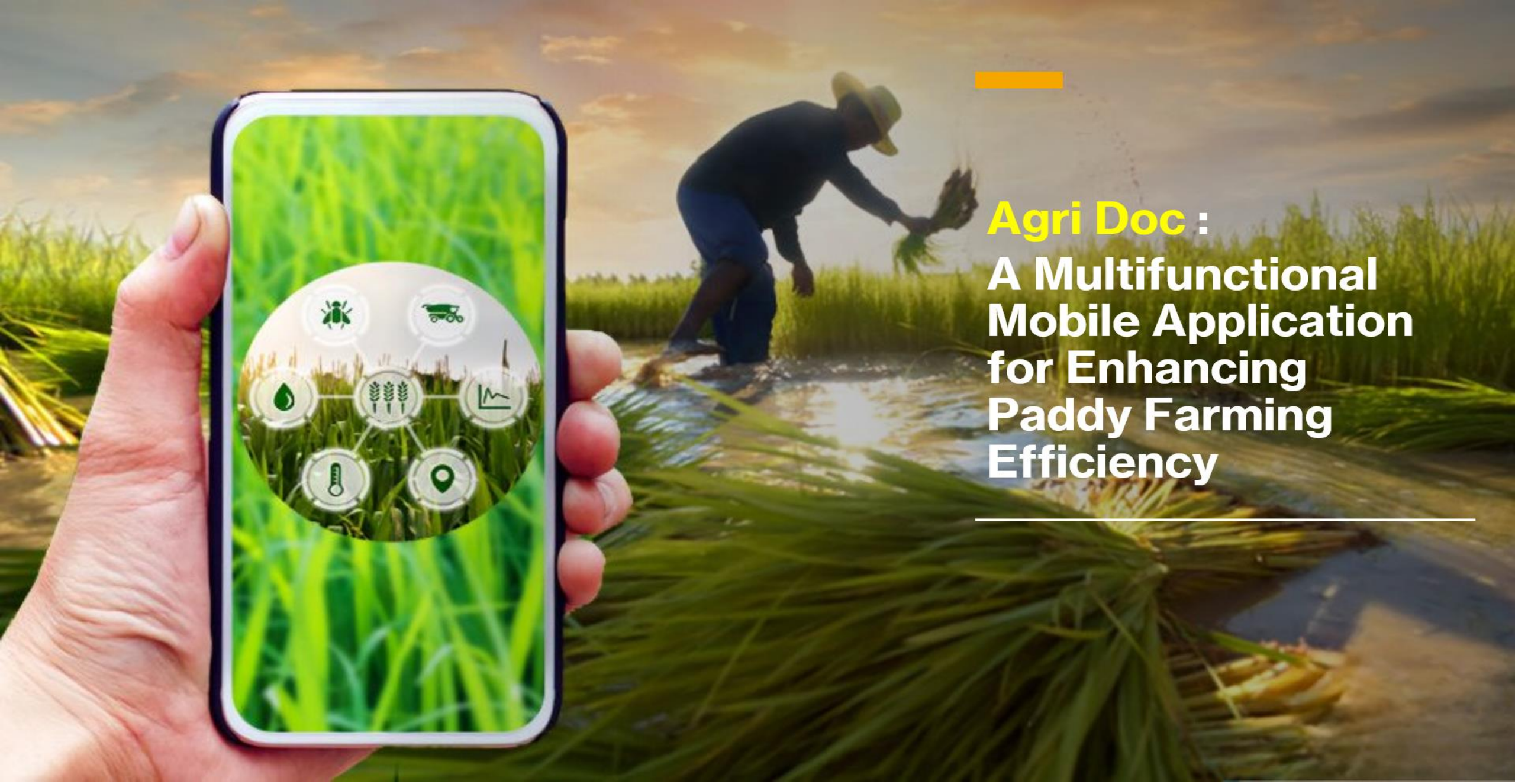

Agri Doc : A Multifunctional Mobile Application for Enhancing Paddy Farming Efficiency

Members

Supervisor
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Introduction to The Overall Project

How can an integrated digital platform address the challenges of irrigation management, weed identification, weather forecasting, and market analytics to improve the sustainability and productivity of paddy farming

Research Questions

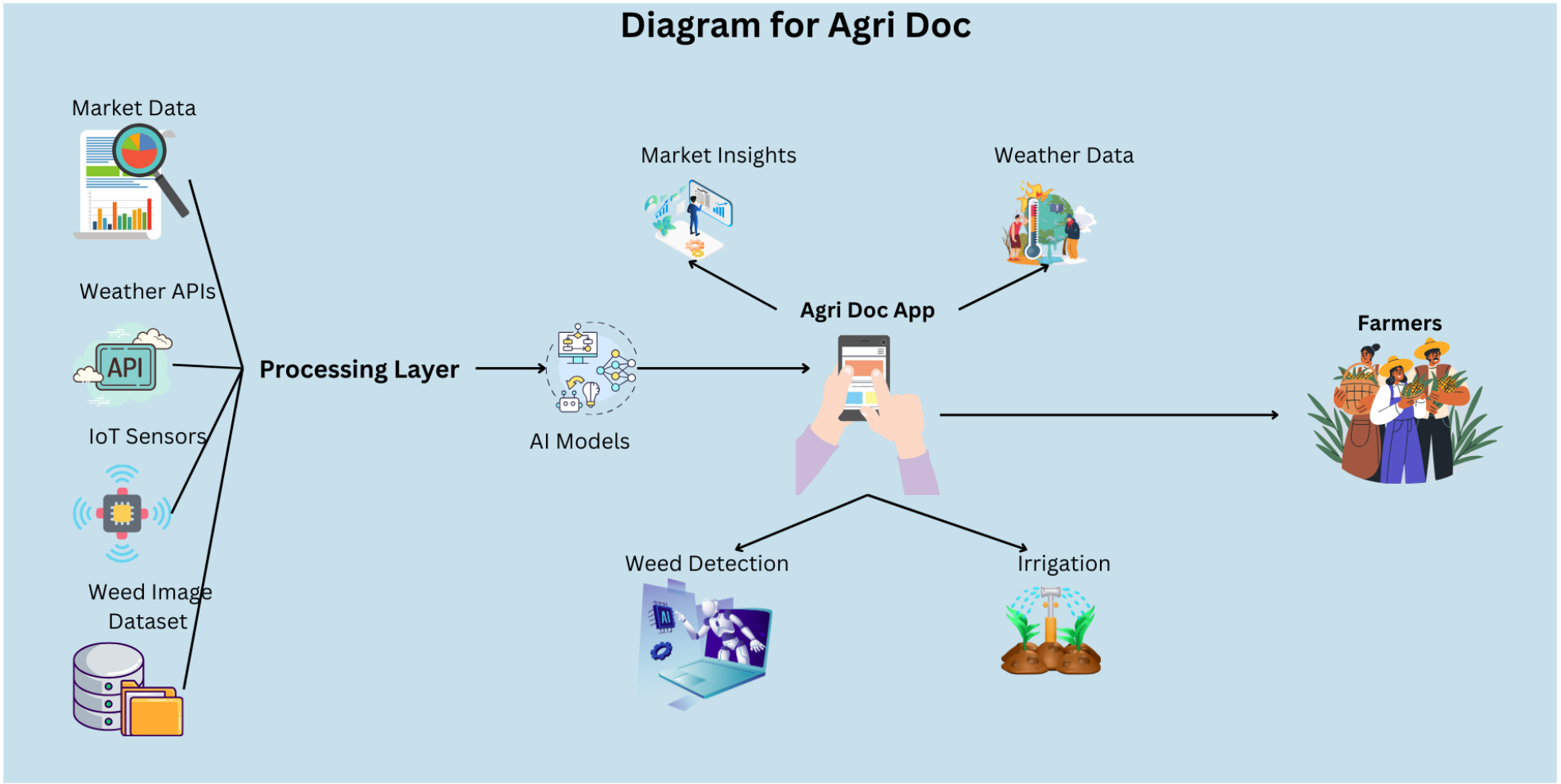
1. How can AI-driven weed identification enhance precision agriculture and reduce herbicide dependency in paddy farming?
2. What measurable impact can real-time weather forecasting ?
3. How does an IoT-based automated irrigation system impact paddy crop yield and water resource efficiency?
4. How can a user-friendly mobile platform improve accessibility and adoption of digital farming solutions among small-scale farmers?

Research Objectives

Develop *Agri Doc* app to empower paddy farmers with technology-driven solutions.

- Real-time irrigation monitoring using IoT sensors.
- AI-based weed identification for targeted control.
- Location-specific weather forecasts and alerts.
- Market insights with pricing and demand trends.

