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## **APPENDICES**

## APPENDIX A

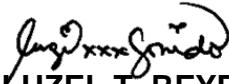
### GANTT CHART OF ACTIVITIES

Activity	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1. Formulation of Title										
2. Title Proposal										
3. Gathering of Data and Interviews										
4. Chapter 1 and 2										
5. Consultation to the Adviser										
6. Consultation to the Critic Reader (Chapter 1 and 2)										
7. Final Revision of Chapter 1 and 2										
8. Compilation and Printing										
9. Colloquium										
10. Revision of recommendation and suggestions										
11. Passing of Final Revisions										
12. Searching about the required application development platform										
13. Development of the system										
14. Testing and debugging										
15. Survey of questionnaire checklist										
16. Interpretation of data collected										
17. Chapter 3 and 4										
18. Consultation and Revision										
19. Final Defense										
20. Submission of Hardbound										

Prepared by:

Rampas, Adonis S.  
 Azarcon, Carl Angelo C.  
 Guillamon, John Rey P.  
 Santos, Roberto Miguel M.  
**Researchers**

Noted by:



**ANGELUZEL T. REYES, Ph. D**  
 Research Adviser

# **APPENDIX B**

## **LETTER FOR ADVISER**



Republic of the Philippines  
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Email Address: ursmain@urs.edu.ph /urs.opmorong@gmail.com  
Main Campus: URS Tanay Tel. (02) 8401-4900, 8401-4910, 8401-4911; 8539-9957 to 58

**College of Engineering - URS Morong**

## APPOINTMENT

November 16, 2023

**ANGELUZEL TONIDO-REYES, Ph.D.**  
Faculty  
This College

Dear Madame:

In consideration of your qualifications in the field of research, the College Research Council represented by the undersigned, upon the recommendations of the Research Professor has approved your application. The amount of

The following are the names of the students in the class.

1. Supervises and monitors the research work of the advisees upon accepting the assignment as an adviser;
  2. Sees that thesis meets the requirements of research before endorsing to the members of the panel and research instructor for consultation;
  3. Certifies to the readiness of the advisees to render final defense.
  4. Requires the advisees to give a copy of the manuscript to the panel members one week before the scheduled oral defense
  5. Works closely with the advisees and monitors the revision of the manuscript considering the suggestions of the panel and certifies the correctness of the same before referring to the members of the panel and research instructors;
  6. Coordinates with the College Research Coordinator on matters related to research activities; and
  7. Undertakes the function of the recorder who records proceedings of the defense and supplies the advisees with the summarized recommendations / suggestions of the panel.

The students who shall be under your supervision include:

<i>Names</i>	<i>Course</i>
RAMPAS, ADONIS S.	BS Computer Engineering
AZARCON, CARL ANGELO C.	BS Computer Engineering
GUILLAMON, JOHN REY P.	BS Computer Engineering
SANTOS, ROBERTO MIGUEL M.	BS Computer Engineering

## **THE THESIS PROPOSAL IS ENTITLED SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS**

Thank you for your usual support to the research program of the College.

Respectfully yours,

  
JASMIN M. PANGANIBAN, MSCE  
College Research Coordinator

Conforme:

*John S. Dow*  
**ANGELUZEL TONIDO-REYES, Ph.D.**  
Thesis Adviser

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## APPENDIX C

### LETTER FOR EXPERT



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*College of Engineering - URS Morong*

### APPOINTMENT

November 16, 2022

**PAUL JOHN L. SAN ANDRES, MSIT (CAR)**  
 Faculty  
 This College

Dear Sir;

In consideration of your qualifications in the field of research, the College Research Council represented by the undersigned, upon the recommendations of the Research Professor has approved your appointment as *Thesis Expert*.

The following are the responsibilities of the Thesis Expert:

1. Provide subject matter expertise for the study;
2. Suggests appropriate statistical treatment for the study;
3. Guides the researchers in computation of data;
4. Guides the researchers in the correct analysis and interpretation of data.

The students who shall be under your scrutiny include:

<i>Names</i>	<i>Course</i>
RAMPAS, ADONIS S.	BS Computer Engineering
AZARCON, CARL ANGELO C.	BS Computer Engineering
GUILLAMON, JOHN REY P.	BS Computer Engineering
SANTOS, ROBERTO MIGUEL M.	BS Computer Engineering

The thesis proposal is entitled **SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO – ECOLOGICAL AWARENESS**

Thank you for your usual support to the research program of the College.

Respectfully yours,

**JASMIN M. PANGANIBAN, MSCE**  
 College Research Coordinator

Conforme:

**PAUL JOHN L. SAN ANDRES, MSIT(CAR)**  
 Thesis Expert

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# **APPENDIX D**

## **LETTER FOR PANEL CHAIRPERSON**



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**College of Engineering - URS Morong**

## **APPOINTMENT**

November 16, 2022

**ALLAN P. ANORICO, MSEE**  
Faculty  
This College

Dear Sir;

In consideration of your qualifications in the field of research, the College Research Council represented by the undersigned, upon the recommendations of the Research Professor has approved your appointment as ***Panel Chairperson***.

The following are the responsibilities of the Panel Chairperson:

1. Acts as presiding officer;
  2. Decides on the procedure of the defense;
  3. Settles disagreements among the panel members and/or comments and suggestions;
  4. Solicits the decision of the panel, and
  5. Consolidates and announces the rating.

The students who shall be under your scrutiny include:

<i>Names</i>	<i>Course</i>
RAMPAS, ADONIS S.	BS Computer Engineering
AZARCON, CARL ANGELO C.	BS Computer Engineering
GUILLAMON, JOHN REY P.	BS Computer Engineering
SANTOS, ROBERTO MIGUEL M.	BS Computer Engineering

## **THE THESIS PROPOSAL IS ENTITLED SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO – ECOLOGICAL AWARENESS**

Thank you for your usual support to the research program of the College.

Respectfully yours,

**JASMIN M. PANGANIBAN, MSCE**  
College Research Coordinator

## Conforme

**ALLAN P. ANORICO, MSEE**  
Panel Chairperson

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## APPENDIX E

### LETTER FOR CRITIC READER



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 Main Campus: URS Tanay Tel. (02) 8401-4900; 8401-4910; 8401-4911; 8539-9957 to 58

*College of Engineering - URS Morong*

### APPOINTMENT

November 16, 2022

**FREDELINA F. DE LEON, MAEd.**  
 Faculty  
 This College

Dear Madame;

In consideration of your qualifications in the field of research, the College Research Council represented by the undersigned, upon the recommendations of the Research Professor has approved your appointment as **Critic Reader**.

