AUTOMATED WATER AND HUMIDITY MANAGEMENT SYSTEM

A DESIGN PROJECT II REPORT (ECS51802)

Submitted by

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in partial fulfilment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

CHENNAI - 603 103

APRIL 2025

BONAFIDE CERTIFICATE

Certified that this project **AUTOMATED WATER AND HUMIDITY MANAGEMENT SYSTEM** is the bonafide work **T. Lijith(23112264),M. Kumar Bhoopathi(23112232) ,V Hemanth Krishna(23112231)**
who carried out the project work under my supervision during the academic year 2024-2025.

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ASSISTANT PROFESSOR,

INTERNAL EXAMINER

Name: ______________________

Designation: ______________________

EXTERNAL EXAMINER

Name: ______________________

Designation: ______________________

Project Viva - voice conducted on ______________________

TABLE 0F CONTENTS

ACKNOWLEDGEMENT

First and foremost we would like to thank ALMIGHTY who has provided us the strength to do justice to our work and contribute our best to it.We wish to express our deep sense of gratitude from the bottom of our heart to our guide **Ms. SWARANA LAKSHMI, Assistant Professor, Computer Science and Engineering**, for his motivating discussions, overwhelming suggestions, ingenious encouragement, invaluable supervision, and exemplary guidance throughout this project work. We would like to express our heartfelt gratitude to Dr. J. Thanga Kumar, Associate Professor &Head, Department of Computer Science and Engineering valuable suggestions and support in successfully completing the project.We wish to thank our Project Co-ordinator and Panel members for keeping our project in the right track. We would like to thank all the teaching, technical and non-technical staff of Department of Computer Science and Engineering for their courteous assistance.We thank the management of **HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE** for providing us the necessary facilities and support required for the successful completion of the project.As a final word, we would like to thank each and every individual who have been a source of support and encouragement and helped us to achieve our goal and complete our project work successfully.

DEDICATION

This project is dedicated to our beloved parents, for their love,endless support, encouragement, and sacrifices.

ABSTRACT

The Powered Greenhouse Management System (PGMS) is an innovative project that leverages Internet of Things (IoT) technology to optimize and automate the cultivation process within a greenhouse environment. This system aims to enhance the efficiency of greenhouse operations, ensuring optimal conditions for plant growth while minimizing resource consumption. The integration of IoT devices allows for real-time monitoring, control, and data analysis, providing valuable insights to greenhouse managers.

The PGMS also incorporates a user-friendly interface accessible through web or mobile applications, allowing greenhouse managers to monitor and control the system remotely. This feature enables timely responses to changing environmental conditions and ensures that the greenhouse operates optimally even when personnel are not physically present.

In conclusion, the IoT-Based Powered Greenhouse Management System offers a sustainable and technologically advanced solution for greenhouse cultivation. By integrating smart devices, real-time monitoring, and automated control, the system optimizes resource utilization, improves crop yield, and contributes to environmentally conscious and economically viable agriculture practices.

Keywords: Arduino, Microcontroller, IOT, sensors

CHAPTER- 01

INTRODUCTION

1.2 OVERVIEW

In recent years, the agriculture sector has witnessed a paradigm shift towards precision farming and sustainable practices. One of the key advancements contributing to this transformation is the integration of Internet of Things (IOT) technology in greenhouse management systems. Greenhouses play a vital role in ensuring year-round cultivation of crops, and the implementation of IOT in this context brings forth a Powered Greenhouse Management System.

Greenhouses provide a controlled environment for plants, allowing optimal conditions for growth regardless of external weather conditions. Traditionally, greenhouse management relied heavily on manual monitoring and control. However, with the advent of IOT, these processes can be automated and enhanced for greater efficiency.

1.2 PROJECT SCOPE

The project scope involves the development of a cutting-edge Greenhouse Management System, integrating Internet of Things (IOT) technology to create an intelligent and energy-efficient environment for greenhouse operations. This system aims to enhance the overall efficiency, productivity, and sustainability of greenhouse farming by employing smart sensors and actuators. The IOT devices will monitor crucial parameters such as temperature, humidity, soil moisture, and light levels in real-time.

Through a centralized control system, the Greenhouse Management System will enable automated adjustments of environmental conditions to optimize plant growth. Additionally, the system will provide remote access to users, allowing them to monitor and control the greenhouse conditions from anywhere using a user-friendly interface. By leveraging IOT technology, this project aspires to contribute to the advancement of eco-friendly and resource-efficient agricultural practices, fostering sustainable food production.

1.3 MOTIVE OF THE PROJECT

The main contribution of this project therefore are :

- Resource optimization
- Crop monitoring and management

- Water conservation
- Remote monitoring and control
- Environmental sustainability
- Increased productivity and profitability
- Data driven decision making

1.4 **DOMAIN OVERVIEW**

A powered greenhouse management system utilizing the Internet of Things (IOT) represents a cutting-edge solution revolutionizing the traditional agricultural landscape. This domain encompasses a sophisticated integration of digital technologies to optimize and automate various aspects of greenhouse operations. IOT sensors are strategically deployed throughout the greenhouse infrastructure to monitor crucial parameters such as temperature, humidity, soil moisture, and light intensity in real-time. These sensors communicate seamlessly with a centralized control system, enabling farmers to remotely access and manage the greenhouse environment.

