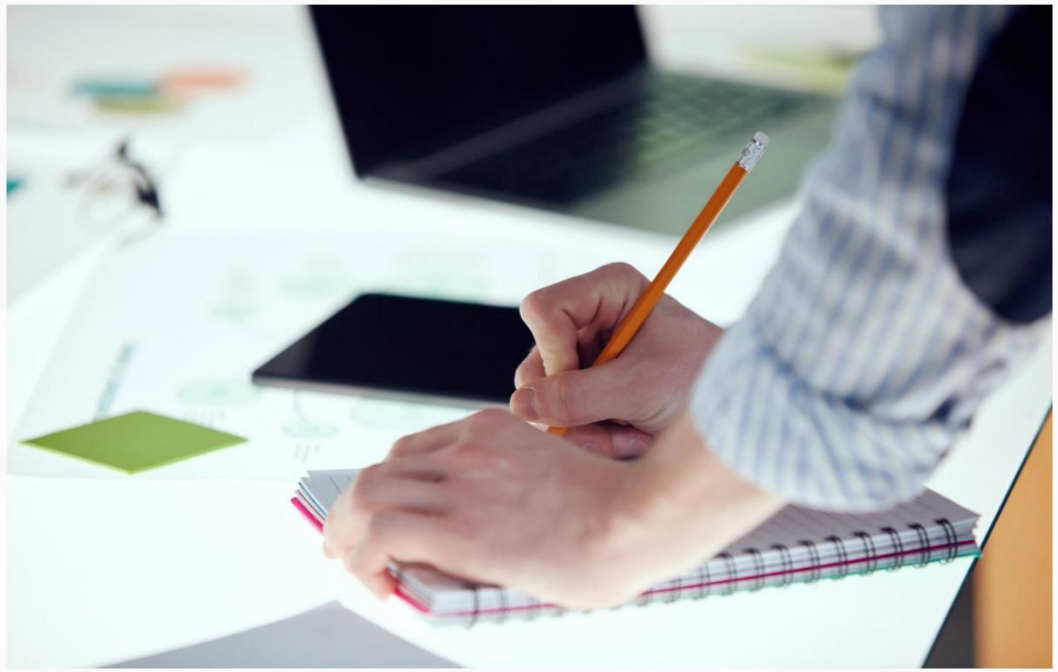
02 Improve Farmer Knowledge and Practices:

Educate and inform farmers about disease prevention, identification, and management techniques, promoting sustainable farming practices.

03 Reduce Economic Losses:

Minimize economic losses for farmers by preventing widespread crop failure and reducing the costs associated with disease management.

Methodology

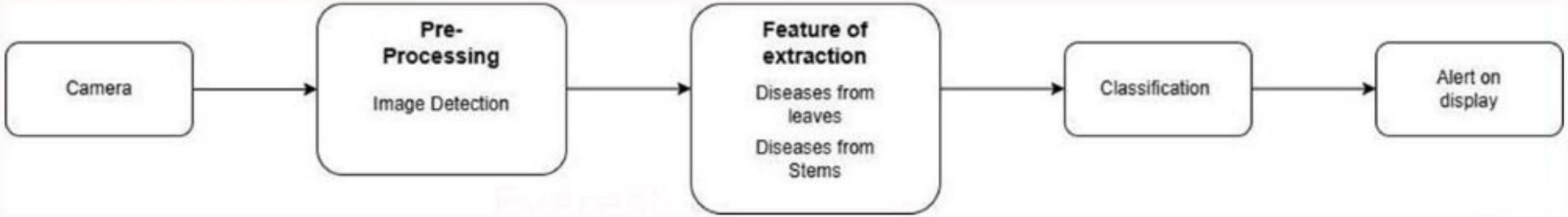


01 System Diagram

02 Technologies

03 Requirements

System Diagram



Tools and technology

Frame Works
Opencv ,
Keras/Tensorflow

Data Base
Mongo Db

Project Management
Ms Planner

Programming language
React Js , Python

Requirements

Functional

- Image Capture and Input
- Image Preprocessing
- Disease Detection and Classification
- Notification and Reporting