Overall Solution As A System Diagram



IT21829406 | U SUTHARSON

BSc(Hons) Information Technology Specializing in Information Technology

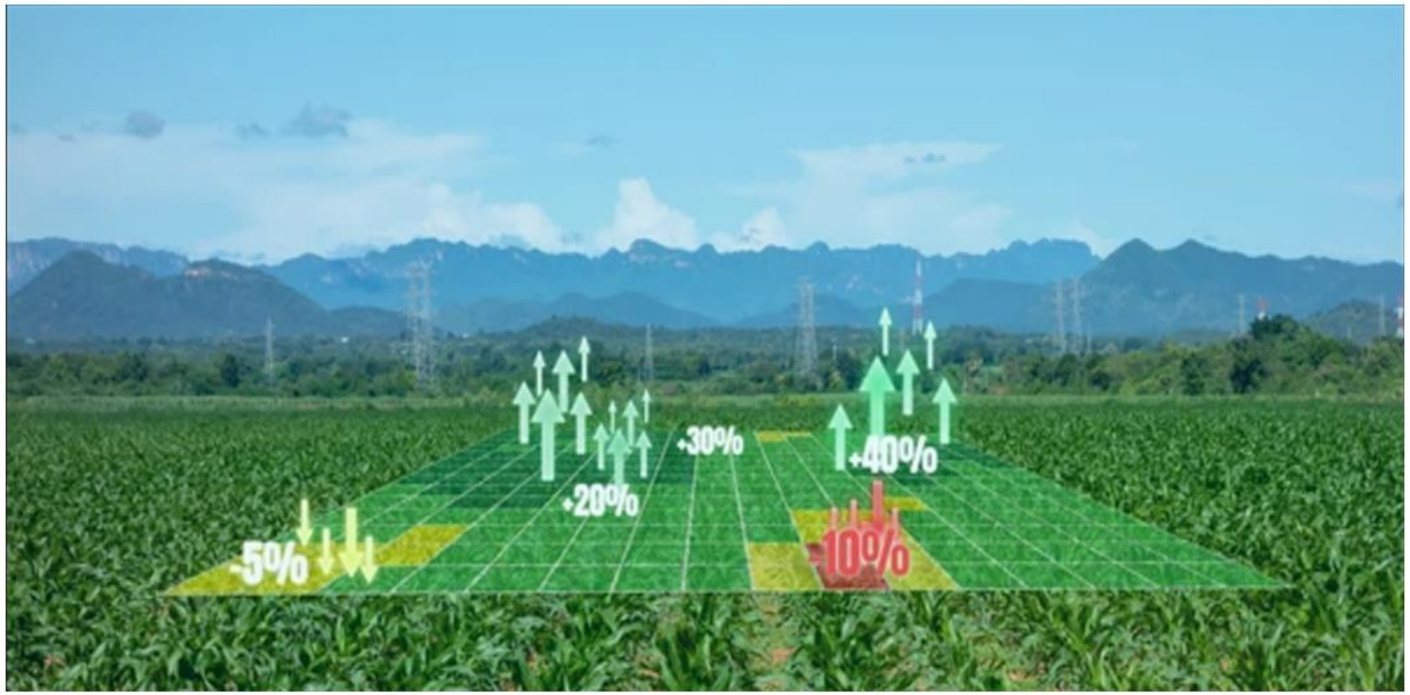
Market Data Analysis

Introduction

Farmers often face challenges due to the lack of real-time market data, which leads to poor pricing decisions and financial losses. The market data analysis function addresses this issue by providing valuable insights into pricing trends and market demand. By leveraging data analytics, machine learning, and seamless market integration, this function equips farmers with accurate and timely information. These insights enable better decision-making, improve profitability, and contribute to enhanced financial stability for farmers.

Research Problem

- Farmers lack real-time, accurate market insights for pricing and sales decisions.
- This leads to economic instability and undervaluation of produce.
- Developing a predictable trend for price and demand can address these challenges effectively.



Research Gap

- Existing platforms focus primarily on crop cultivation, not market insights.
- No region-specific or predictive models tailored for paddy farmers.
- Previous apps and research have separate functions for prices or demands but lack a combined function integrating both price and demand.

Main Objective

To design a market data analysis module that equips farmers with actionable insights into pricing trends and optimal selling times.

Sub Objective

Collect and analyze

- Collect and analyze market data, including pricing and demand.

Develop

- Develop predictive models for future pricing trends and demand

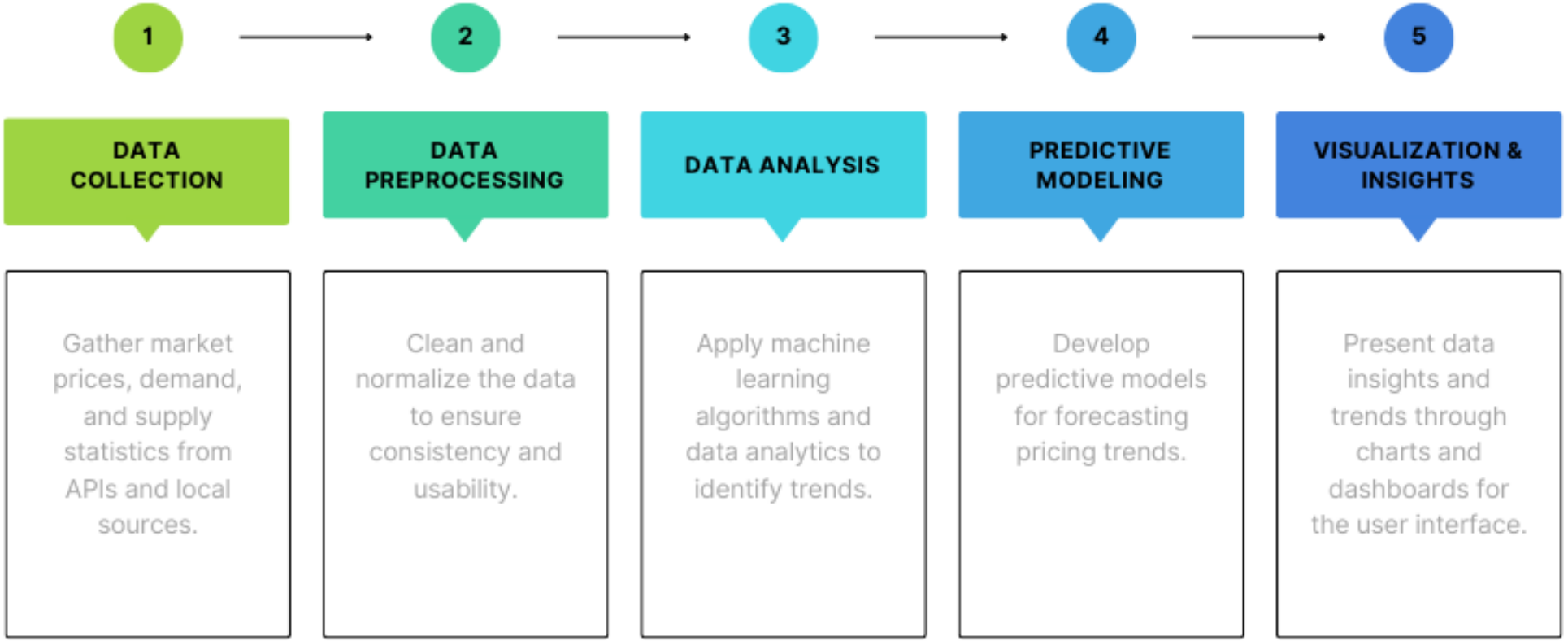
Provide

- Provide comparative insights into local and regional markets.