The following are the responsibilities of the Critic Reader:

1. Reviews all the grammatical aspects;
2. Certifies that the manuscript is already free of grammatical errors and is ready for submission to the office of the Dean of the College;

The students who shall be under your scrutiny include:

Names	Course
RAMPAS, ADONIS S.	BS Computer Engineering
AZARCON, CARL ANGELO C.	BS Computer Engineering
GUILLAMON, JOHN REY P.	BS Computer Engineering
SANTOS, ROBERTO MIGUEL M.	BS Computer Engineering

The thesis proposal is entitled **SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO – ECOLOGICAL AWARENESS**

Thank you for your usual support to the research program of the College.

Respectfully yours,

**JASMIN M. PANGANIBAN, MSCE**  
 College Research Coordinator

Conforme:

**FREDELINA F. DE LEON, MAEd.**  
 Critic Reader

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URS Angono  
 URS Antipolo  
 URS Binangonan

Tel. 8539-9930 to 31  
 Tel. 8539-9932 to 34  
 Tel. 8539-9935 to 37

URS Calita  
 URS Cardona  
 URS Morong

Tel. 8539-9938 to 39  
 Tel. 8539-9940 to 41  
 Tel. 8539-9950 to 56

URS Pulda  
 URS Rodriguez  
 URS Taytay

Tel. 8539-9942 to 44  
 Tel. 8539-9945 to 47  
 Tel. 8539-9948 to 49

## APPENDIX F

### CERTIFICATE OF CONTENT VALIDATION



Republic of the Philippines  
**UNIVERSITY OF RIZAL SYSTEM**  
 Morong, Rizal



**COLLEGE OF ENGINEERING**  
 Bachelor of Science in Computer Engineering  
 2<sup>nd</sup> Semester, School Year 2022-2023

#### CERTIFICATE OF CONTENT VALIDATION

This is to certify that the following experts have validated the researchers' questionnaire checklist prepared and submitted by Adonis S. Rampas, Carl Angelo C. Azarcon, John Rey P. Guillamon and Roberto Miguel M. Santos for their undergraduate thesis entitled "Smart Crop and Health Monitoring System for Cucumber Farming: Innovating Techno-Ecological Awareness" as a requirement for the degree Bachelor of Science in Computer Engineering (BSCpE).

Name	Signature	Date
ANGELUZEL TONIDO-REYES, Ph. D.		03/17/2023
PAUL JOHN L. SAN ANDRES, MSIT (CAR)		03/20/23
FREDELINA F. DE LEON, MAEd.		03/14/2023
ALLAN P. ANORICO, MSEE		03-14-23

## APPENDIX G

### LETTER TO RESPONDENTS



Republic of the Philippines  
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#### ***College of Engineering - URS Morong***

November 30, 2022

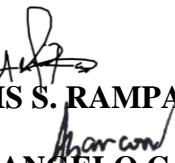
Dear Respondents,

Greetings of Peace and Prosperity!

We, Researchers, are conducting research study entitled "**Smart Crop and Health Monitoring System for Cucumber Farming: Innovating Techno-Ecological Awareness**", in partial fulfillment of requirements for the degree Bachelor of Science in Computer Engineering (BSCpE). In view of this, we would like to have you as one of our respondents in this research study. We will appreciate it if you accomplish the attached questionnaire-checklist honestly and properly.

Rest assured that your response would be treated with utmost confidentiality. We are hoping at your favorable response. Thank you and God Bless.

Respectfully yours,

  
**ADONIS S. RAMPAS**

  
**CARL ANGELO C. AZARCON**

  
**JOHN REY P. GUILLAMON**

  
**ROBERTO MIGUEL M. SANTOS**

Noted By:

  
**ANGELUZEL TONIDO-REYES, Ph.D.**

Thesis Adviser

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## APPENDIX H

### LETTER TO CONDUCT THE STUDY



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#### ***College of Engineering - URS Morong***

**Hon. ALVIN B. OPLE**

Barangay Captain  
Quisao, Pililla, Rizal

Dear Sir:

Warmest Greetings!

In partial fulfillment of our requirements for our subject CpE Practice and Design 1, we 4<sup>th</sup> year college students of BS Computer Engineering namely: Adonis S. Rampas, Carl Angelo C. Azarcon, John Rey P. Guillamon, and Roberto Miguel M. Santos, would like to ask for permission to conduct a research study entitled “Smart Crop and Health Monitoring System for Cucumber Farming: Innovating Techno-Ecological Awareness”.

In connection with this, we would like to ask your good office to allow us to conduct a survey in Quisao, Pililla, Rizal. Rest assured that the data we will gather will remain confidential and to be used in academic purposes only.

We believe that you are with us in our enthusiasm to finish the requirement as compliance for our subject and to develop our well-being. We hope of your positive response on this humble matter. Your approval to conduct this study will be greatly appreciated.

Respectfully yours,

The Researchers

Recommending Approval:

**ANGELUZEL T. REYES, Ph. D.**  
Research Adviser

Approved by:

**HON. ALVIN B. OPLE**  
Barangay Captain

***Nurturing Tomorrow's Nobles***

## APPENDIX I

### RESEARCHERS-MODIFIED QUESTIONNAIRE CHECKLIST FOR SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS



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 Main Campus: URS Tanay Tel. (02) 8401-4900; 8401-4910; 8401-4911; 8539-9957 to 58

***College of Engineering - URS Morong***

Student (Estudyante)       Expert (Eksperto)

Name (Pangalan): \_\_\_\_\_

Age (Edad): \_\_\_\_\_ Date (Petsa): \_\_\_\_\_

Profession (Propesyon): \_\_\_\_\_

**Directions:** Check (✓) the box that corresponds to your answer. Use legends as your guide. (Lagyan nang tsek (✓) ang kahon na tumutugma sa iyong sagot. Gamitin and mga legends bilang iyong basehan.)

**LEGEND:** 5 - Very Much Accepted (Lubos na sumasangayon)

4 - Accepted (Sumasangayon)

3 - Moderately Accepted (Katamtamang sumasangayon)

2 - Slightly Accepted (Bahagyang sumasangayon)

1 - Not Accepted (Walang katiyakan)

<b>1. FUNCTIONAL SUITABILITY</b> The developed device... (Ang binuong aparato ay...)		1	2	3	4	5
1.1	functions well. (gumagana nang maayos at tama.)					
1.2	can make expected results. (nakapag-bigay ng inaasahang resulta.)					
1.3	can respond to user's command. (akma at maayos.)					