The system's automation capabilities extend to tasks like irrigation, ventilation, and shading, enhancing resource efficiency and crop yield. Additionally, data analytics play a pivotal role, providing valuable insights for informed decision-making. This domain not only fosters sustainable farming practices by minimizing resource wastage but also empowers farmers with data-driven tools to maximize productivity in a dynamically controlled environment.

CHAPTER - 02
LITERATURE REVIEW

2.1 INTRODUCTION

The Powered Greenhouse Management System (PGMS) is an innovative project that leverages Internet of Things (IOT) technology to optimize and automate the cultivation process within a greenhouse environment. This system aims to enhance the efficiency of greenhouse operations, ensuring optimal conditions for plant growth while minimizing resource consumption. The integration of IOT devices allows for real-time monitoring, control, and data analysis, providing valuable insights to greenhouse managers.

2.2 LITERATURE SURVEY

This system uses Arduino technology to manage watering and roofing of the green house.

1. It uses statistical data acquired from sensors (like temperature, humidity, moisture and light-weight intensity sensors) compared with the forecast for higher noises. Kalman filter is employed to eliminate noise from the sensors.
2. Agriculture System (Argosy's) uses temperature, pH, humidity sensors then the

hybrid inference to input the knowledge from sensors. The system monitors the sensors information on LCD and PC.

3. Muhammad (2010), proposed a simple approach to Automatic Irrigation control problem using Artificial Neural Network Controller. The proposed system is compared with ON/OFF controller and it's shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand, ANN based approach has resulted in possible implementation of upper and more efficient control. These controllers don't require a previous knowledge of system and have inherent ability to ANN based systems can save lot of resources (energy and water) and might provide optimized results to any or all or any type of agriculture areas.
4. Sanju Kumar (2013), proposed Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose was developed and successfully implemented along with flow sensor. Salient features of the system are: control system automatic irrigation system, temperature and water usage monitoring.

2.2.1 **PAPER1**:

TITLE: A smart and ubiquitous controller environment agriculture system.

PUBLICATION DETAILS: MEC International Conference on Big

AUTHOR DETAILS: Abdullah, et al.2016

INFERENCE:

- The system provide increased productivity Enhanced safety instant Interventions and advanced life style.
- The system enable more efficient use of resources , reducing waste and environmental impact.

2.2.2 **PAPER 2**:

TITLE: Applying machine learning on sensor data for irrigation re Commendations.

PUBLICATION DETAILS: *Precision Agric* **19**, 421–444 (2018). https://doi.org/

AUTHOR DETAILS: Goldstein, et .al ,2018

INFERENCE:

- Monitoring sensor and ML Algorithm can detect early Signs of stress or diseases In crop
- It can help address water scarcity challenges while improving crop yields and Reducing the environmental impact of farming practices

2.2.3 **PAPER 3**:

TITLE: Moisture Using IOT Agriculture

PUBLICATION DETAILS: Journal of Physics Conference Series

Smart Irrigation System supported Soil

AUTHOR DETAILS: S Nalini Durga (2018)

INFERENCE:

- These techniques are should be combined with IOT so we are able to make use of water vary efficiently
- IoT helps to access information and make major decision-making process by getting different values from sensors like soil moisture, water level sensors, water quality etc.

2.2.4 **PAPER 4**:

TITLE: Moisture Using IOT Agriculture

PUBLICATION DETAILS: International Journal of Advanced Research in Computer and Communication Engineering

AUTHOR DETAILS: Nikesh Gondchawa et.al

June 2016

INFERENCE:

- project is a complete solution to field activities, irrigation problems, and storage problems using remote controlled robot, smart irrigation system and a smart warehouse management system respectively.
- Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production
-

2.2.5 **PAPER 5**:

TITLE: irrigation monitoring based on Internet of Things, remote sensing and artificial intelligence.

PUBLICATION DETAILS: International Conference on Networks, Communications and Information Technology

AUTHOR DETAILS: Jinyao Liu , et.al,

09 August

INFERENCE:

- The monitoring objects are mainly divided into three categories based on soil moisture, weather and evapotranspiration, and plants, among which the monitoring based on soil moisture is the most common and direct method

- Provide advanced technical means for irrigation monitoring

2.3 **IMPORTANCE OF AUTOMATION IN AGRICULTURE**

Automation in agriculture, particularly in the context of powered greenhouse management systems, offers numerous benefits that can enhance efficiency, productivity, and sustainability. Here are some key reasons highlighting the importance of automation in agriculture for powered greenhouse management:

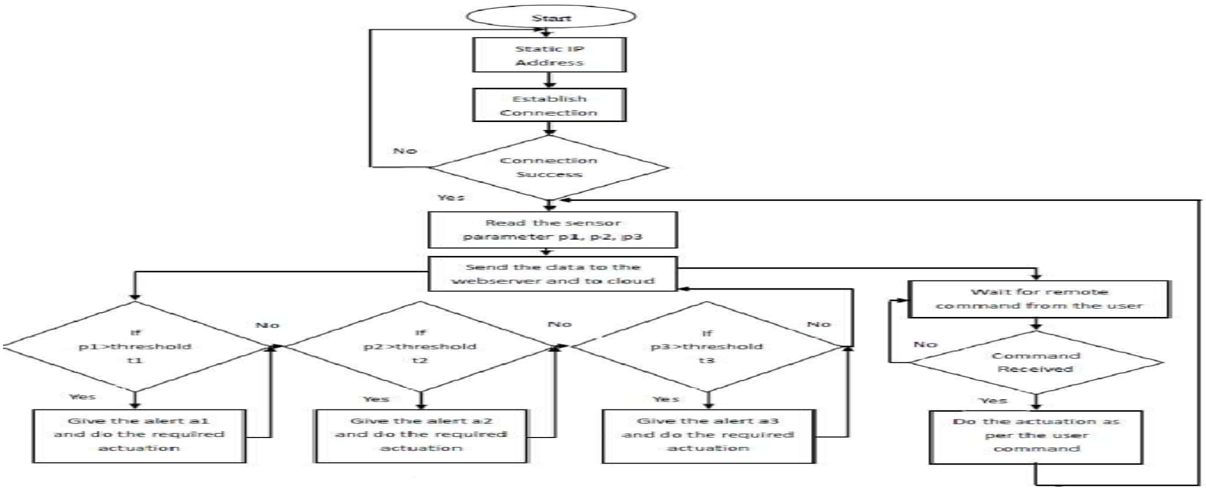
- Precision Farming
- Resource Efficiency
- Labor Saving
- Energy Saving