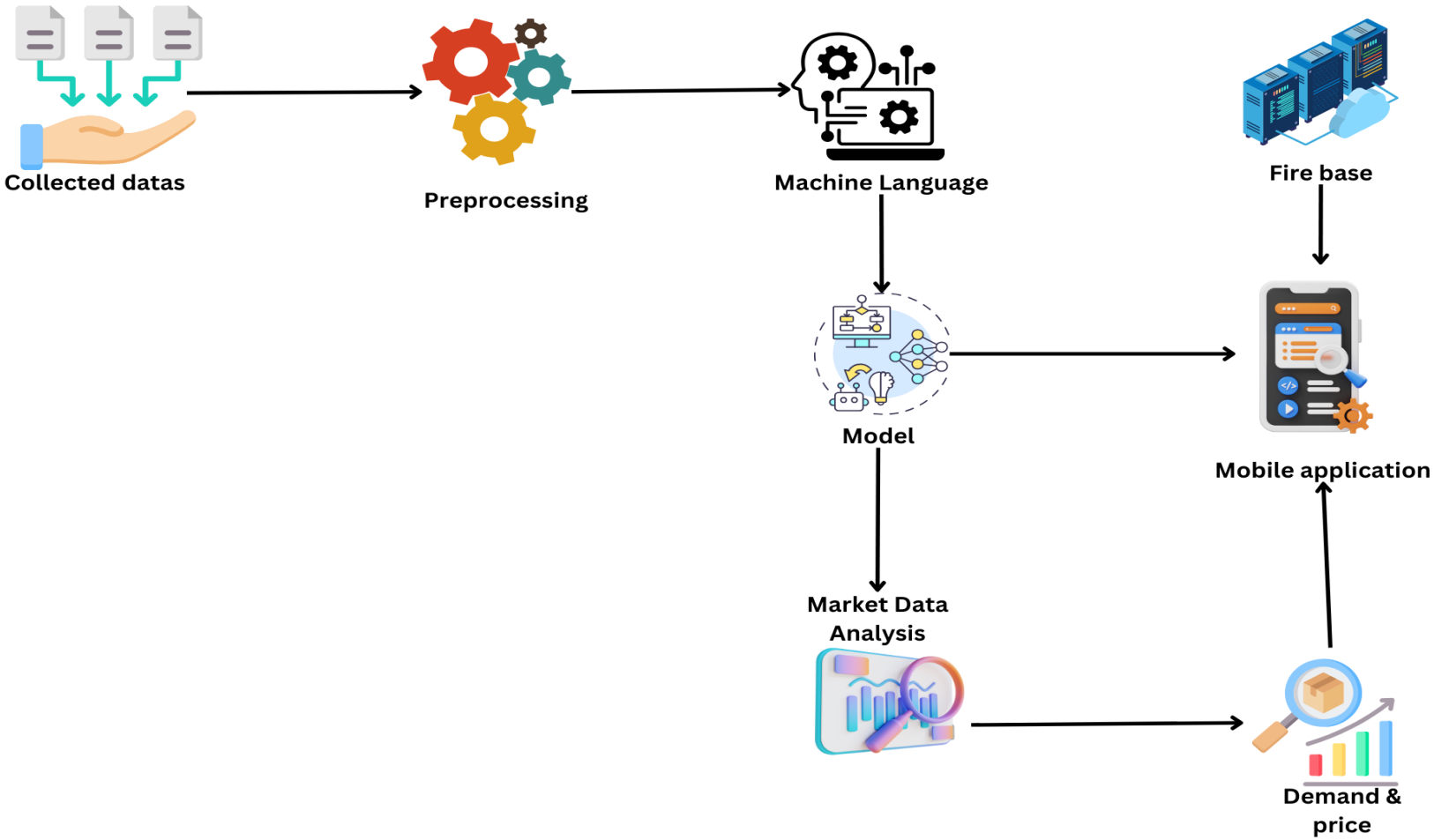
Enable

- Enable real-time tracking of market changes.

Methodology



System Diagram



System Requirements

- **Hardware**:

  Server: Intel Core i5, 8GB RAM, 500GB SSD, high-speed internet.

  Mobile Devices: Android/iOS, 2GB RAM, 50MB storage.

- **Personal**:

  System Administrator, Data Analyst, Software Developer.

- **Software**:

  Development: Python, Dart, Firebase , Android Studio.

  Machine Learning: Supervised Learning

  Visualization: Flutter chart

  API Integration: RESTful APIs for real-time data.

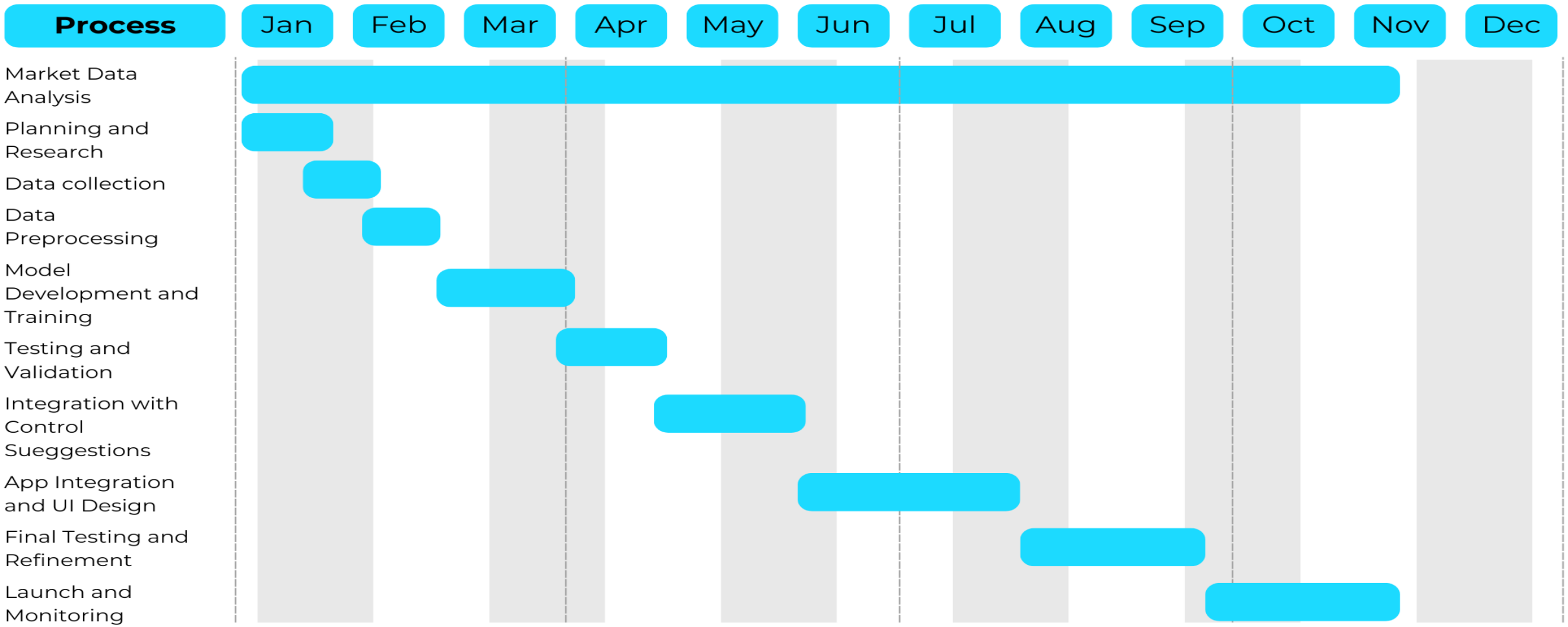
Technologies to Be Used

- Programming Languages: Python (analytics), Dart (Flutter UI)
- ML Frameworks: Supervised Learning
- Database: Firebase
- Dataset: Farmers
- Visualization Tools: Flutter chart

Commercialization Strategy

- **Target Audience**: Small to medium-scale paddy farmers, agricultural cooperatives.
- **Revenue Model**:
  - Freemium (basic insights free, advanced analytics premium).
  - Partnerships with governments/NGOs for subsidies.
  - Advertisement revenue from agricultural products.
- **Distribution**:
  - Mobile app stores (Google Play, Apple App).
  - Partnerships with farming associations.
  - Workshops and awareness campaigns.
- **Growth**:
  - Localized market data and languages.
  - Expand to other crops/agriculture industries.
  - Integrate with e-commerce platforms.

Gantt Chart
R25-057 | Agri Doc App



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IT21813320 | A SHIVAPHIRIYAN

BSc (Hons) Information Technology Specializing in Information Technology

Weather Forecasting

Introduction

This project focuses on developing a weather forecasting system tailored for agriculture. It provides accurate, localized weather predictions and actionable insights to help farmers plan cultivation activities, reduce crop losses, and enhance productivity. By integrating real-time data APIs, machine learning, and user-friendly visualizations, the system aims to transform traditional agricultural practices through innovative technology.

Research Problem

Farmers in Sri Lanka struggle with unpredictable weather and limited access to precise forecasts. Current systems lack localization, leading to reduced crop yields, inefficient planning, and insufficient alerts for extreme weather.

Research Gap

Existing weather forecasting tools are not localized for Sri Lanka's micro-climates, lack advanced technologies like IoT and machine learning, and are not user-friendly for small-scale farmers. These gaps result in poor prediction accuracy and limited accessibility for effective agricultural planning.

Main Objective:

To develop a mobile-based weather forecasting system that provides accurate, localized weather forecasts and helps farmers make informed decisions to improve agricultural productivity and mitigate risks from extreme weather events.

Sub-Objectives:

1.Accurate Weather Forecasting

2.Extreme Weather Notifications

3.User-Friendly Data Visualizations

4.Localized Weather Insights

Project Methodology

Phase 1: Requirements Gathering

1

Identify farmer needs and critical weather parameters through surveys and research.

Phase 2: System Design

2

Develop system architecture, select technologies, and design intuitive interfaces.

Phase 3: Prototype Development

3

Build a functional prototype with real-time data integration and machine learning models.