<b>2. PERFORMANCE EFFICIENCY</b> The developed device... (Ang binuong aparato ay...)		1	2	3	4	5
2.1	can gather values of the parameters. (kayang kumuha ng value ng iba't ibang uri ng parameters.)					
2.2	can help to produce desired and accurate results. (tumutulong na makagawa ng inaasahan at akmang resulta.)					
2.3	can maintain certain humidity and temperature conditions. (kayang panatilihin ang saktong klima at alinsangan.)					
<b>3. RELIABILITY</b> The developed device... (Ang binuong aparato ay...)		1	2	3	4	5
3.1	can make correct and accurate informations. (nakagagawa ng tama at akmang impormasyon.)					
3.2	is ready to use and accessible anytime when it is needed. (laging pwede gamitin at nasa maayos na kalagayan.)					
3.3	can perform its work efficiently. (nakagagawa ng naaayon sa dapat gawin.)					
<b>4. MAINTAINABILITY</b> The developed device... (Ang binuong aparato ay...)		1	2	3	4	5

4.1	components are available locally. (maaaring mabili ang mga bahagi sa loob ng bansa.)					
4.2	is easy to operate and not that complicated to build. (madaling gamitin at hindi mahirap kumpunihin.)					
4.3	is effective and durable. (maasahan at matibay.)					
<b>5. PORTABILITY</b> The developed device... (Ang binuong aparato ay...)		1	2	3	4	5
5.1	can effectively and efficiently be adapted for different hardware, software, or other operational environments. (naaayon at akma sa kahit saang hardware at software.)					
5.2	can be effective, efficient and can be installed in a specified environment. (kayang gumana sa kahit saang lugar.)					
5.3	can be replaced by another software product for the same purpose. (maaaring palitan ng naaayon na piyesa base sa lugar na paglalagyan.)					

Comments or Suggestions (Mga komento o suhestiyon):

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## APPENDIX J

### WEIGHTED MEAN FORMULA



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 Main Campus: URS Tanay Tel. (02) 8401-4900; 8401-4910; 8401-4911; 8539-9957 to 58

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### ***College of Engineering - URS Morong***

### SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS

#### **Weighted Mean Formula:**

$$\bar{x} = \frac{\sum w x}{\sum w}$$

**Where:**

$\bar{x}$  = Weighted Mean

$\Sigma$  = Summation

w = weights applied to x values

x = data values to be averaged

## APPENDIX K

### MOISTURE PERCENTAGE, SATURATED VAPOR, ACTUAL VAPOR PRESSURE AND RELATIVE HUMIDITY FORMULA



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---

#### ***College of Engineering - URS Morong***

##### **Moisture Percentage Formula:**

$$MC = \frac{(w - d)}{w} \times 100$$

where:

MC = moisture content (percentage)

w = weight of the soil while wet

d = weight of the soil while dry

##### **Actual Vapor Pressure Formula:**

$$e = 6.11 \times 10 \frac{7.5 \times T_d}{237.3 + T_d}$$

where:

e = actual vapor pressure

T<sub>d</sub> = dew point temperature of the air (Celsius)

##### **Saturated Vapor Formula:**

$$e_s = 6.11 \times 10 \frac{7.5 \times T}{237.3 + T}$$

where:

e<sub>s</sub> = saturated vapor pressure

T = air temperature (Celsius)

##### **Relative Humidity Formula:**

$$rh = \frac{e}{e_s} \times 100$$

where:

rh = relative humidity

e = actual vapor pressure

e<sub>s</sub> = saturated vapor pressure

## APPENDIX L

### DEVICE STRUCTURE FOR SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS



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Main Campus: URS Tanay Tel. (02) 8401-4900; 8401-4910; 8401-4911; 8539-9957 to 58

#### *College of Engineering - URS Morong*



## APPENDIX M

### MONITORING DEVICE FOR SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS



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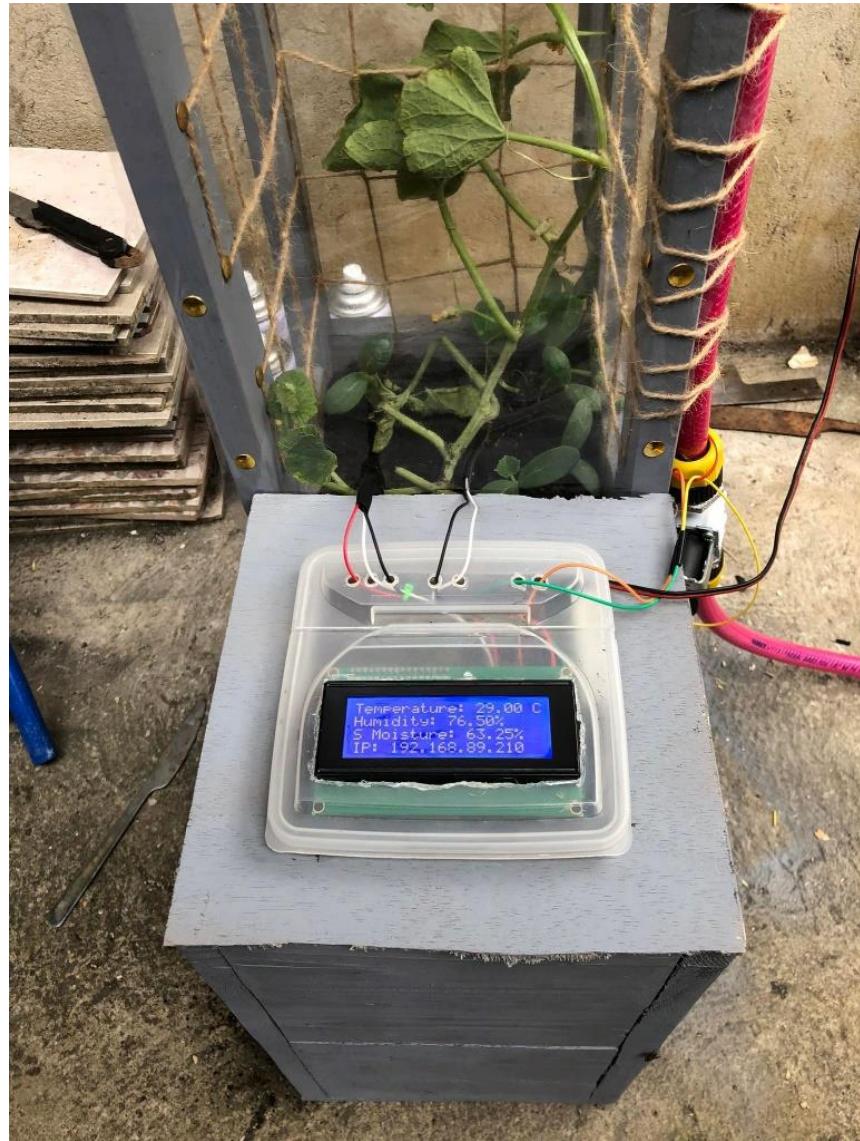


