FARMTRACK:

AGRICULTURE MONITORING SYSTEM

Presented to

JOSEPH VISTAL

In fulfillment for the subject **IT-108**

ADVANCED DATABASE MANAGEMENT SYSTEM

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By

Parminder Cristoria

Jonna Ree R. Cepeda

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Republic of the Philippines
CARAGA STATE UNIVERSITY
CABADBARAN CAMPUS
T. Curato Street, Cabadbaran City 8605, Agusan del Norte
Competence Service Uprightness

(+63 85) 818-5583
+63 917 148 0063
URL: http//csucc.edu.ph
Email Address: chancellorsoffice@csucc.edu.ph
BAGONG PILIPINAS

SOCOTEC
ISO 9001

JAB
PAB ACCREDITED QMS
CERTIFICATION BODY
MSA - 005

1.0 INTRODUCTION

Agriculture continues to be one of the economy's most critical sectors in terms of supplying food, employment, and raw materials. Despite that, conventional farming methods tend to be reliant on manual monitoring, which may be time-consuming and lack accuracy. Farmers often lack the capability to monitor critical factors like soil moisture, temperature, humidity, and crop health conditions that have a direct impact on productivity and yield.

In order to respond to these challenges, FarmTrack: Agriculture Monitoring System is created as a web application that will support farmers in monitoring and managing their farms more effectively. The system supports farmers in registering their personal profiles, such as name, age, location, and the crops they cultivate.Through real-time data monitoring integration, the system offers precise environmental data and crop condition status updates that guide farmers in decision-making.

FarmTrack aims to reduce resource waste, promote sustainable agriculture, and boost productivity by digitizing farm management. In the current digital era, it gives farmers easy access to data and timely information, facilitating more intelligent farming practices.

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2.0 System Objectives

2.1 General Objective

The aim is to come up with a web-based agricultural monitoring system that assists farmers to effectively monitor their crops and farm conditions via real-time data tracking, statistical analysis, and digital record keeping.

2.2 Specific Objectives

- To come up with a farmer profiling system that captures vital information like name, age, location, and crop types grown.

- To create a dashboard that shows environmental conditions like soil moisture, temperature, humidity, and light intensity.

- To allow farmers to input, edit, and track crop details, such as date of planting, date of harvesting, and crop status.

- To create a statistical report dashboard that can handle a maximum of 10,000 data records, giving thorough information about farm and crop performance.

- To offer data visualization features like charts and graphs for trend analysis and decision-making.

- To provide a secure, user-friendly web interface through which farmers can access their information at any time and from anywhere.

- To provide data storage and management with an effective mechanism to manage large datasets for long-term reporting and analysis.

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3.0 System Features

3.1 Dashboard / Analytics View

- Displays an overview of the farmer's profile and farm activities.
- Shows environmental data such as soil moisture, temperature, humidity, and light intensity.
- Provides easy-to-understand analytics summarizing farm performance.
- Includes data summary cards (e.g., total crops, average soil moisture, and yield rates).

3.2 Statistical Report Dashboard

- Capable of handling and visualizing up to 10,000 data entries efficiently.
- Displays key agricultural statistics such as:
- Average soil moisture per crop type
- Temperature and humidity trends per season
- Crop yield distribution
- Resource utilization rates
- Generates summary reports in both graphical and tabular form.
- Allows farmers to download reports in PDF or Excel format for documentation and sharing.
- Includes filter and search options for analyzing specific date ranges or crop types.

3.3 Data Visualization (Graphs and Charts)

- Provides visual representation of environmental trends and crop data.
- Line graphs showing daily or weekly changes in soil moisture and temperature.
- Bar charts comparing crop performance or farm zones.
- Pie charts illustrating crop type distribution and productivity ratio.

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3.4 Tables / Tabular Data Presentation

- Displays detailed data logs for environmental readings and crop records.
- Supports sorting, filtering, and exporting of data for analysis.
- Optimized to handle up to 10,000 rows without performance lag.

3.5 User Registration and Login

- Secure registration for new farmers including name, password, age, location, and crop type.
- Login system for authenticated users to access their personalized dashboard.
- Role-based access for administrators, farmers, or technicians (optional).

3.6 Transaction / Record Management Modules

- Allows farmers to add, edit, and delete crop records such as planting date, harvest date, and status.
- Stores and organizes all environmental data readings in a secure database.
- Generates reports summarizing productivity, crop history, and environmental conditions.

3.7 Data Storage and Management

- Centralized MySQL database capable of storing and managing 10,000+ entries efficiently.
- Uses data indexing and optimization to ensure fast loading and retrieval.
- Provides backup and recovery features to prevent data loss.

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3.8 Reports and Analytics

- Farmers can generate automated reports summarizing:
- Farm performance
- Environmental trends
- Crop growth patterns
- Harvest history
- Reports can be viewed on-screen or exported for offline use.

3.9 System Security

- Implements secure login authentication and password encryption using Laravel's built-in authentication system.
- Ensures data privacy through access control and role-based permissions.
- Uses HTTPS protocol for encrypted data transmission.

3.10 Accessibility and Responsiveness

- Farmers can access the system anytime and anywhere via a web browser.
- Fully responsive interface optimized for desktop, tablet, and mobile use.
- Designed using Tailwind CSS and Flowbite (Tailwind UI Library) to create a clean, modern, and mobile-friendly interface.

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4.0 Development Tools and Technologies

To ensure that the system is secure, efficient, and visually appealing, FarmTrack utilizes the following tools and technologies:

Tool/ Technology	Purpose / Description
Laravel Framework (PHP)	Used for backend development, routing, authentication, and database management. Provides MVC architecture for organized and maintainable code.
MySQL Database	Serves as the main database for storing farmer profiles, crop data, and environmental records. Supports relational data handling and indexing for large-scale data.
Tailwind CSS	Used for designing a clean, responsive, and customizable interface. Enables rapid UI development with utility-first classes.
Flowbite (Tailwind UI Library)	Enhances design with pre-built, modern UI components such as charts, modals, and tables. Ensures consistency and aesthetic presentation.
JavaScript / AJAX	Handles front-end interactivity and real-time data updates without reloading pages.
XAMPP / Local Server	Provides a local development environment for running Laravel, PHP, and MySQL during system testing and deployment.

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5.0 System Flow of FarmTrack: Agriculture Monitoring System

Farmer Registration and Login

- Farmers register by providing name, password, age, location, and crop details.
- Registered users log in to access their personalized dashboards.

Farmer Dashboard

- Displays the farmer's profile, farm summary, environmental data.
- Includes statistical summary panels for key insights.

Crop Management

- Farmers can add, view, update, and manage multiple crop records simultaneously.

Data Storage and Management

- Stores all data (up to 10,000 records) securely in the MySQL database for long-term reference.

Statistical Report Dashboard

- Processes large data volumes for analysis and decision-making.
- Provides detailed visual reports (charts, graphs, and summaries).

Reports and Analytics

- Generates exportable reports summarizing performance and environmental conditions.

Access and Security

- Ensures data confidentiality and reliability through secure Laravel authentication and database encryption.