Phase 4: System Deployment

4

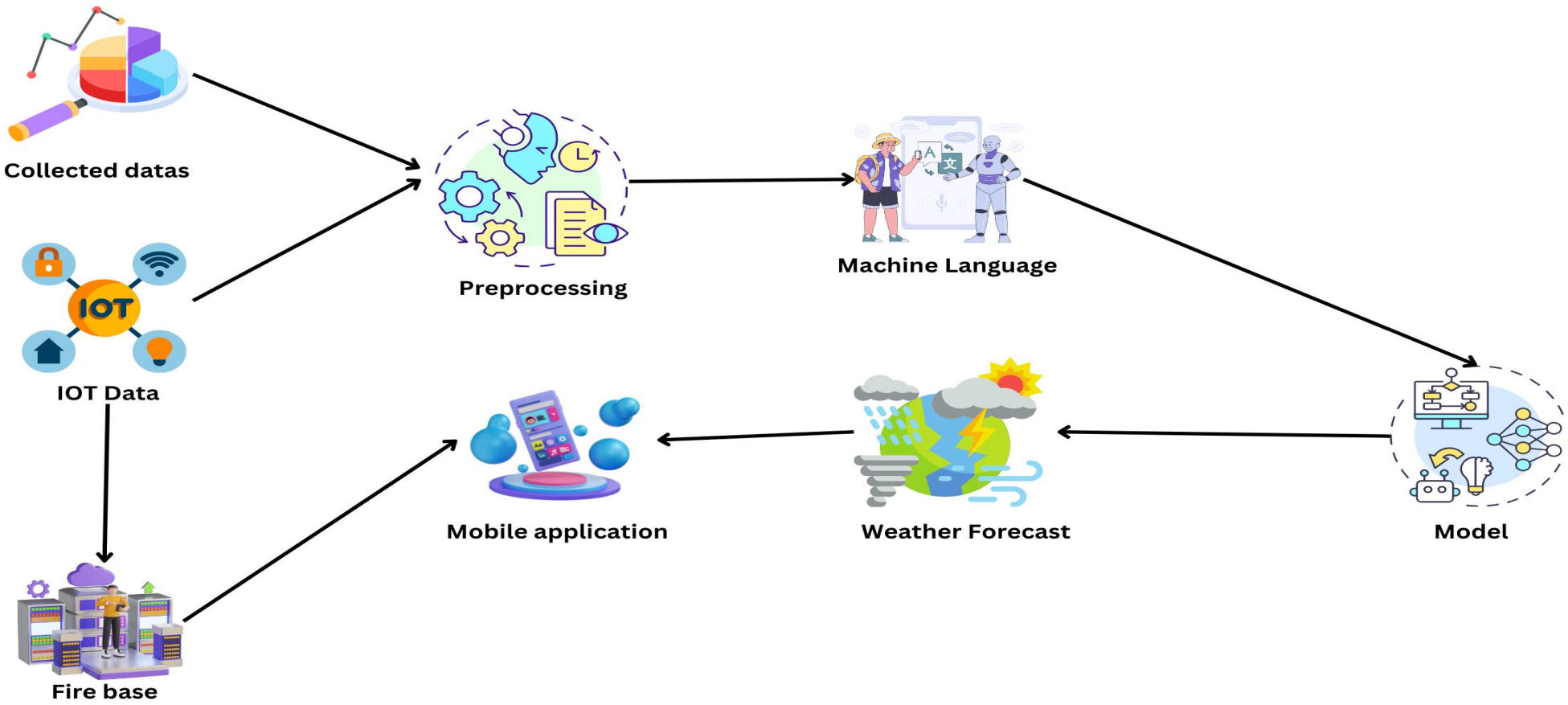
Deploy and test the system in pilot areas while training farmers.

Phase 5: Evaluation & Optimization

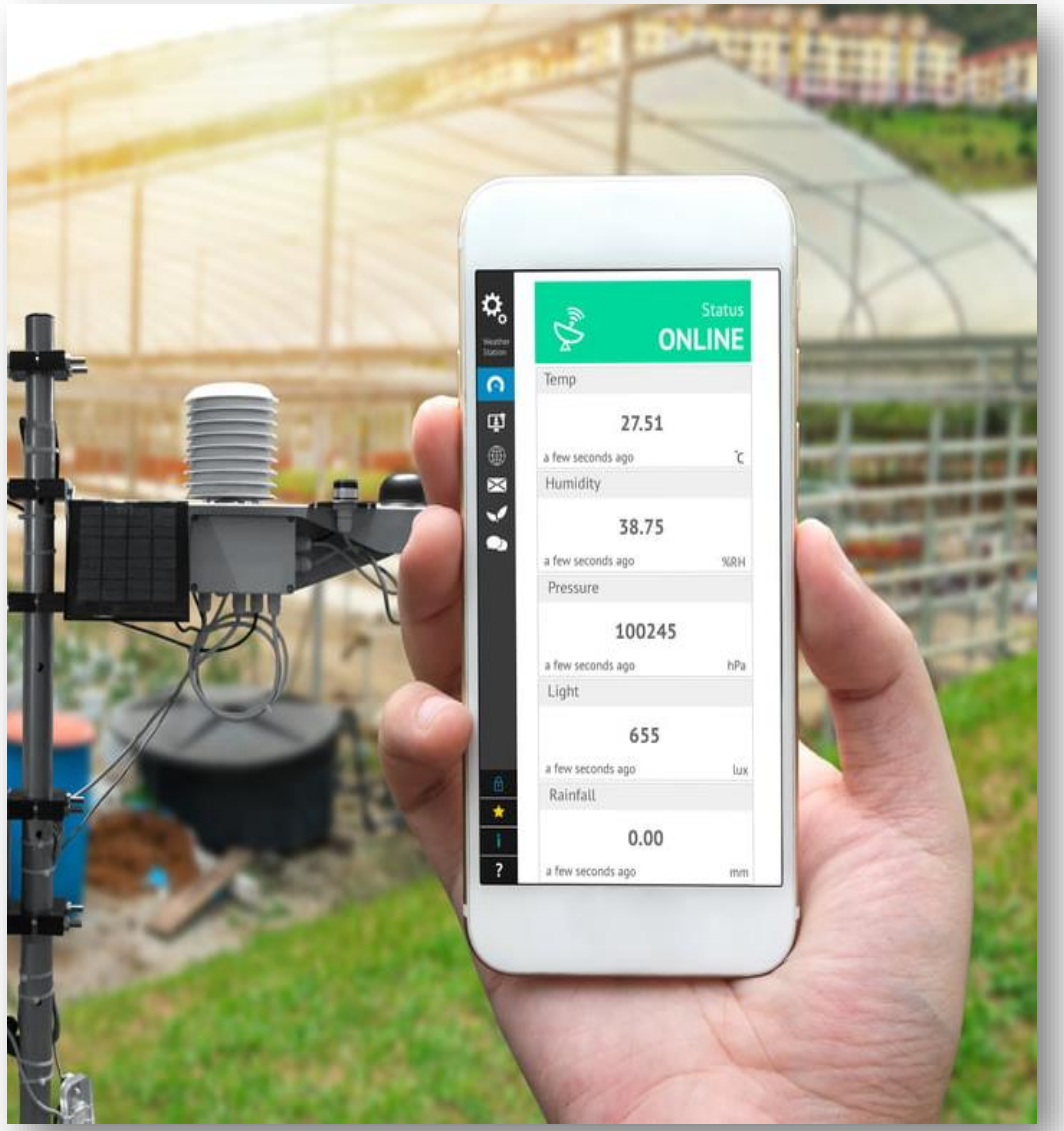
5

Collect feedback, optimize performance, and expand deployment regionally.

System Diagram



System Overview



System Architecture:

1. **User Interface (UI) Layer:**
    1. Interactive mobile application for weather insights.
    2. Built with Flutter for cross-platform compatibility.
2. **Controller Layer:**
    1. Python-based algorithms analyze weather patterns.
    2. Manages data flow between APIs, backend, and UI.
3. **Backend Layer:**
    1. Python And Firebase