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#### *College of Engineering - URS Morong*



## APPENDIX N

### GRAPHICAL USER INTERFACE (GUI) FOR SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS

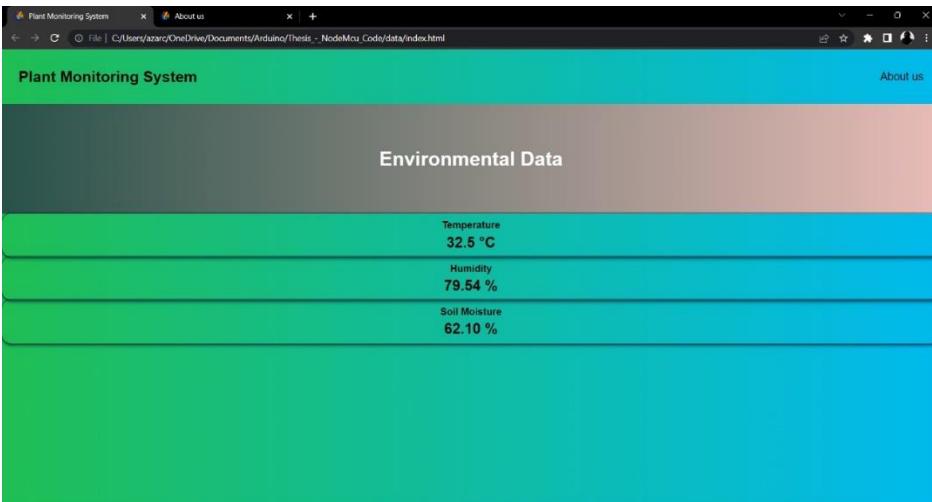


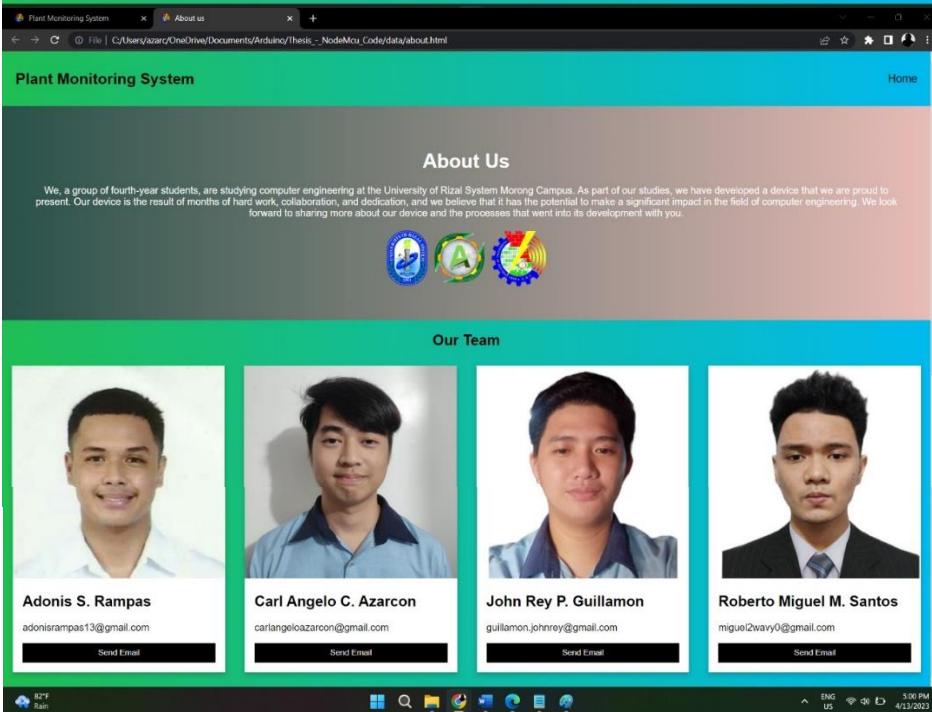
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**About Us**

We, a group of fourth-year students, are studying computer engineering at the University of Rizal System Morong Campus. As part of our studies, we have developed a device that we are proud to present. Our device is the result of months of hard work, collaboration, and dedication, and we believe that it has the potential to make a significant impact in the field of computer engineering. We look forward to sharing more about our device and the processes that went into its development with you.



**Our Team**

 <b>Adonis S. Rampas</b> <a href="mailto:adonirsampas13@gmail.com">adonirsampas13@gmail.com</a> <a href="#">Send Email</a>	 <b>Carl Angelo C. Azarcon</b> <a href="mailto:carlangeloazarcon@gmail.com">carlangeloazarcon@gmail.com</a> <a href="#">Send Email</a>	 <b>John Rey P. Guillamon</b> <a href="mailto:gilliamon.johnrey@gmail.com">gilliamon.johnrey@gmail.com</a> <a href="#">Send Email</a>	 <b>Roberto Miguel M. Santos</b> <a href="mailto:migue2wavy0@gmail.com">migue2wavy0@gmail.com</a> <a href="#">Send Email</a>
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## APPENDIX O

### ALERT MESSAGE BOX FOR SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS



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This page says

Warning: Crop Getting Too Much Sunlight/Heat

This page says

Warning: Crop is low on humidity

This page says

Warning: Crop low on soil moisture

**APPENDIX P**  
**SCHEMATIC DIAGRAM FOR SMART CROP AND HEALTH MONITORING**  
**SYSTEM FOR CUCUMBER FARMING: INNOVATING**  
**TECHNO-ECOLOGICAL AWARENESS**