CHAPTER – 03
PROJECT DISCRIPTION

3.1 OBJECTIVE

The primary objective of implementing a powered greenhouse management system is to optimize and enhance the overall efficiency of greenhouse operations. This system aims to provide a sustainable and controlled environment for plant cultivation, ensuring optimal growth and yield. By integrating automation and technology, the system seeks to streamline various processes such as temperature regulation, irrigation, and nutrient management. Additionally, the goal is to minimize resource consumption, promoting eco-friendly practices and reducing the ecological footprint of greenhouse farming.

The powered greenhouse management system aims to empower farmers with real-time monitoring and control capabilities, enabling them to make data-driven decisions for improved crop quality and quantity. Ultimately, the overarching objective is to foster a more sustainable and productive approach to greenhouse agriculture, aligning with environmental conservation and agricultural innovation.



3.2 CHALLENGES AND OPPORTUNITIES

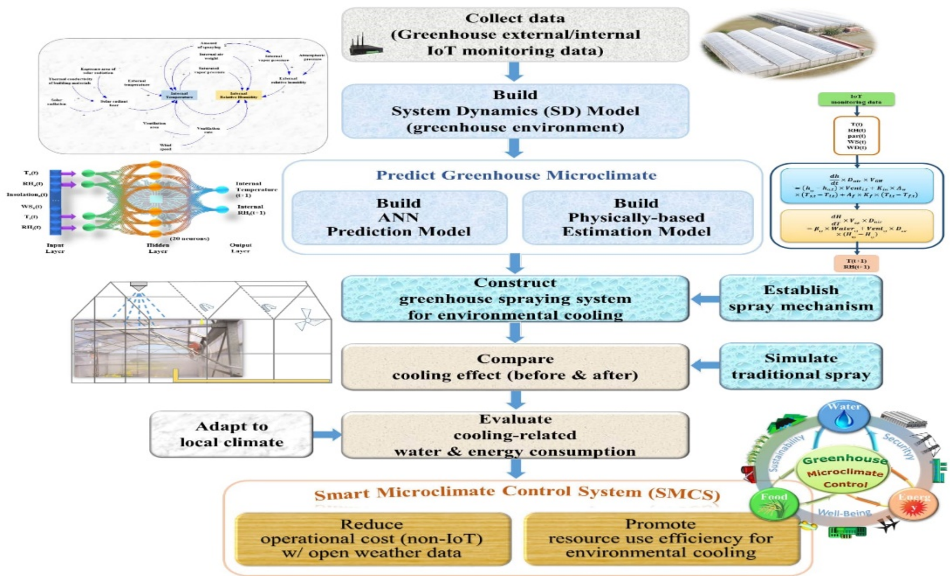
A powered greenhouse management system can bring about several advantages, but it also comes with its own set of challenges. Here's a breakdown of both the challenges and opportunities associated with such systems:

CHALLENGES :-

- Initial Costs
- Technical Complexity
- Maintenance and Reliability
- Data security and Privacy

OPPORTUNITIES :-

- Climate Control
- Year-Round Production
- Market Access and Premium Pricing
- Precision Agriculture



CHAPTER – 04
PROJECT REQUIREMENTS

4.1 METHODOLOGY

The planned algorithmic rule uses sensors knowledge of recent past and also the weather forecasted knowledge for prediction of soil wet of coming days. the anticipated price of the soil wet is healthier in terms of their accuracy and error rate. Further, the prediction approach is integrated into a standalone system epitome. The system epitome is price effective, because it is predicated on the open normal technologies.

The machine mode makes it a sensible system and it may be additional tailor-made for application specific eventualities. In future, we have a tendency about to conduct a water saving analysis supported planned algorithmic rule with multiple nodes in conjunction with minimizing the system price. system to observe temperature, humidity, wet levels within the soil was designed and also the project provides a chance to review the present systems, in conjunction with their options and downsides.

4.2 SOFTWARE & HARDWARE REQUIREMENTS

SOFTWARE REQ :

- Operating System
- Data Base Management System(DBMS)
- Programming Language
- Web Development Frame Work
- Communication Protocol

HARDWARE REQ :

- Micro-Controllers
- LCD Display
- Sensor
- Cables & Connectors
- Node MCU(ESP8266)

CHAPTER – 05
COMPONENTS & IT'S WORKING

5.1 COMPONENTS :-

- Climate Control System
- Irrigation System
- Lighting System
- Automated Ventilation System
- Environmental Sensors
- Automated Shading System
- Monitoring and Control Units
- Plant Growth Management System
- Emergency Backup & Security System
- Remote Access & Controls

5.2 WORKING :-

1.Climate Control System:

- Heating system:- Maintains the temperature within the desired range during colder periods.
- Cooling system:- Such as evaporative cooling or air conditioning for temperature control.