System Requirements

Hardware

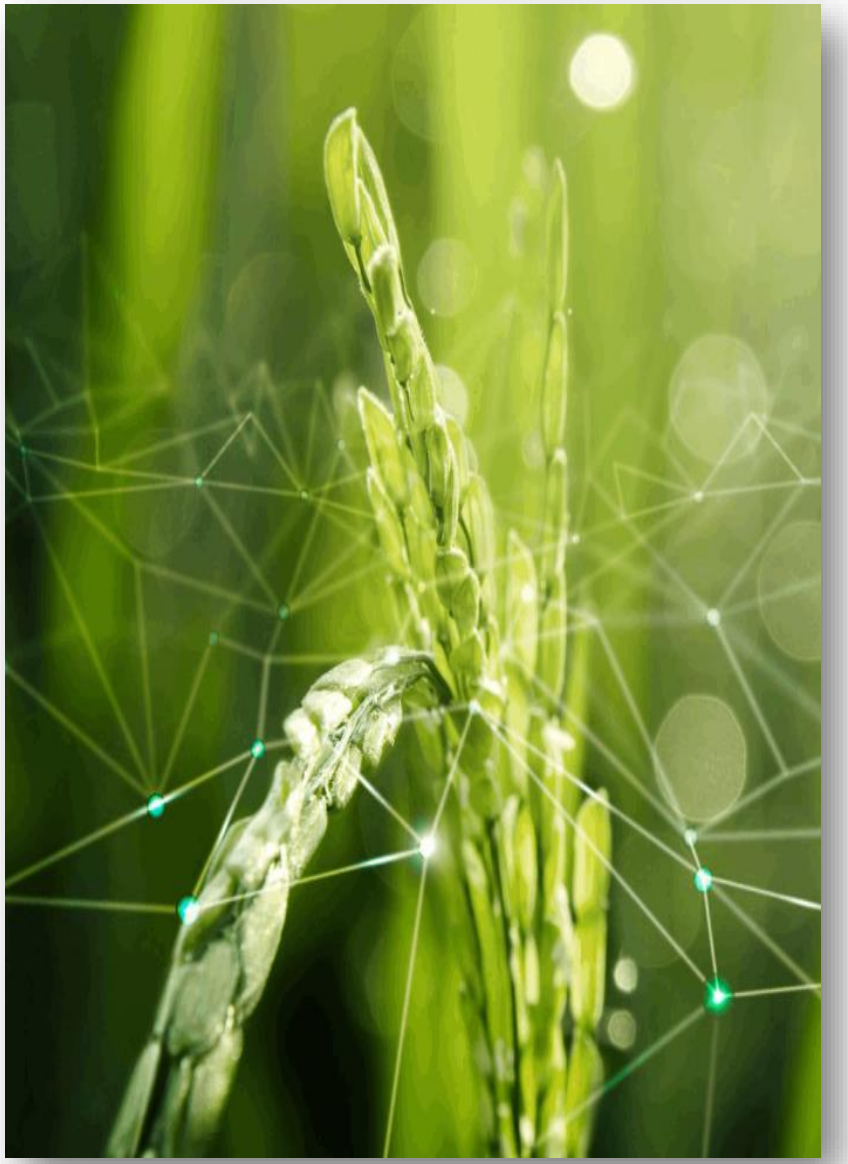
IServer: Intel Core i5, 8GB RAM, 500GB SSD, high-speed internet.
Mobile Devices: Android/iOS, 2GB RAM, 50MB storage

Personnel

Specialists in data integration with APIs from the Sri Lankan Meteorology Department..

Software

APIs for integrating Meteorology Department data with the system.
Machine learning algorithms for accurate forecasting.
platforms, and mobile app development tools.



Key Technologies

Technologies Used:

1. **Frontend:**
    1. Flutter for building a responsive mobile application.
2. **Backend:**
    1. Python for implementing data analysis and machine learning models.
3. **Database:**
    1. Firebase - Realtime database
4. **APIs:**
    1. Retrieving real-time weather data.
5. **Machine Learning Frameworks:**
    1. Supervised learning

Commercialization Strategy

1

Target Audience

Paddy farmers, agricultural cooperatives, and government agencies involved in promoting sustainable farming practices.

2

Value Proposition

Enhanced decision-making through accurate, localized weather forecasts, real-time alerts for extreme weather events, and actionable insights to improve agricultural efficiency and sustainability.

3

Marketing & Sales

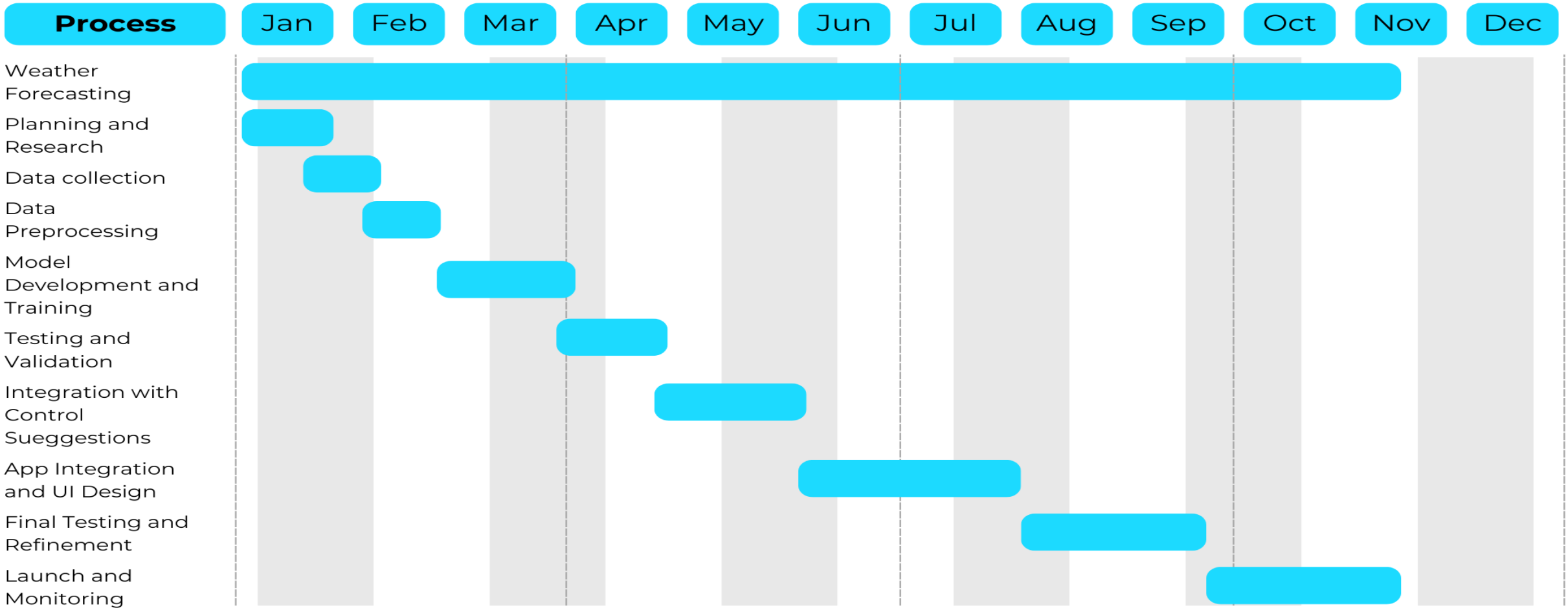
Focused marketing campaigns targeting farmer cooperatives and agricultural communities. Collaborations with agricultural extension officers and demonstrations in farming regions for system adoption.

4

Pricing Strategy

Subscription-based model with tiered pricing plans offering basic forecasts to comprehensive weather analytics. Special rates for low-income farmers to encourage widespread adoption.

Gantt Chart
R25-057 | Agri Doc App



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IT21809460|LAVANYA.M

BSc (Hons) Information Technology Specializing in Information Technology

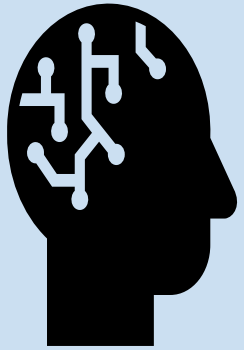

Weed
Identification

Introduction

Background

- Weed management boosts crop yield by reducing competition for resources. Traditional methods are labor-intensive and inefficient for large-scale farming.
- Manual detection is often inaccurate, and excessive herbicide use harms the environment. Advanced tools for precision weed control are lacking.
- AI and ML enhance weed detection through image recognition, classify weeds efficiently, and provide tailored recommendations for effective control.
- AI systems reduce herbicide use, save time, promote sustainability, and improve crop yield.

Research problem



How can AI-based image recognition techniques be employed to develop an adaptive system that effectively identifies and classifies weeds in paddy fields, providing real-time recommendations for environmentally sustainable weed management?