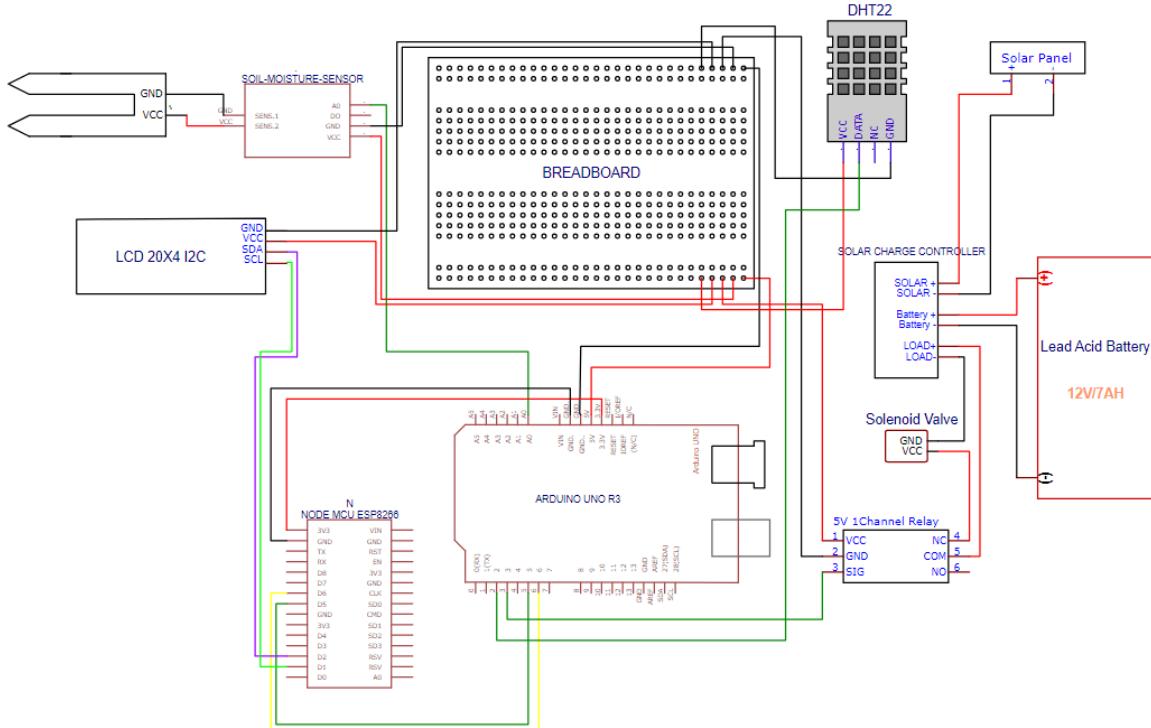


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**APPENDIX Q**  
**PICTORIAL PRESENTATION OF THE DIFFERENT HARDWARE PARTS OF  
 THE SMART CROP AND HEALTH MONITORING SYSTEM FOR  
 CUCUMBER FARMING**



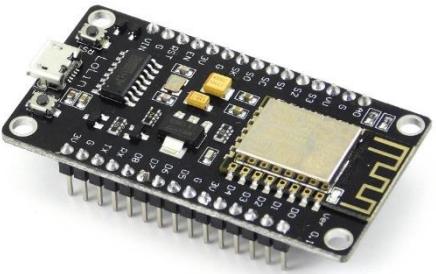
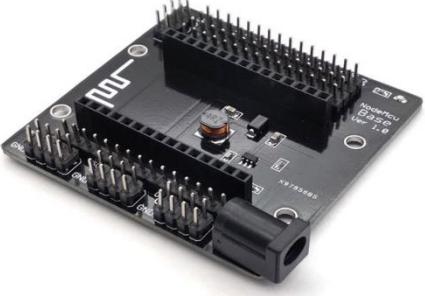
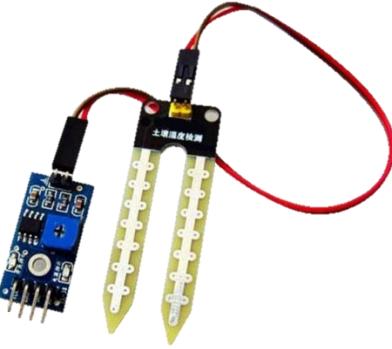
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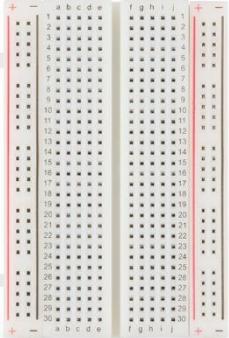
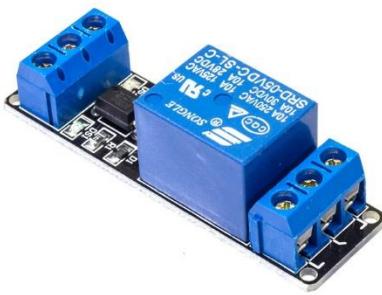


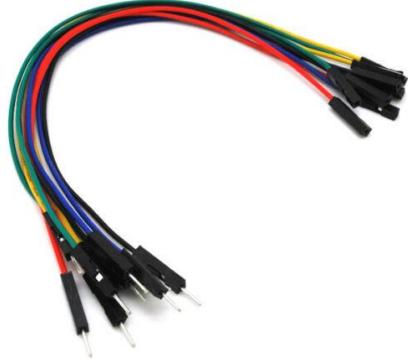
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Different Hardware Parts of the Research Device	Description
	<b>Arduino Uno R3</b> - The Arduino Uno R3 is a microcontroller board based on the ATmega328P chip. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button.
	<b>DHT22</b> - The DHT22 is a temperature and humidity sensor that can be used to measure the temperature and humidity of the surrounding environment. It uses a capacitive humidity sensor and a thermistor to accurately measure both the temperature and humidity levels.
	<b>LCD I2C</b> - An LCD I2C (Inter-Integrated Circuit) module is a display unit that uses the I2C interface protocol to communicate with a microcontroller or other devices. It consists of an LCD (Liquid Crystal Display) screen and

	<p>an I2C interface chip, which allows the microcontroller to send data to the LCD screen with only two wires (SDA and SCL) instead of the normal 8 or 16 wires required for parallel communication.</p>
	<p><b>NodeMCU esp8266</b> - NodeMCU ESP8266 is a small Wi-Fi development board that runs on the ESP8266 chip. It provides an easy way to connect devices to the internet and can be used for a wide range of applications such as IoT (Internet of Things), home automation, and robotics.</p>
	<p><b>NodeMCU Expansion Board</b> - A NodeMCU Expansion Board is an add-on board that provides additional features and functionalities to a NodeMCU ESP8266 development board. It allows for easy expansion of the NodeMCU board's capabilities and can be used to interface with other electronic components such as sensors, relays, and displays.</p>
	<p><b>Soil Moisture Sensor Module</b> - A Soil Moisture Sensor Module is a device that measures the moisture content of soil. The sensor module consists of two probes that are inserted into the soil and a control board that reads the moisture level and outputs a signal. The sensor works by measuring the electrical conductivity of the soil, which is directly related to its moisture content.</p>

