**NOTICE OF TITLE ACCEPTANCE**

**C E R T I FI C A T I O N**

The undersigned members comprising the panel for oral examination hereby approve the Research Project entitled **Project Israel: Water Management and Soil Nutrient Detection for Crop Selection Using NPK Sensor** including its team members composed of LORAINE B. ALAGASI, ELLIE ROSE T. ALMEDA, CY KEAN DAVE R. PERJES.

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| EPIE F. CUSTODIO, *DIT* | |
| **IT Research Methods, Instructor** | |
| EPIE F. CUSTODIO, *DIT* | JOHN EDGAR S. ANTHONY, MSIT |
| **Panelist** | **Panelist** |
| MALOU B. ADAY |  |
| **Panelist** |  |
|  | |
| EPIE F. CUSTODIO, *DIT* | |
| **Program Chair, BSIT** | |
| POLEMER M. CUARTO, *Ph.D.* | |
| **Coordinator for Research, MinSU Calapan Campus** | |
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| JOHN EDGAR S. ANTHONY, *MSIT* | |
| **Dean, College of Computer Education** | |

* **MAJOR FEATURES:**
* **Real-Time Soil Monitoring (NPK Sensors)**: Uses sensors to gather live data on Nitrogen, Phosphorus, and Potassium levels in the soil.
* **Automated Watering System**: IoT-based system that adjusts water distribution based on soil moisture and specific crop requirements.
* **Crop Selection Algorithm**: Machine learning algorithm that analyzes soil and environmental data to recommend the best-suited crops.
* **Environmental Monitoring** (*Temperature and Humidity Sensors*): Tracks temperature and humidity to refine recommendations for crop selection and water management.
* **Water Management Optimization**: Optimizes water use based on soil and environmental data to match the exact needs of each crop.
* **Remote Monitoring and Control**: Enables remote access to real-time data and control over the system through an app or web interface.
* **FUNCTIONAL REQUIREMENTS:**

**Real-Time Soil Monitoring (NPK Sensors)**

* **Data Collection**: The system must collect real-time data on Nitrogen (N), Phosphorus (P), and Potassium (K) levels using NPK sensors embedded in the soil.
* **Data Storage**: The collected nutrient data should be stored in a database for analysis and historical tracking.
* **Data Display**: Soil nutrient levels should be displayed in a user-friendly interface, allowing users to view live nutrient data and historical trends.

**2. Automated Watering System**

* **Moisture Level Detection**: Soil moisture sensors must measure soil moisture in real time.
* **Automated Water Control**: The system should automatically adjust water distribution based on moisture readings and crop-specific water requirements.

**3. Crop Selection Algorithm**

* **Machine Learning Integration**: The system should integrate a machine learning algorithm to analyze soil nutrient levels, moisture, temperature, and humidity data.
* **Crop Recommendation**: Based on data analysis, the system should recommend suitable crops that align with the current soil conditions.

**4. Environmental Monitoring (Temperature and Humidity Sensors)**

* **Environmental Data Collection**: Temperature and humidity sensors should collect environmental data continuously.
* **Data Logging**: Environmental data should be logged in the database for historical analysis.
* **Impact Analysis**: The system should use temperature and humidity data to influence water distribution and crop selection, adjusting recommendations based on environmental factors.

**5. Water Management Optimization**

* **Optimized Water Distribution**: The system must analyze soil nutrient and environmental data to determine the optimal amount of water for each specific crop type.
* **Water Usage Reports**: Generate reports on water usage over time, highlighting efficiency and identifying areas for improvement.
* **Water Consumption Alerts**: Notify users when water consumption deviates significantly from optimal levels.

**6. Remote Monitoring and Control**

* **User Access**: Users must be able to access the system remotely through an app or web interface.
* **Real-Time Data Display**: Display all real-time and historical data related to soil nutrients, moisture, temperature, and humidity on the remote interface.
* **Control Features**: Provide controls for adjusting water distribution settings remotely, either automatically or manually.
* **User Authentication**: Implement a secure authentication system to ensure only authorized users can access or control the system remotely.
* **PANEL’S SUGGESTIONS:**

* **SIR JOHN EDGAR S. ANTHONY – Dean of CCS**
* Mobile App/Web App
* Indicate what specific machine learning will be used for the project.

**ESTIMATED BUDGET:**

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| --- | --- |
| **Name** | **Cost** |
| 1. Hose | 500 - 1,500 |
| 2. Sprinkler | 300 - 1,200 |
| 3. Water Pump Motor | 3,000 - 7,000 |
| 4. ESP32 (Microcontroller) | 300 - 600 |
| 5. Raspberry Pi | 2,500 - 5,000 |
| 6. Relay Module | 150 - 300 |
| 7. Soil NPK Sensor | 1,500 - 3,000 |
| 8. Soil Moisture Sensor | 100 - 400 |
| 9. pH Sensor | 800 - 1,500 |
| 10. Water Flow Sensor | 400 - 700 |
| 11. Jumper Wires, Breadboard, Resistors, etc. | 200 - 500 |
| 12. Power Supply | 500 - 1,000 |
| **Estimated Total Cost:** | 10,550 - 22,700 |

**COLLEGE OF COMPUTER STUDIES**

**Bachelor of Science in Information Technology**

November 13, 2024

Sr. Leila M. Montero, FMA

Technical Directress

Mary Help of Christians School (Mindoro) INC.

Dear Sr. Leila Montero:

A Blessed Day,

We, Loraine B. Alagasi, Ellie Rose T. Almeda, Cy Kean Angel Dave R. Perjes are 3rd year students taking Bachelor of Science in Information Technology at Mindoro State University, Calapan City Campus, are currently working on our proposed title for the Capstone I entitled " **Project Israel: Water Management and Soil Nutrient Detection for Crop Selection Using NPK Sensor**" as a requirement to our course, Research Methods.

In connection with this, our group would like to request your good office to allow us to conduct a study in your workplace

The focus of this study is to develop an intelligent, data-driven system that uses NPK sensors to monitor soil nutrients and optimize water management for crop selection. The system will include real-time soil monitoring, automated water distribution based on soil moisture levels, and a crop selection algorithm that recommends optimal crops suited to the current soil and environmental conditions.

We are hoping for your kind consideration and favorable response regarding this matter. Thank you so much, and God bless.

Respectfully yours,

Loraine B. Alagasi Ellie Rose T. Almeda

**Group Representative** **Group Representative**

Cy Kean Angel Dave R. Perjes

**Group Representative**

Noted by:

Epie F. Custodio, DIT John Edgar S. Anthony

**Facilitator, IT Research Methods** **Dean, College of Computer Studies**

Approved:

Sr. Leila M. Montero, FMA

**Technical Directress**

Mary Help of Christians School (Mindoro) INC.