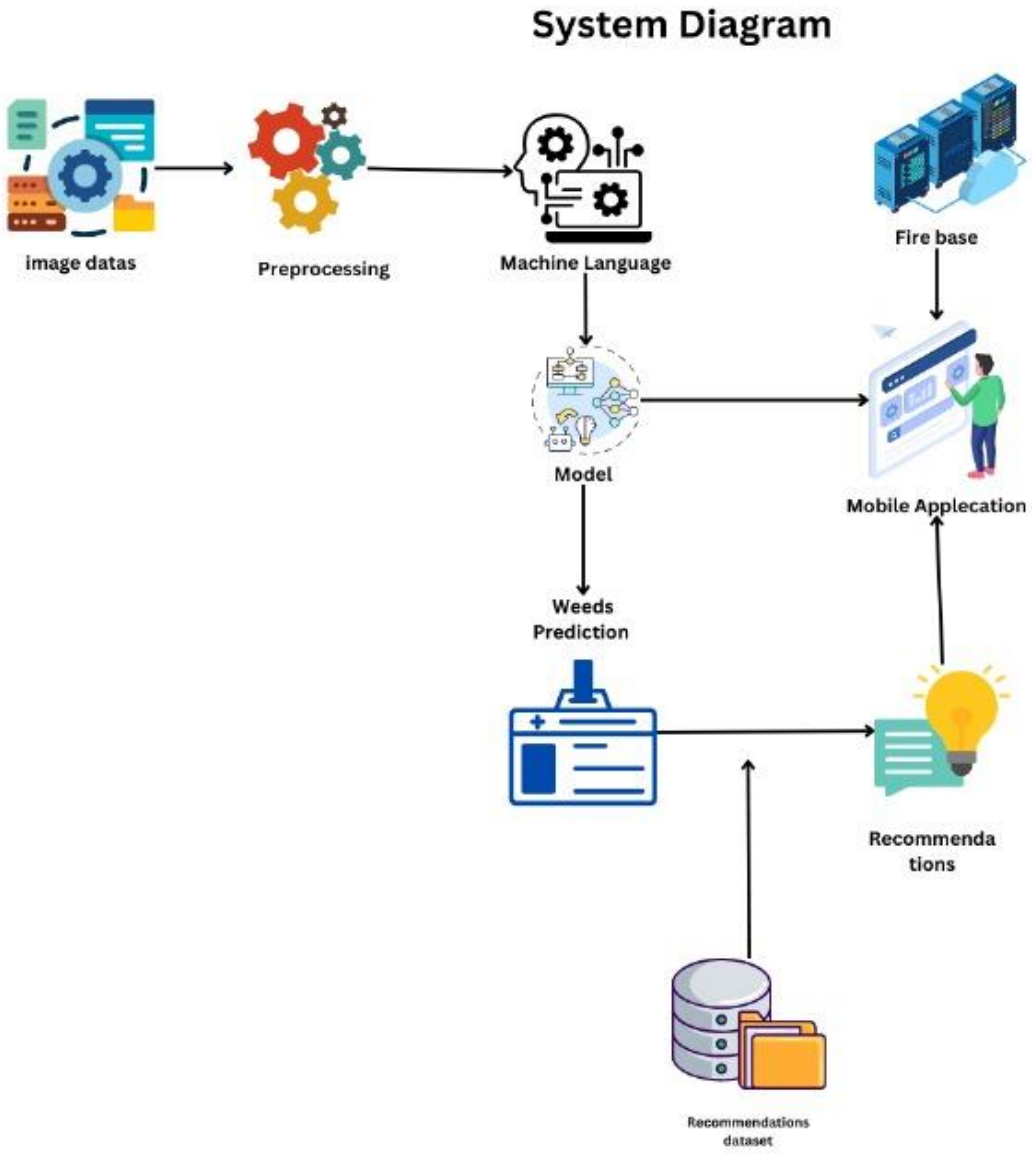
Specific and Sub Objectives

Specific Objectives

- Develop an Accurate Weed Identification Model
- Optimize for Real-Time Image Processing
- Provide Sustainable Weed Control Recommendations

Sub-Objectives

- Data Collection & Labeling
- Model Training & Evaluation
- Cloud-Based Real-Time Alerts
- User Interface Design


System Diagram
image datas
Preprocessing
Machine Language
Fire base
Model
Mobile Applecation
Weeds
Prediction
Recommenda
tions
Recommendations
dataset

Tools & Technologies

Technologies

- OpenCV, Flutter, Firebase, FastAPI , TensorFlow,VJJ16

Storage

- Firebase Cloud Storage

Programming Languages

- Python(training the machine learning model)
- Dart

Requirements

Functional	Non-Functional
○ Identify and classify weed species from field images. ○ Provide real-time weed control recommendations. ○ Notify farmers through the mobile app about detected weeds.	○ Fast processing ○ High availability ○ Multilingual support. ○ Data security.

Commercialization Strategy

Weeds Identification System

Develop the Product:

Create an easy-to-use mobile or web app with accurate AI-based weed detection, integrating it with agricultural tools like drones or automated sprayers.

Market Research

Identify target customers (farmers, agribusinesses, governments), analyze competitors, and tailor the product to meet market needs

Revenue Models

Offer subscription plans, freemium services, or B2B licensing to generate revenue.

Partnerships

Collaborate with agricultural equipment manufacturers, research institutions, and government bodies.

Marketing

Promote through case studies, digital marketing, trade shows, and referral programs.

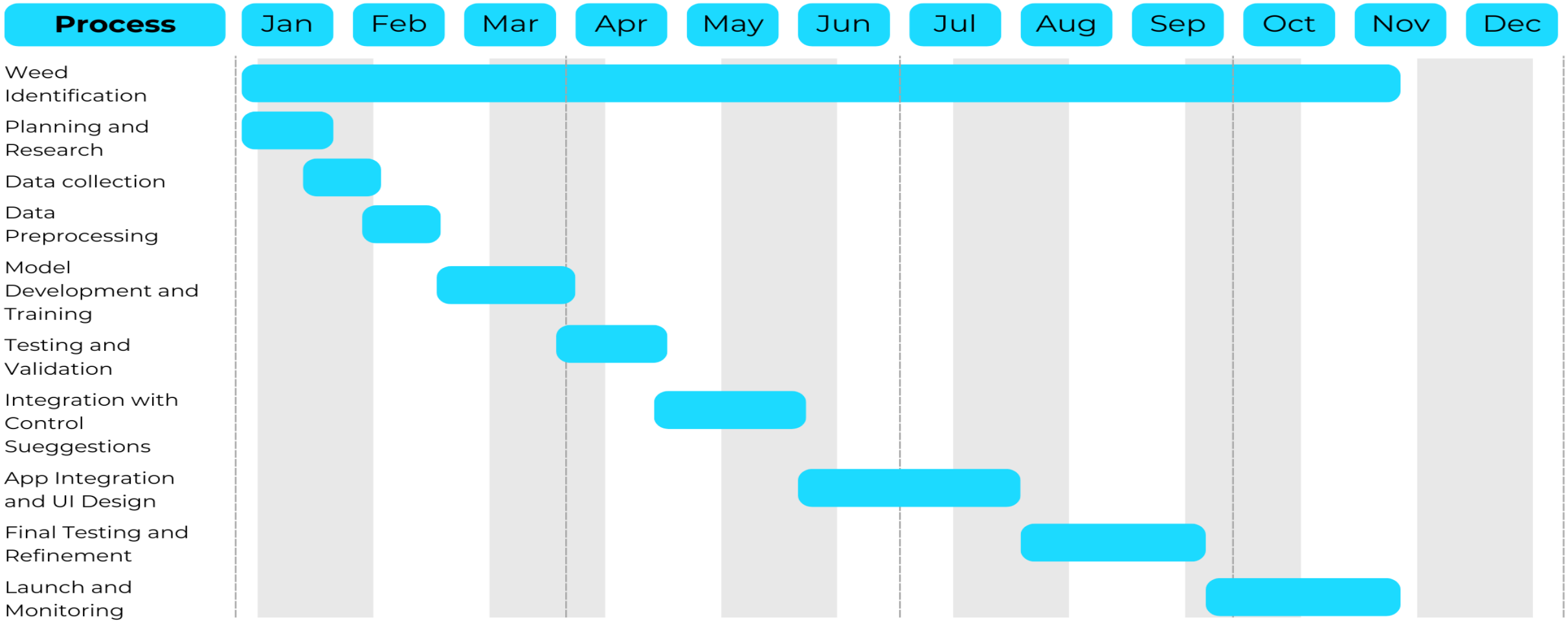
Global Expansion

Scale globally with cloud technology, localize for different regions, and integrate with global agricultural data.

Sustainabilit

Highlight environmental benefits by reducing herbicide use and promoting sustainable farming practices.

Gantt Chart
R25-057 | Agri Doc App



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IT21819506 | V ABILAXSHAN

BSc (Hons) Information Technology Specializing in Information Technology

Smart Irrigation System

Introduction

- Agriculture is a cornerstone of Sri Lanka's economy, with paddy farming being one of the primary crops cultivated.
- Irrigation is essential for paddy farming, but traditional methods are often inefficient, relying on fixed schedules rather than real-time water needs.
- Global efforts in smart agriculture have demonstrated the potential of IoT and machine learning in optimizing irrigation systems, yet these technologies are underutilized in Sri Lanka.