2.Irrigation system:

- Drip Irrigation or Sprinklers:- Automated watering system to ensure plants receive the right amount of water.
- Soil Moisture Sensors:- Monitors soil moisture levels and triggers irrigation when necessary.

3.Automated Ventilation System:-

- Ventilation Fans:- Controlled by the system to regulate air circulation and prevent overheating.
- Louvers:- Adjustable openings for controlled airflow.

4.LIGHTING SYSTEM :-

- Artificial Grow Lights:- Provide supplemental lighting when natural sunlight is insufficient.

- Light Control System:- Regulates the intensity and duration of artificial lighting.

5.ENIVORNMENT SYSTEM :-

- Temperature Sensor:- Monitors and controls the temperature inside the greenhouse.

- Humidity Sensor:- Measures and manages humidity levels for optimal plant growth.
- Light Sensor:- Ensures that plants receive the right amount of light for photosynthesis.
- Co2 Sensors:-Monitors carbon dioxide levels to promote photosynthesis.

6.AUTOMATED SHADING SYSTEM :-

- Shade Cloth or Automated Shades :-Controls the amount of sunlight reaching plants.

7.MONITORING AND CONTROL UNITS :-

- Microcontroller or PLC(Programmable Logic or Controller):-Controls and coordinates the operation of various components based on sensor inputs.
- User Interface:-A dashboard or control panel for manual monitoring and adjustments.

8.PLANT GROWTH MANAGEMENT SYSTEM :-

- Nutrients Delivery System:- For hydroponic or aeroponic systems.
- PH and EC(Electrical Conductivity):- Monitor and adjust .

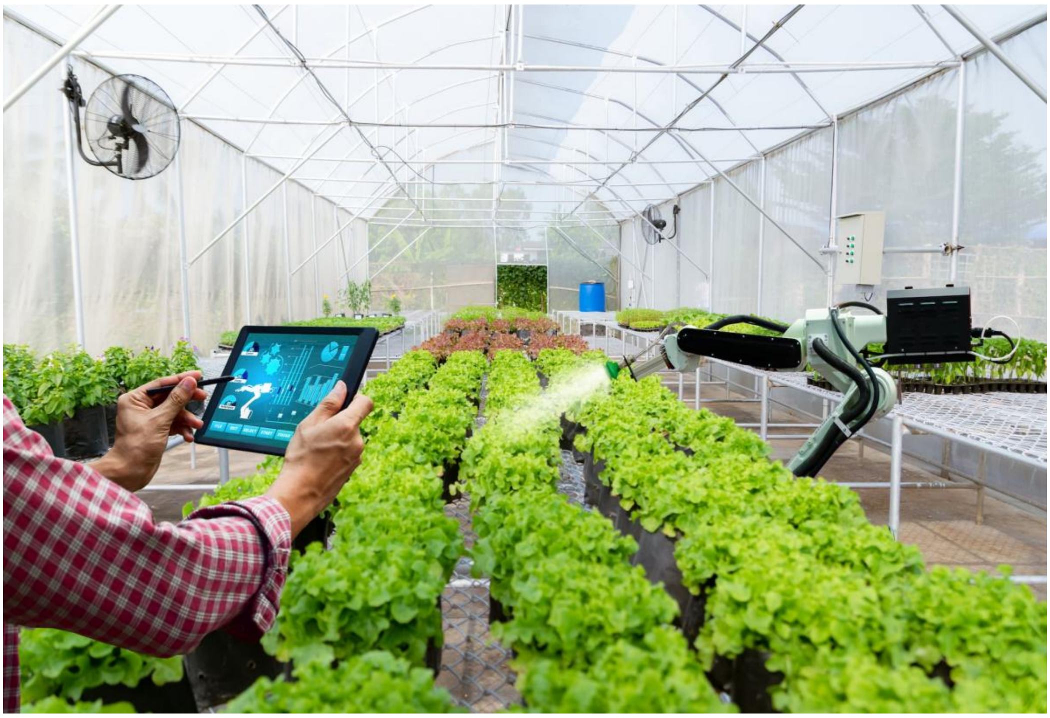
9.EMERGENCY AND SECURITY SYSTEM :-

- Backup Power Supply:- In case of power outages.

- Backup Heating or Cooling Systems:- For extreme weather conditions.
- Surveillance Cameras:-Monitor the greenhouse for security purposes.
- Alarm System:-Alerts in case of unauthorized access or potential issues.
-

10.REMOTE ACCESS AND CONTROL :-

- IOT(Internet of Things) :-Allows remote monitoring and control via a web interface or mobile app.



CHAPTER – 06

IMPLEMENTATION

6.1 **THEORY EXPLANATION**:

Green house management is all about creating and maintaining the ideal environment for plants to grow. It involves controlling temperature, humidity, light, and ventilation to ensure optimal conditions. This helps plants thrive and increases their productivity. Greenhouse are used for growing a variety of crops, including fruits, vegetables, and flowers.

Greenhouse management refers to the practice of creating and maintaining the ideal conditions inside a greenhouse for plant growth. It involves controlling factors such as temperature, humidity, light, and ventilation to provide the best environment for plants to thrive.