Non Funcational

- Accuracy
- performance
- Availability
- usability

References

[1] https://www.researchgate.net/publication/372523323_Automated_Pest_and_Disease_Identification_in_A griculture_using_Image_Processing

[2] https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2024.1356260/full

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[4] https://ieeexplore.ieee.org/document/9754145

[5] https://www.sciencedirect.com/science/article/abs/pii/S2214785321042115

[6] Agrios, G. N. (2005). Plant Pathology (5th ed.). Academic Press.

[7] Cook, R. J., & Baker, K. F. (1983). The Nature and Practice of Biological Control of Plant Pathogens. American Phytopathological Society.

Plans

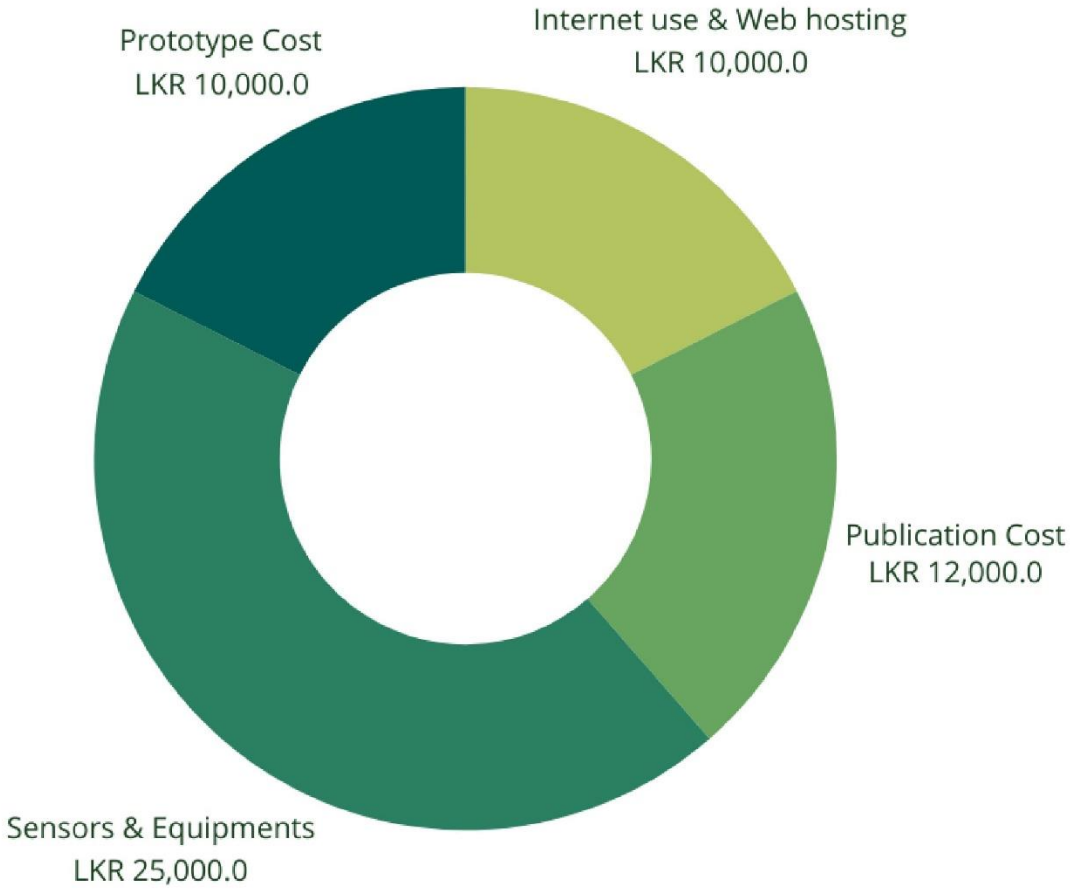
01 Cost Management Plan

02 Project Management

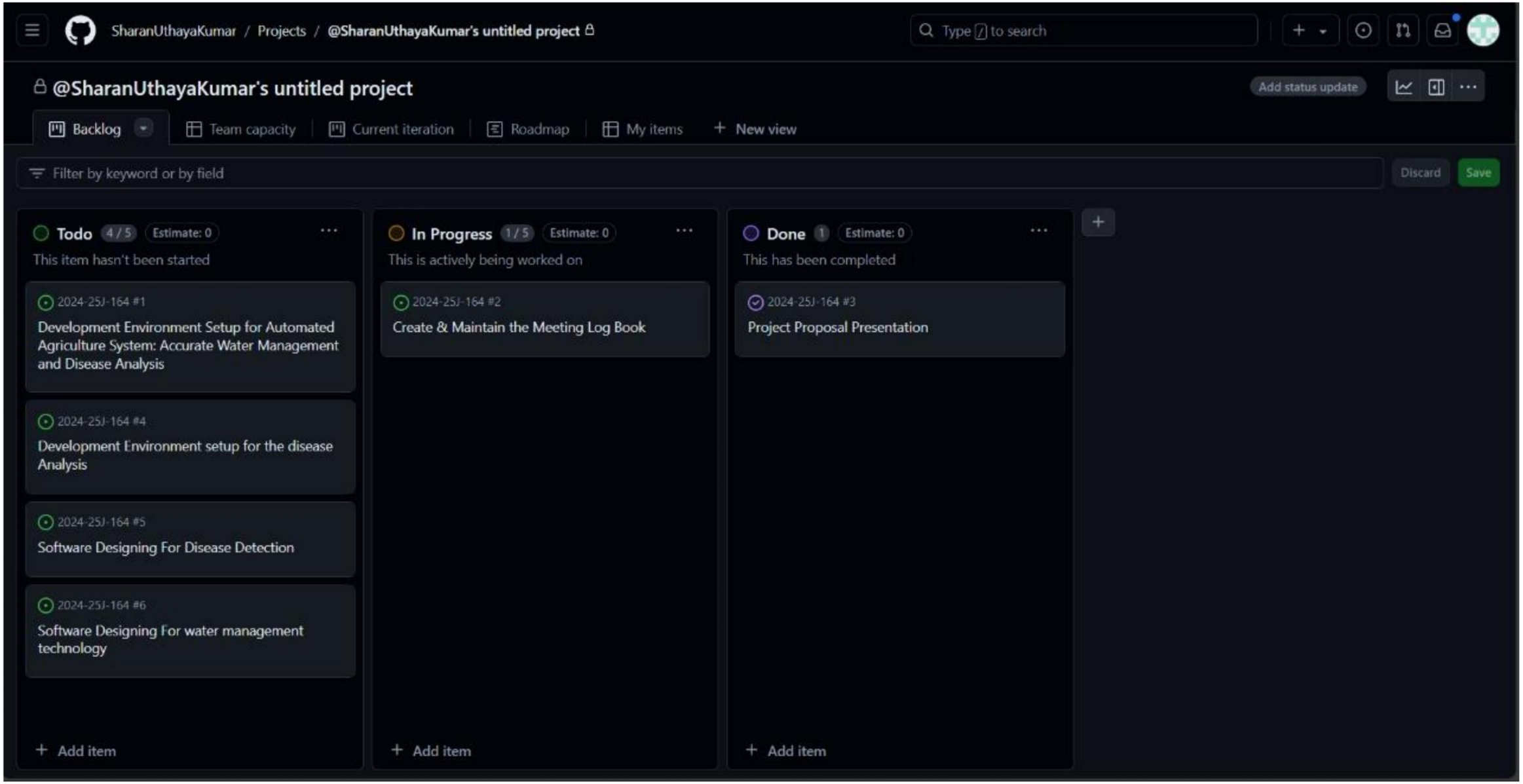
Cost Management Plan

Total – LKR 47,000

This amount may differ according to economic crisis.



Project Management Plan

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Thanks