	<p><b>Breadboard</b> - A Breadboard is a prototyping board used to build electronic circuits without the need for soldering. It consists of a plastic board with a grid of holes arranged in rows and columns, and each hole is connected to others in its row and column by metal strips.</p>
	<p><b>Lead-Acid Battery</b>- A lead-acid battery is a type of rechargeable battery that uses lead and lead oxide as electrodes and sulfuric acid as the electrolyte. These batteries are commonly used in cars, boats, and other vehicles, as well as in uninterruptible power supplies (UPS), solar power systems, and other applications where a reliable source of backup power is needed.</p>
	<p><b>Relay Module 5v 1Channel</b> - A Relay Module 5V 1Channel is an electronic device that allows low-power circuits to control high-power devices. It is commonly used in home automation, robotics, and other applications where a low-power signal needs to control a high-power load. The relay module consists of a relay, a control board, and screw terminals for connecting wires</p>

	<p><b>Solenoid Valve</b> - A Solenoid Valve is an electromechanical device that controls the flow of fluids or gases in a system. It works by using an electromagnetic field to move a plunger or piston within a cylinder, which in turn controls the flow of fluid or gas through the valve. Solenoid valves are commonly used in a variety of applications, including irrigation systems, pneumatic systems, and HVAC systems.</p>
	<p><b>Jumper Wires</b> - Jumper wires are a type of electrical wire that are used to connect electronic components in circuits. They are typically made of thin, flexible copper wire with plastic insulation, and come in a variety of lengths and colors. Jumper wires are commonly used in electronic prototyping and testing, where they allow for easy connection and disconnection of components without the need for soldering.</p>
	<p><b>Solar Charge Controller</b> - A Solar Charge Controller is an electronic device that regulates the flow of electric current from solar panels to batteries. It is commonly used in solar power systems to ensure that the batteries are charged properly and to prevent overcharging or undercharging. The solar charge controller works by regulating the voltage and current from the solar panels, so that it matches the charging requirements of the batteries.</p>

	<p><b>Solar Panel</b> - A Solar Panel is a type of photovoltaic module that converts sunlight into electrical energy. It is made up of multiple solar cells, which are connected together to form a circuit. The solar panel typically has a rigid frame and is covered with tempered glass to protect the cells from weather and other environmental factors.</p>
	<p><b>USB Type A to Type B</b> - A USB Type A to Type B cable serves as a physical connector between a host device (such as a computer) and a peripheral device (such as a printer or scanner).</p>
	<p><b>Micro USB</b> - A Micro USB cable is a type of cable that is commonly used to connect mobile devices to computers or chargers. Micro USB is a smaller version of the standard USB Type-A connector and is designed to be used with smaller mobile devices such as smartphones, tablets, and portable gaming devices.</p>

	<p><b>Hose</b> - A hose is a flexible tube made of rubber, plastic, or other materials that is used to transport liquids and connect to the faucet down to the solenoid valve to distribute water.</p>
	<p><b>Laptop</b> – A portable and compact personal computer (PC) used in writing programs and in making system's monitoring software.</p>

## APPENDIX R

### PICTORIAL PRESENTATION OF THE DIFFERENT SOFTWARE AND PROGRAMMING LANGUAGES OF THE SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING

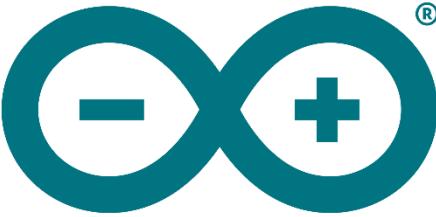


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Different Software and Programming Languages of the Research Device	Description
 <b>ARDUINO</b>	<p><b>Arduino IDE</b> – An Integrated Development Environment that contains text editor for writing codes, messages area and text console. It connects to the Arduino hardware to upload programs and communicate with them. This was used to program the main controller of the system which is the Arduino Uno R3.</p>
	<p><b>Sublime Text 3</b> - Sublime Text 3 is a code editor software that provides a wide range of functionality to support programming and development tasks. One of its main features is the ability to work on multiple files simultaneously, with easy switching between them. It provides syntax highlighting for a wide range of programming languages, making it easy to read and write code</p>

 The CSS logo features a stylized letter 'E' composed of blue and white geometric shapes, set against a white background.	<b>Cascading Style Sheet (CSS)</b> – A style sheet language used for describing the presentation of a document written in a markup language. This was used to enable the separation of presentation and content, including layout, colors and fonts.
 The JavaScript logo features a stylized letter 'JS' composed of yellow and white geometric shapes, set against a white background.	<b>JavaScript (JS)</b> – Programming language of HTML and used for creating web pages. A standalone language that is prototype-based, multi-paradigm, dynamic language, supporting object-oriented, imperative and declarative styles.
 The HTML logo features a stylized letter 'E' composed of orange and white geometric shapes, set against a white background.	<b>Hypertext Markup Language (HTML)</b> – A standard markup language for documents designed to be displayed in a web browser. Used to describe the structure of a webpage semantically and originally included cues for the appearance of the document.

## APPENDIX S

### MATERIALS USED IN THE DEVELOPMENT OF SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS



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Quantity	Unit	Description	Unit Price	Amount
1		Device Structure (Palochina wood with deliver and labor fee for the carpenter)	1,500.00	1,500.00
1	pc	Arduino Uno R3	650.00	650.00
1	pc	DHT22 (Temperature and Humidity Sensor)	200.00	200.00
1	pc	LCD I2C	200.00	200.00
1	pc	NodeMCU esp8266	160.00	160.00
1	pc	NodeMCU expansion board	105.00	105.00
1	pc	Soil Moisture Sensor Module	55.00	55.00
1	pc	BreadBoard	65.00	65.00
1	pc	Lead Acid Battery	487.00	487.00
1	pc	Relay Module 5v 1Channel	200.00	200.00
1	pc	Solenoid Valve	300.00	300.00
2	bundles	Jumper Wires	30.00	60.00
1	pc	Solar Charge Controller	250.00	250.00
1	pc	Solar Panel	900.00	900.00
1/4	kilo	Wood Nail	30.00	30.00
2	pcs	Hose 1/2	24.00	48.00
3	pcs	Hose Coupling 1/2	35.00	105.00
2	meters	Lead	14.00	28.00
1	roll	Electrical Tape	20.00	20.00
3	pcs	Spray Paint	105.00	315.00
1	roll	Plant Rope	80.00	80.00
1	meter	Plastic Cover	25.00	25.00
4	boxes	Thumbtacks	15.00	60.00
1	pc	Wood Glue	45.00	45.00
3	pcs	Hose Metal Connector	22.00	66.00
2	pcs	Glue Stick	3.00	6.00
			<b>TOTAL:</b>	<b>5960.00</b>