Research Gap

- **Technological Gaps**:
  - Current systems lack real-time monitoring of environmental and soil conditions.
  - Limited use of machine learning models to predict irrigation needs based on data trends and environmental factors.
- **Farmer Adoption Challenges**:
  - Most existing solutions are either too complex or expensive for local farmers to adopt.
  - Lack of mobile-friendly platforms tailored to Sri Lankan farmers' needs and literacy levels.
- **Localized Solutions**:
- Few solutions address the unique environmental and socio-economic conditions of Sri Lankan paddy fields, such as tank irrigation systems and irregular rainfall

• Research problem

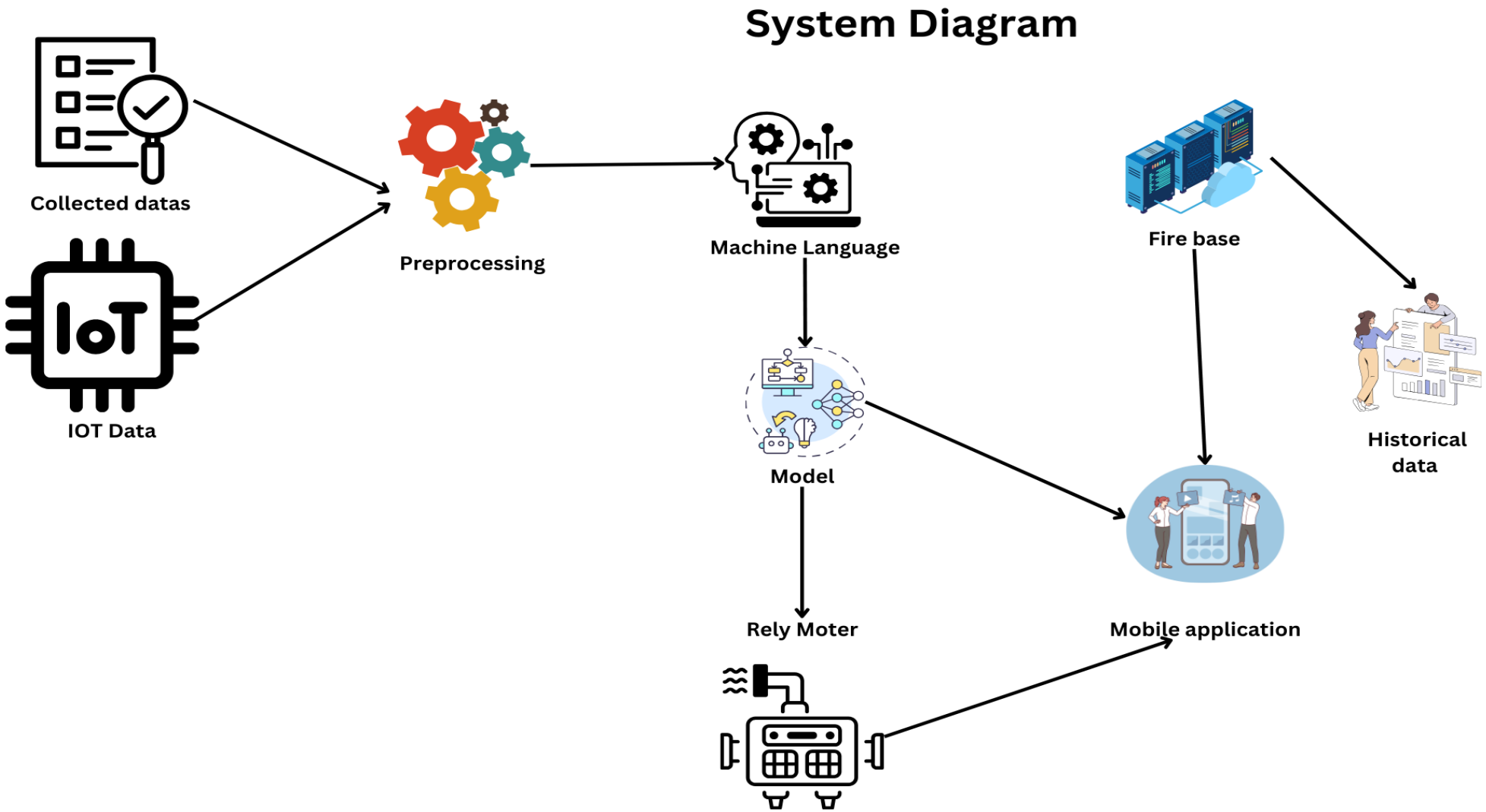
Main Problem:

- Farmers need **reduce human interfere** and based **cost-effective**, **easy-to-use**, and **data-driven system** that enables them to make precise irrigation decisions based on real-time data, reducing water wastage and improving crop yields .

- **Core Challenges:**

1. Designing a system that integrates data from **IoT sensors** and external environmental datasets (soil moisture sensor, environment temperature sensor,)
2. Ensuring accurate and reliable predictions using **machine learning** models (trained on real-world and historical data).
3. Balancing **technical sophistication** with **simplicity and affordability** to ensure broad adoption among Sri Lankan farmers.

System Diagram



Specific Objective:

- To **develop and deploy a Smart Irrigation System** that improves water use efficiency in paddy farming by leveraging IoT, machine learning, and real-time data accessibility.

- **Sub Objectives (Detailed):**

- **Data Collection**:
  - Use IoT sensors (Arduino-based) to monitor:
    - **Environment Temperature sensor** : Environement Moisture, Environment temperature.
    - **soil moisture sensor**: soil moisture details
    - **Soil temperature sensor** :Temperature , humidity
  - Collect historical data from government meteorological reports to enhance prediction accuracy.
- **Data Analysis**:
  - Implement machine learning models (using SL) to:
    - Predict irrigation requirements based on soil and environmental data.
    - Adapt schedules to seasonal crop requirements
  - Analyze iot and rainfall data to improve water usage patterns.

Project Methodology

1

Phase 1: Requirements Gathering

Conducting field research to understand farmer needs and environmental conditions.

2

Phase 2: System Design

Developing a detailed system architecture, selecting appropriate technologies, and designing the user interface.

3

Phase 3: Prototype Development

Developing a functional prototype of the system and conducting field testing to ensure accuracy and effectiveness.

4

Phase 4: System Deployment

Deploying the system in pilot paddy fields and providing training to farmers on system usage.

5

Phase 5: Evaluation & Optimization

Monitoring system performance, collecting user feedback, and making necessary adjustments to optimize system efficiency and effectiveness.

System Overview

IoT Sensors

Collect real-time soil moisture data, providing insights into the actual water needs of the paddy field.

Data Analysis

Analyzes collected data, environmental factors (temperature, humidity, rainfall), and historical data.

Irrigation Recommendations

Generates dynamic irrigation schedules and notifications based on real-time and historical data.

User Interface

Provides a user-friendly platform for farmers to access real-time water usage data, irrigation recommendations, and system performance.

• System Integration:

- ➢ Integrate components into a cohesive system:
  - **Hardware**: Sensors and communication devices to gather and transmit data.
  - **Software**: A backend pipeline to process data and generate irrigation schedules.
  - **Mobile App**: Provide farmers with real-time insights, schedules, and alerts in a user-friendly format.

- **User Accessibility**:
  - ➢ Design a **mobile application** using **Flutter**:
    - Provide real-time updates on field conditions.
    - Display easy-to-understand irrigation recommendations (e.g., water today, skip tomorrow).
    - Display
  - ➢ Ensure offline functionality for areas with limited internet access.
- **Evaluation**:
  - ➢ Conduct field tests in pilot paddy fields to evaluate:
    - Accuracy of sensor data and predictions.
    - Ease of use of the mobile app for farmers.
    - Water savings and crop yield improvements.
  - ➢ Gather feedback to optimize system components before large-scale deployment.

System Requirements

Hardware

Server: Intel Core i5, 8GB RAM, 500GB SSD, high-speed internet.
Mobile Devices: Android/iOS, 2GB RAM, 50MB storage

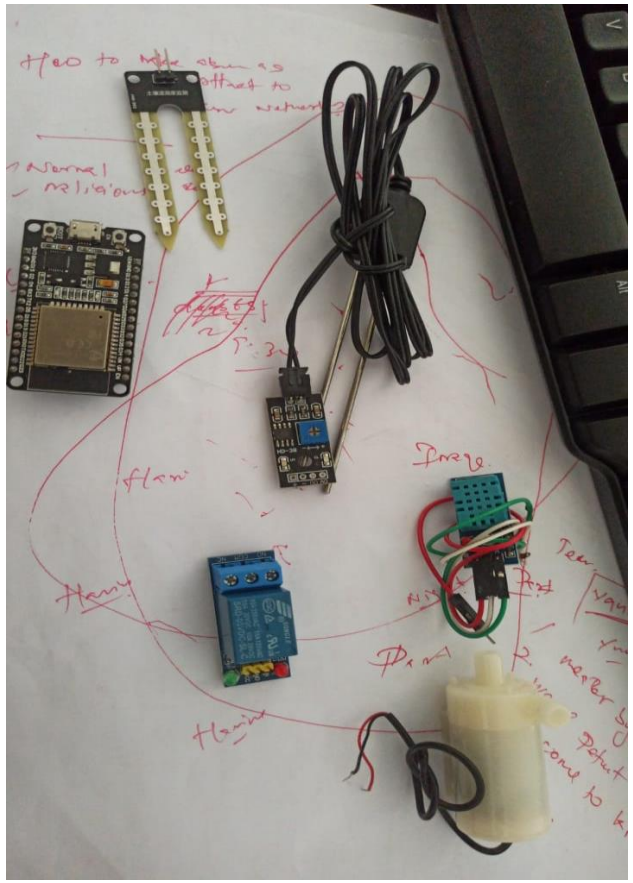
Software

Development: Python, Dart, MySQL, Android Studio.
Machine Learning: Supervised Learning
Visualization: Chart.js.
API Integration: RESTful APIs for real-time data.