6.2 **SYSTEM REQUIRMENT**:

To effectively manage a greenhouse, you'll need a few key systems in place. Here are some common requirements:

1. Climate control system: This includes heaters, fans, and ventilation systems to regulate temperature, humidity, and air circulation.

2. Irrigation system: A reliable watering system is crucial to ensure plants receive the right amount of water at the right time. This can include drip irrigation, sprinklers, or automated watering systems.

3. Lighting system: Depending on the type of plants being grown and the natural light available, supplemental lighting may be necessary. LED or fluorescent lights can provide the required spectrum for plant growth.

4. Monitoring and control system: Sensors and controllers are used to monitor and adjust environmental factors such as temperature, humidity, CO_2 levels, and light intensity. This helps maintain optimal conditions for plant growth.

5. Pest and disease management: Implementing integrated pest management strategies, such as using beneficial insects or organic pesticides, helps control pests and diseases without harming the plants or the environment.

6. Nutrient management: A proper fertilization system is essential to provide plants with the necessary nutrients. This can include hydroponic or soil-based fertilization methods.

These are just a few of the key systems required for effective greenhouse management. The specific requirements may vary depending on the size, type of crops, and location of the greenhouse.

6.3 **SOURCE CODE**:

```
/*************************************************************

  This example shows how value can be pushed from Arduino to
  the Blynk App.

  NOTE:
  BlynkTimer provides SimpleTimer functionality:
    http://playground.arduino.cc/Code/SimpleTimer

  App dashboard setup:
    Value Display widget attached to Virtual Pin V5
 *************************************************************/

/* Fill-in information from Blynk Device Info here */
#define BLYNK_TEMPLATE_ID "TMPL3-XsZYd5y"
#define BLYNK_TEMPLATE_NAME "plant watering system "
#define BLYNK_AUTH_TOKEN
"px_vhWl2XvBMWT2HWRQ7h8L11Dmuw8pt"



/* Comment this out to disable prints and save space */
```

```
#define BLYNK_PRINT Serial
#define relay 14

#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

#include "Wire.h"
#include <Adafruit_Sensor.h>
#include <DHT.h>



#include <LiquidCrystal_I2C.h>

// set the LCD number of columns and rows
int lcdColumns = 16;
int lcdRows = 2;

// set LCD address, number of columns and rows
// if you don't know your display address, run an I2C scanner sketch
LiquidCrystal_I2C lcd(0x27, lcdColumns, lcdRows);

#define DHTPIN 13  // Digital pin connected to the DHT sensor

// Uncomment the type of sensor in use:
#define DHTTYPE DHT11  // DHT 11
```

```
//#define DHTTYPE    DHT22     // DHT 22 (AM2302)

DHT dht(DHTPIN, DHTTYPE);

// current temperature & humidity, updated in loop()
float t = 0.0;
float h = 0.0;

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "Srikanth";
char pass[] = "Srikanth";

BlynkTimer timer;

// This function sends Arduino's up time every second to Virtual Pin (5).
// In the app, Widget's reading frequency should be set to PUSH. This means
// that you define how often to send data to Blynk App.
void myTimerEvent() {
  // You can send any value at any time.

  Serial.println("sending data ");
  // Please don't send more that 10 values per second.
  int raw_water_level = analogRead(A0);
  int map_water_level = map(raw_water_level, 499, 680, 100, 0);
```

```
float newT = dht.readTemperature();
delay(50);
float newH = dht.readHumidity();

Serial.print("temp:");
Serial.println(newT);

Serial.println("Humid:");
Serial.println(newH);

Blynk.virtualWrite(V2, newT);
Blynk.virtualWrite(V3, newH);
Blynk.virtualWrite(V0, map_water_level);
//Blynk.virtualWrite(V1, millis() / 2000);
if (map_water_level < 30) {
  digitalWrite(relay, LOW);
  Blynk.virtualWrite(V3, 1);
} else {
  digitalWrite(relay, HIGH);
  Blynk.virtualWrite(V3, 0);
}
lcd.setCursor(0, 0);
// print message
lcd.print("H:");
lcd.print(newH);
```