# **APPENDIX T**

## **USER'S MANUAL**



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## USER'S MANUAL

**SMART CROP AND HEALTH MONITORING SYSTEM FOR CUCUMBER FARMING: INNOVATING TECHNO-ECOLOGICAL AWARENESS**



## TABLE OF CONTENTS

- INTRODUCTION**
- MAIN PARTS AND FUNCTIONS**
- SCHEMATIC DIAGRAM**
- BLOCK DIAGRAM**
- OPERATION**
- SAFETY PRECAUTIONS**

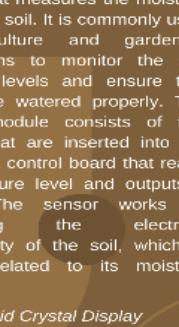
## MAIN PARTS AND FUNCTIONS

**MAIN PARTS AND FUNCTIONS**

**Monitoring Device**

A Soil Moisture Sensor Module is a device that measures the moisture content of soil. It is commonly used in agriculture and gardening applications to monitor the soil moisture levels and ensure that plants are watered properly. The sensor module consists of two probes that are inserted into the soil and a control board that reads the moisture level and outputs a signal. The sensor works by measuring the electrical conductivity of the soil, which is directly related to its moisture content.

**Liquid Crystal Display**



Displays the sensor values (Soil Moisture, Temperature and Humidity) as well as the IP Address

## MAIN PARTS AND FUNCTIONS

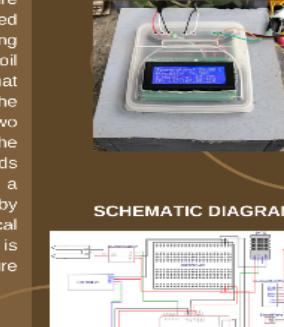
**MAIN PARTS AND FUNCTIONS**

The Smart Crop and Health Monitoring System for Cucumber Farming is a state-of-the-art innovation that helps farmers monitor and track the growth and health of their crops. The system uses sensors that provide real-time data about the crop's health. This manual will provide you with step-by-step instructions on how to use the system.

**INTRODUCTION**

The DHT22 is a temperature and humidity sensor that can be used to measure the temperature and humidity of the surrounding environment. It uses a capacitive humidity sensor and a thermistor to accurately measure both the temperature and humidity levels.

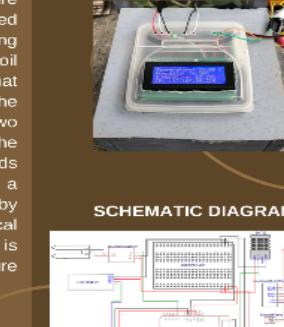
**Soil Moisture Sensor**



## MAIN PARTS AND FUNCTIONS

**MAIN PARTS AND FUNCTIONS**

**SCHEMATIC DIAGRAM**



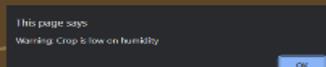
Representation of the elements of the system

**BLOCK DIAGRAM**

```

graph TD
    PLANT[PLANT] --> DHT[DHT22]
    PLANT --> SIS[Soil Infrared Sensor]
    DHT --> Nodemcu[Nodemcu ESP8266]
    SIS --> Nodemcu
    Nodemcu --> AD[Analog-to-Digital]
    AD --> SOLENOID[SOLENOID Valve]
    SOLENOID --> WATER[WATER Pump]
    WATER --> WEB[WEB Server]
    SOLENOID --> DATA[Data Chart & Control]
    DATA --> BATT[Battery]
    DATA --> SOLAR[Solar Panel]
    
```

The diagram represents the functional block of the sequence that shows and describes the functions and interrelation of system monitoring.

<p><b>OPERATIONS</b></p> <ol style="list-style-type: none"> <li>Connect the sensors to the Arduino.</li> <li>Connect the Arduino, battery, and solar panel to solar charge controller.</li> <li>Wait for the lcd to display the sensor values and the IP address.</li> <li>Connect your device (e.g laptop or smartphone) on the same Wi-Fi network.</li> <li>Open any browser and search the IP displayed on the LCD.</li> </ol>  <p>6. Main page will display the value of the parameters gathered by the sensors.</p> <p>7. If you see these message box appeared on your screen you should do the following:</p>  <p><b>7.1 "Warning: Crop Getting Too Much Sunlight/Heat"</b></p>	<p><b>OPERATIONS</b></p> <p>Please take the following steps to prevent your crop from getting too much sunlight:</p> <ol style="list-style-type: none"> <li>Move your crop to a shadier location if possible, or provide it with shade using a canopy or shade cloth.</li> <li>Ensure your crop is getting the appropriate amount of water for its needs.</li> <li>Monitor your crop closely for any signs of sun damage such as wilting, yellowing, or burnt leaves.</li> </ol>  <p><b>7.2 "Warning: Crop Low on Humidity"</b></p> <p>Please take the following steps to increase the humidity around your crop:</p> <ol style="list-style-type: none"> <li>Increase the amount of water you are providing to your crop. Make sure to water it enough to maintain a consistent level of moisture in the soil.</li> </ol>	<p><b>OPERATIONS</b></p> <ol style="list-style-type: none"> <li>Place a humidifier near your crop, or mist the leaves with a spray bottle to increase the humidity around the plant.</li> <li>Consider grouping your crops together, as plants release moisture into the air through a process called transpiration, and this can help to increase the humidity levels in the immediate area.</li> </ol>  <p><b>7.3 "Warning: Crop Low on Soil Moisture"</b></p> <p>Please take the following steps to increase the soil moisture around your crop:</p> <ol style="list-style-type: none"> <li>Check the solenoid valve if it is connected properly.</li> <li>Check the faucet if it is opened.</li> <li>You may disconnect your smartphone or laptop from the Wi-Fi and manually check it through the device.</li> </ol>
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<p><b>SAFETY PRECAUTIONS</b></p>  <p><b>Electrical Safety:</b> Make sure all electrical components are properly grounded and that there is no exposed wiring or damaged cables.</p>  <p><b>Water Safety:</b> Install the device on dry place.</p>  <p><b>Fire Safety:</b> Avoid using any flammable materials near the monitoring system.</p>  <p><b>Proper Installation:</b> Install properly and handle carefully.</p>  <p><b>Regular Maintenance:</b> Regularly inspect and maintain the monitoring system to ensure that it is functioning properly.</p>	<p><b>Maintenance and Troubleshooting</b></p> <p><b>Maintenance</b></p> <p><b>Cleaning</b></p> <p>Clean the sensors and control unit regularly to prevent dust and dirt from interfering with the data readings.</p> <p><b>Battery Replacement</b></p> <p>Replace the batteries in the control unit when they run low to ensure that the system continues to function properly.</p> <p><b>Sensor Calibration</b></p> <p>Calibrate the sensors periodically to ensure accurate readings.</p> <p><b>Troubleshooting</b></p> <p><b>No Data Displayed</b></p> <p>Make sure the sensors are connected properly. Check that the batteries in the control unit are not dead.</p> <p>Make sure the sensors are placed correctly in the soil.</p> <p><b>Inaccurate Data:</b></p> <p>Make sure the sensors are calibrated properly. Check that the sensors are not damaged or dirty.</p> <p>Make sure the sensors are placed correctly in the soil.</p> <p><b>System Failure</b></p> <p>Check that the batteries in the control unit are not dead.</p> <p>Make sure the sensors are connected properly. Check that the sensors are not damaged or dirty.</p> <p>If none of these troubleshooting steps work, contact the manufacturer for further assistance.</p> <p>Thank you for using the plant monitoring system. With proper use, maintenance, and troubleshooting, you can keep your plants healthy and thriving.</p>	<p><b>Contact Us</b></p> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  <p>Adonis S. Rampas 09154886731 adonisrampas13@gmail.com</p> </div> <div style="text-align: center;">  <p>Carl Angelo C. Azarcon 09052277458 carlangeloazarcon@gmail.com</p> </div> <div style="text-align: center;">  <p>John Rey P. Guillamon 09853740286 guillamon.johnrey@gmail.com</p> </div> <div style="text-align: center;">  <p>Roberto Miguel M. Santos 09281915612 miguel2wavy0@gmail.com</p> </div> </div>
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## APPENDIX U