Personnel

System Administrator, Data Analyst, Software Developer.

Key Technologies



Internet of Things (IoT)

Utilizes wireless sensor networks for continuous monitoring of soil moisture and other environmental parameters.

Machine Learning

Develops predictive models to analyze data and provide accurate irrigation recommendations. Using python

Cloud Computing

Enables secure data storage, analysis, and communication between system components.

Mobile App

Provides farmers with a user-friendly interface to access real-time data, irrigation schedules, and system alerts. Using **flutter**

Commercialization Strategy

1

Target Audience

Paddy farmers, agricultural cooperatives, and government agencies involved in promoting sustainable farming practices.

2

Value Proposition

Reduced water consumption, increased crop yields, and improved profitability for farmers, while promoting sustainable agriculture.

3

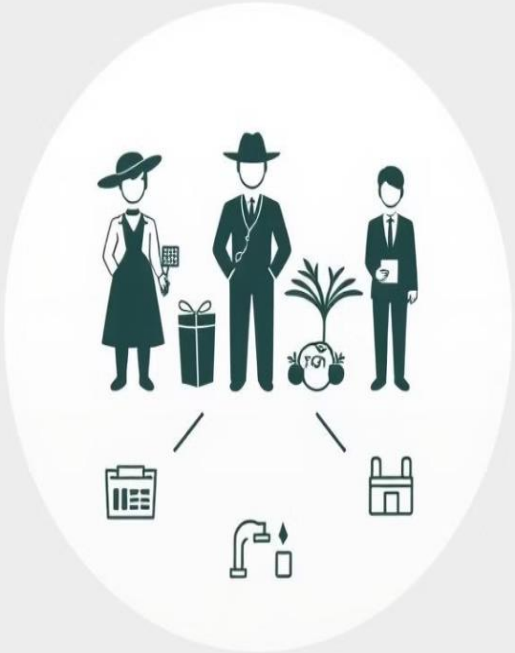
Marketing & Sales

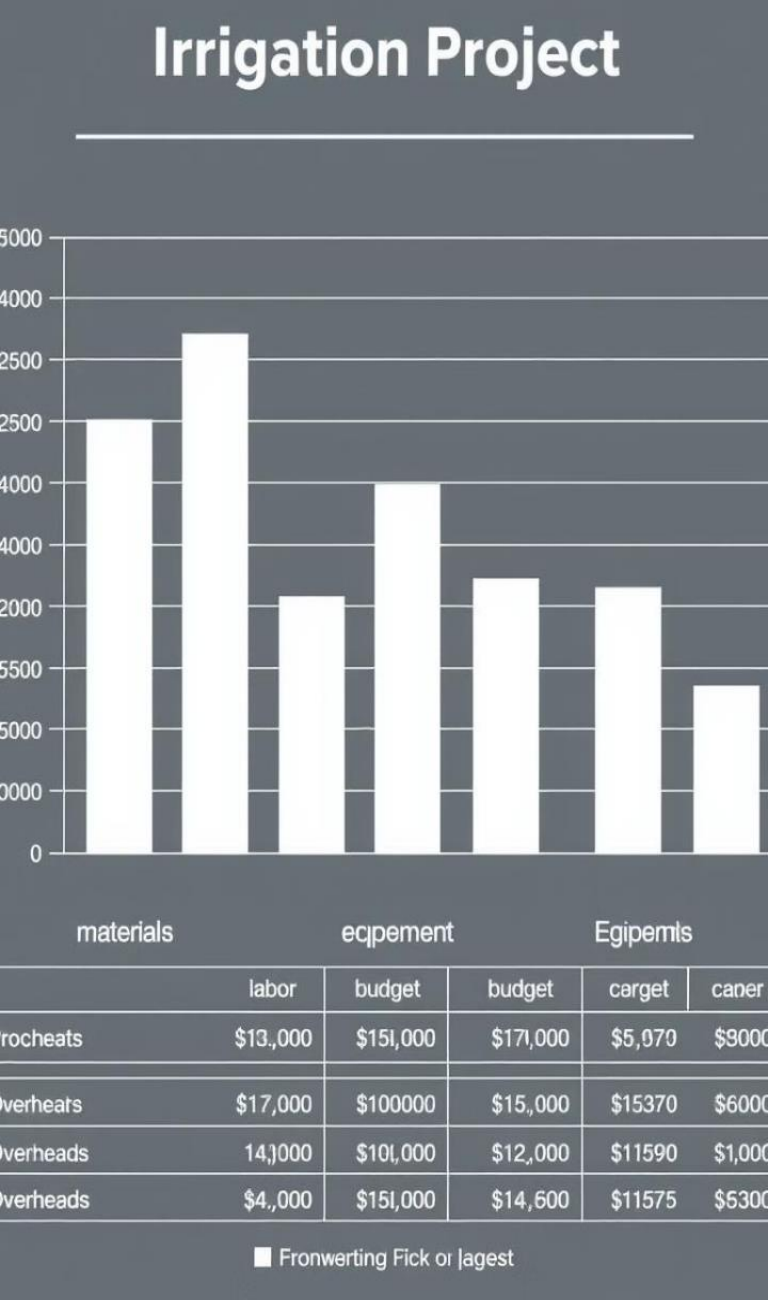
Targeted marketing campaigns, partnerships with agricultural organizations, and demonstrations in pilot paddy fields.

4

Pricing Strategy

Subscription-based model with flexible pricing plans tailored to the specific needs of different farmer groups.





Budget & Funding

35k

Development Costs

Hardware, software, and development team expenses.

500K

Marketing & Sales

Marketing campaigns, partnerships, and training programs.

25k

Pilot Deployment

System deployment costs and farmer training.

Gantt Chart
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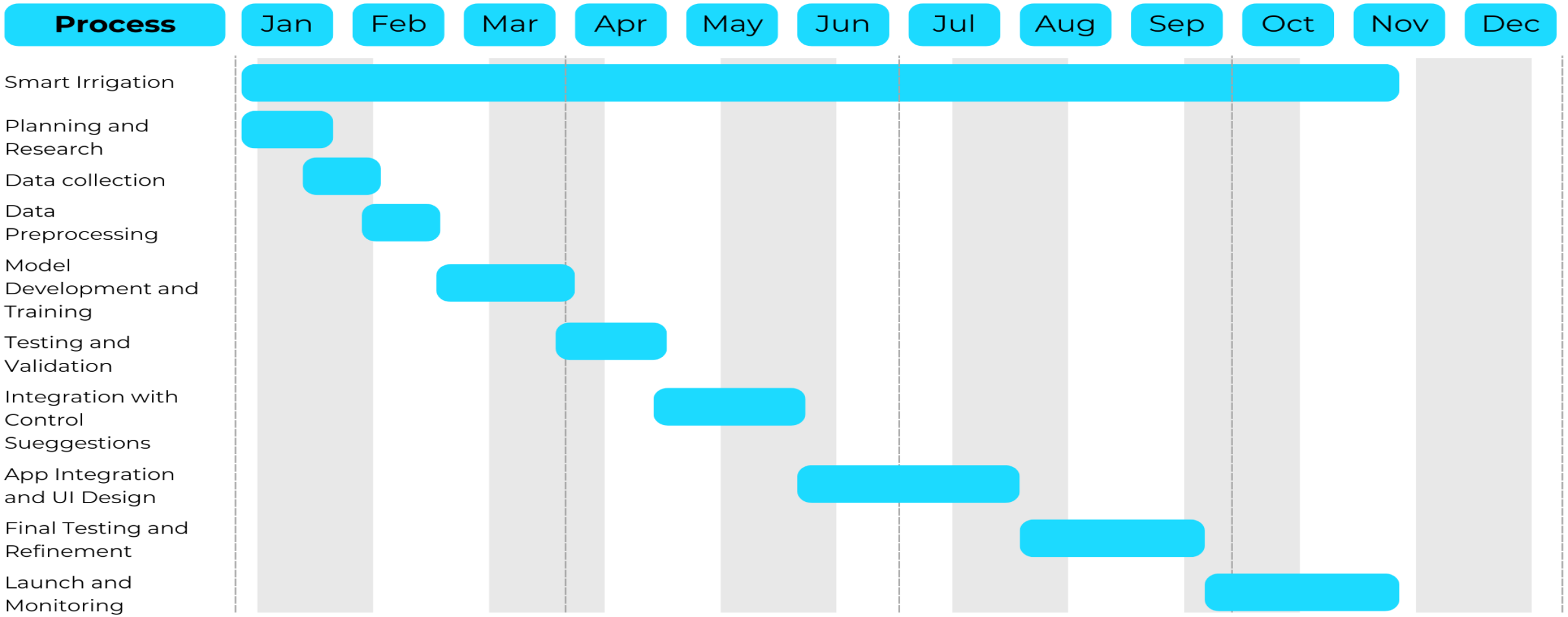

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THANK YOU

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