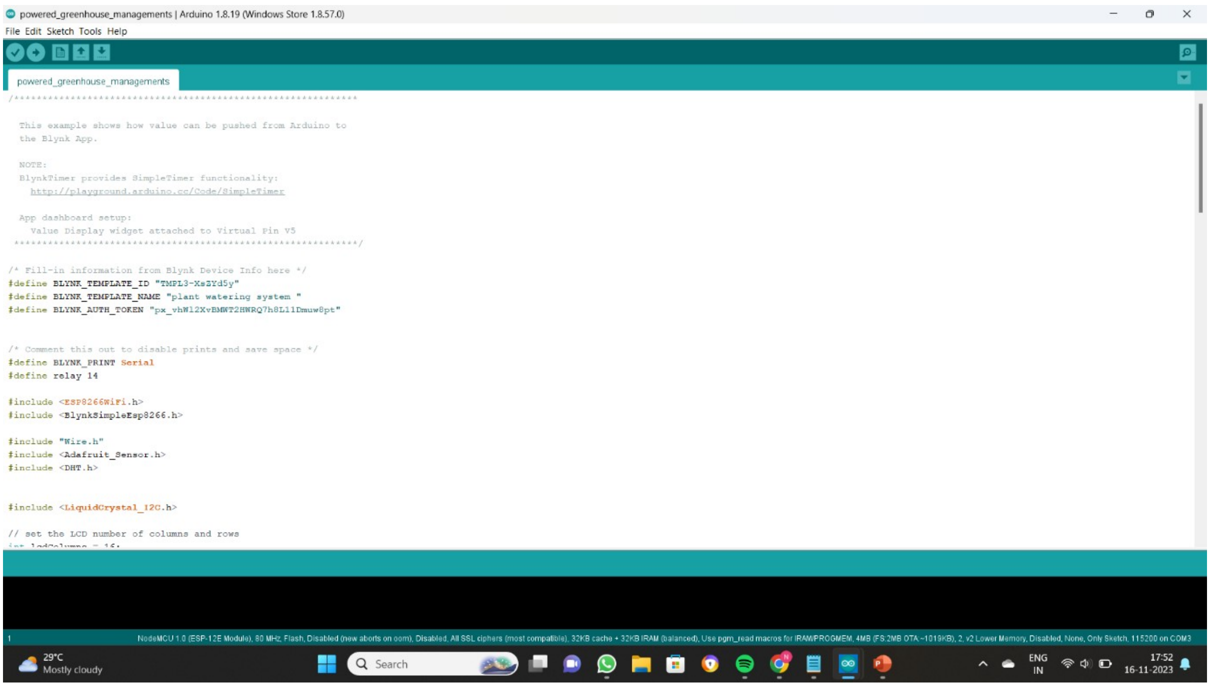
```
  // set cursor to first column, second row
  lcd.setCursor(0, 1);
  lcd.print("T:");
  lcd.print(newT);
  lcd.print(" C");
  delay(200);
  lcd.clear();
}
BLYNK_WRITE(V1) {
  int value = param.asInt();
  if (value == 1) {
    digitalWrite(relay, LOW);
    delay(2000);
  } else {
    digitalWrite(relay, HIGH);
  }
}
void setup() {
  // Debug console
  Serial.begin(115200);
  pinMode(relay, OUTPUT);
  digitalWrite(relay, HIGH);
  dht.begin();
  lcd.begin();
  // turn on LCD backlight
```

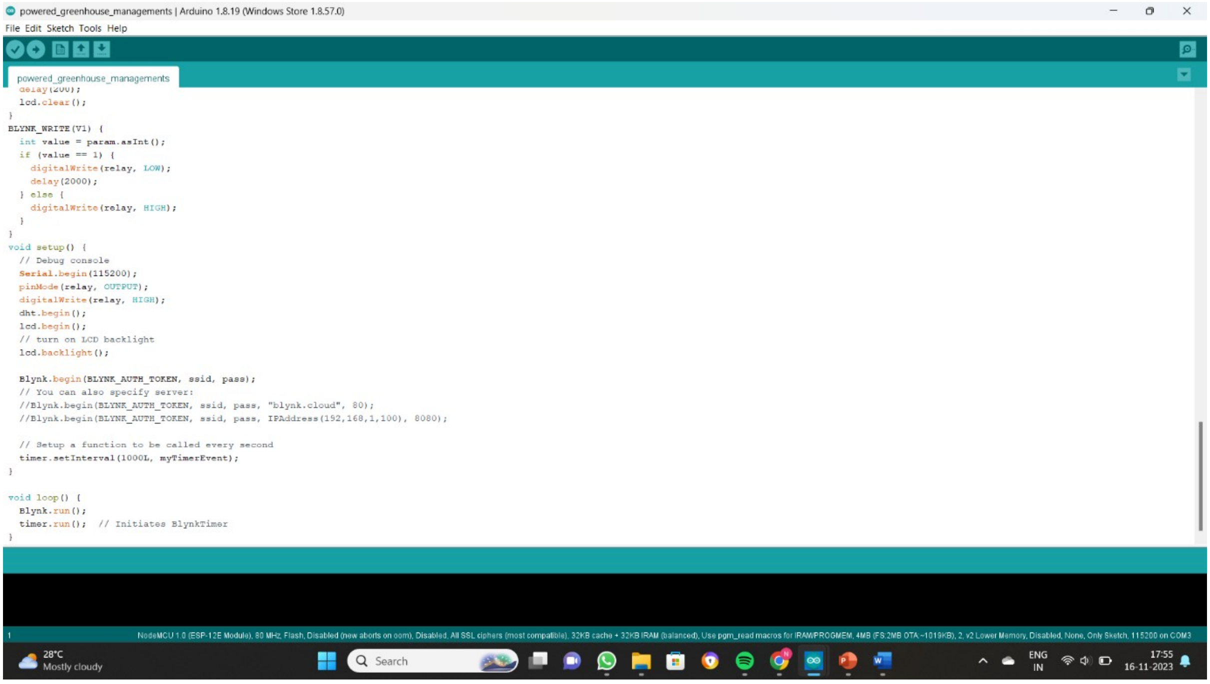
```
  lcd.backlight();

  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
  // You can also specify server:
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass,
IPAddress(192,168,1,100), 8080);

  // Setup a function to be called every second
  timer.setInterval(1000L, myTimerEvent);
}

void loop() {
  Blynk.run();
  timer.run();  // Initiates BlynkTimer
}
```





powered_greenhouse_managements | Arduino 1.8.19 (Windows Store 1.8.57.0)