### PICTURES DURING THE CONDUCT OF THE STUDY

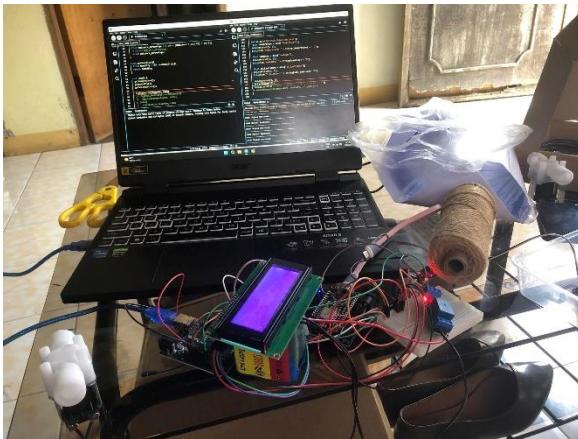


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## APPENDIX V

### PICTURES TAKEN DURING THE COLLOQUIUM AND FINAL DEFENSE



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## **PERSONAL INFORMATION**

Gender : Male  
 Civil Status : Single  
 Birthdate : June 13, 2001  
 Age : 21  
 Religion : Catholic  
 Citizenship : Filipino  
 Mother : Abella S. Rampas  
 Father : Hermie E. Rampas

## **EDUCATIONAL BACKGROUND**

Tertiary : University of Rizal System – Morong Campus  
                  Bachelor of Science in Computer Engineering  
                  Morong, Rizal  
                  2019-Present

Secondary

Senior High : Binangonan Catholic College  
                  Libid Binangonan Rizal  
                  2017-2019

Junior High : Binangonan Catholic College  
                  Libid Binangonan Rizal  
                  2013-2017

Primary : Binangonan Elementary School  
                  Dalig Binangonan Rizal  
                  2007-2013

## **CARL ANGELO C. AZARCON**



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## PERSONAL INFORMATION

Gender : Male  
Civil Status : Single  
Birthdate : May 21, 2001  
Age : 21  
Religion : Catholic  
Citizenship : Filipino  
Mother : Ma. Cecilia C. Azarcon  
Father : Ariel M. Azarcon

## EDUCATIONAL BACKGROUND

Tertiary : University of Rizal System – Morong Campus  
Bachelor of Science in Computer Engineering  
Morong, Rizal  
2019-Present  
Secondary  
Senior High : Vicente Madrigal Integrated School  
Pantok Binangonan Rizal  
2017-2019  
Junior High : Vicente Madrigal Integrated School  
Pantok Binangonan Rizal  
2013-2017  
Primary : Dona Susana Elementary School  
Pantok Binangonan Rizal  
2007-2013

## **JOHN REY P. GUILLAMON**

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## **PERSONAL INFORMATION**

Gender : Male  
Civil Status : Single  
Birthdate : June 27, 2000  
Age : 22  
Religion : Catholic  
Citizenship : Filipino  
Mother : Beverly P. Guillamon  
Father : Reynaldo G. Guillamon

## **EDUCATIONAL BACKGROUND**

Tertiary : University of Rizal System – Morong Campus  
Bachelor of Science in Computer Engineering  
Morong, Rizal  
2019-Present  
Secondary  
Senior High : Vicente Madrigal Integrated School  
Pantok Binangonan Rizal  
2017-2019  
Junior High : Vicente Madrigal Integrated School  
Pantok Binangonan Rizal  
2013-2017  
Primary : Binangonan Elementary School  
Dalig Binangonan Rizal  
2007-2013

## **ROBERTO MIGUEL M. SANTOS**



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## PERSONAL INFORMATION

Gender : Male  
Civil Status : Single  
Birthdate : April 30, 2001  
Age : 21  
Religion : Baptist  
Citizenship : Filipino  
Mother : Myra M. Santos  
Father : Rinaldo S. Santos

## EDUCATIONAL BACKGROUND

Tertiary : University of Rizal System – Morong Campus  
Bachelor of Science in Computer Engineering  
Morong, Rizal  
2019-Present  
Secondary  
Senior High : Thomas Claudio Colleges  
Morong, Rizal  
2017-2019  
Junior High : Peniel Integrated Christian Academy of Quisao  
Quisao, Pililla, Rizal  
2013-2017  
Primary : Peniel Integrated Christian Academy of Quisao  
Quisao, Pililla, Rizal  
2007-2013