File Edit Sketch Tools Help

powered_greenhouse_managements

```
  delay(200);
  lcd.clear();
}
BLYNK_WRITE(V1) {
  int value = param.asInt();
  if (value == 1) {
    digitalWrite(relay, LOW);
    delay(2000);
  } else {
    digitalWrite(relay, HIGH);
  }
}
void setup() {
  // Debug console
  Serial.begin(115200);
  pinMode(relay, OUTPUT);
  digitalWrite(relay, HIGH);
  dht.begin();
  lcd.begin();
  // turn on LCD backlight
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  // You can also specify server:
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, IPAddress(192,168,1,100), 8080);

  // Setup a function to be called every second
  timer.setInterval(1000L, myTimerEvent);
}

void loop() {
  Blynk.run();
  timer.run();  // Initiates BlynkTimer
}
```

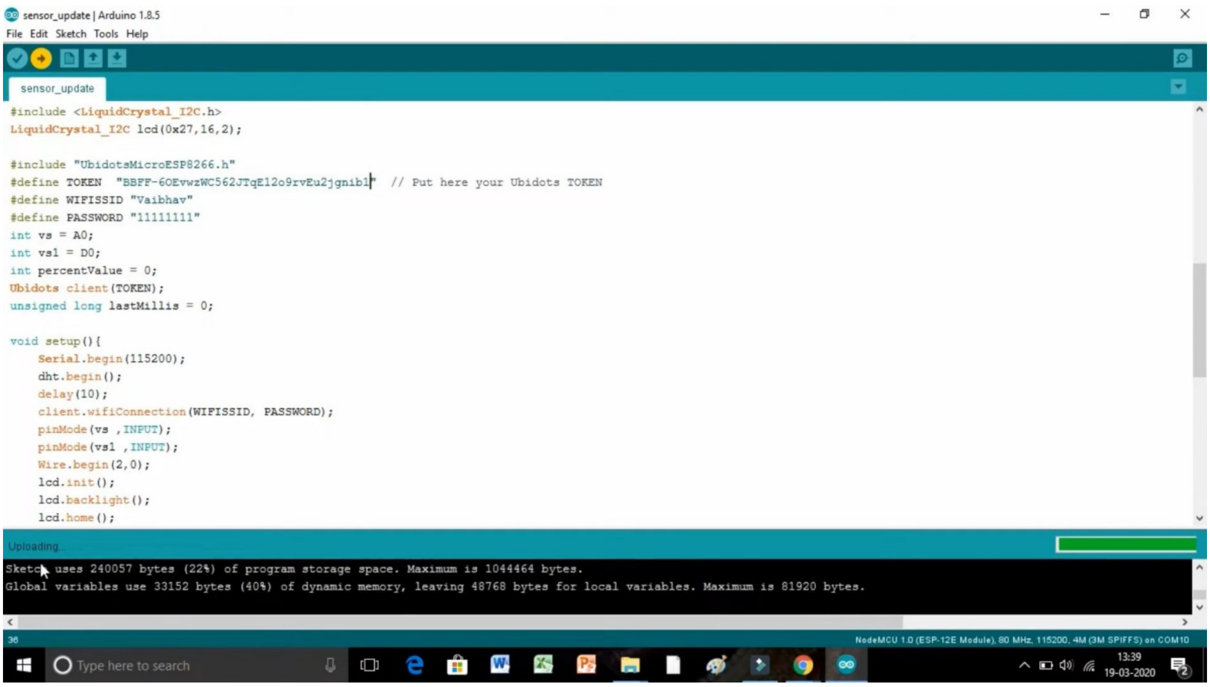

sensor_update | Arduino 1.8.5

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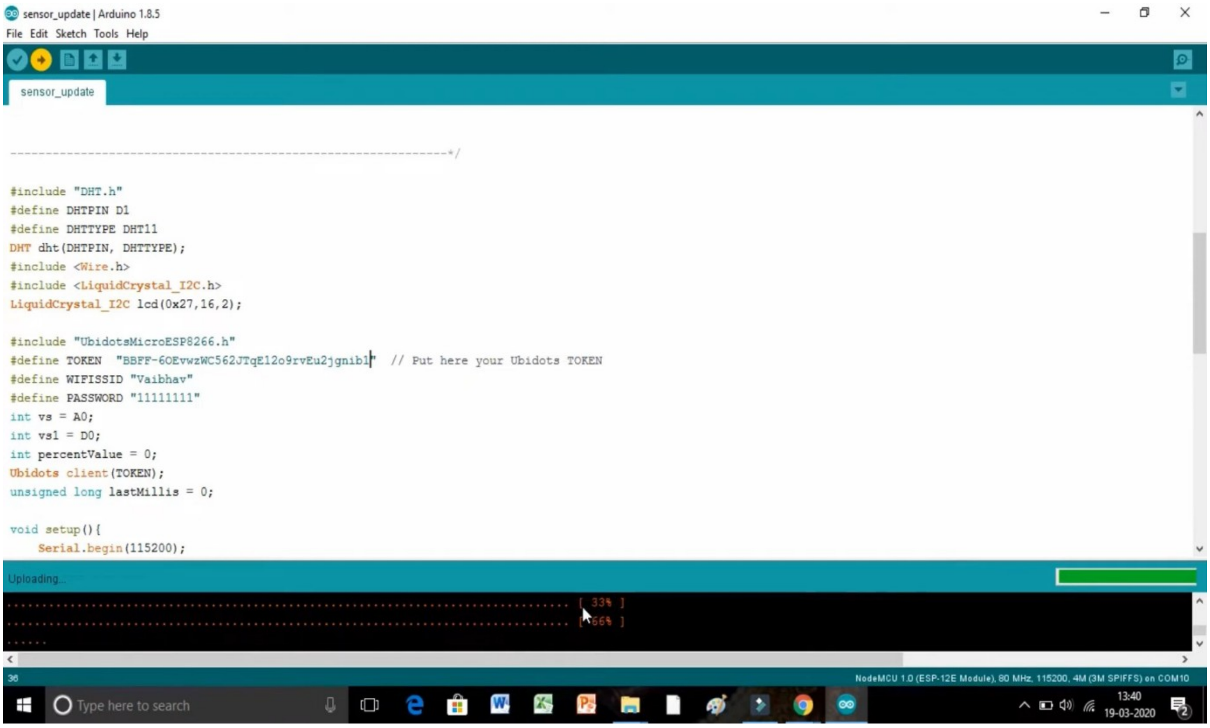
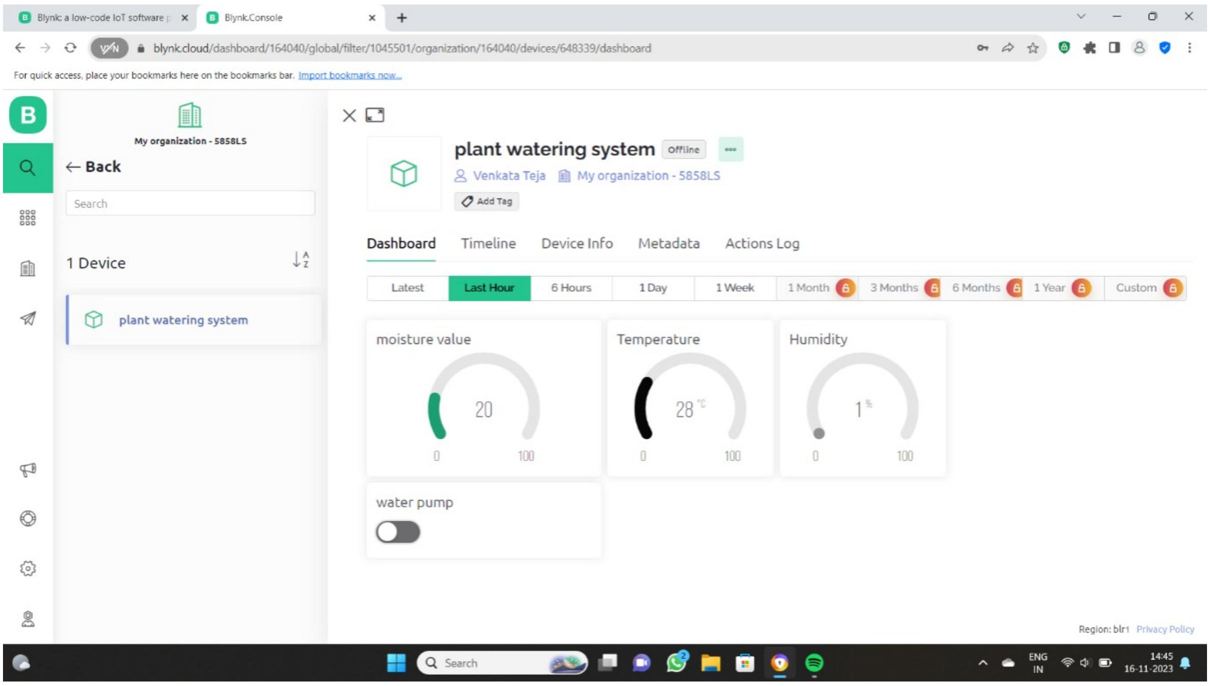
sensor_update

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);

#include "UbidotsMicroESP8266.h"
#define TOKEN  "BBFF-6OEvwzWC562JTqE12o9rvEu2jgnib1"  // Put here your Ubidots TOKEN
#define WIFISSID "Vaibhav"
#define PASSWORD "11111111"
int vs = A0;
int vs1 = D0;
int percentValue = 0;
Ubidots client(TOKEN);
unsigned long lastMillis = 0;

void setup(){
    Serial.begin(115200);
    dht.begin();
    delay(10);
    client.wifiConnection(WIFISSID, PASSWORD);
    pinMode(vs ,INPUT);
    pinMode(vs1 ,INPUT);
    Wire.begin(2,0);
    lcd.init();
    lcd.backlight();
    lcd.home();
```

Uploading...

```
Sketch uses 240057 bytes (22%) of program storage space. Maximum is 1044464 bytes.
Global variables use 33152 bytes (40%) of dynamic memory, leaving 48768 bytes for local variables. Maximum is 81920 bytes.
```


sensor_update | Arduino 1.8.5
File Edit Sketch Tools Help
sensor_update
#include "DHT.h"
#define DHTPIN D1
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
#include "UbidotsMicroESP8266.h"
#define TOKEN "BBFF-6OEvwzWC562JTqE12o9rvEu2jgnibl" // Put here your Ubidots TOKEN
#define WIFISSID "Vaibhav"
#define PASSWORD "11111111"
int vs = A0;
int vs1 = D0;
int percentValue = 0;
Ubidots client(TOKEN);
unsigned long lastMillis = 0;
void setup(){
Serial.begin(115200);
Uploading...
NodeMCU 1.0 (ESP-12E Module), 80 MHz, 115200, 4M (3M SPIFFS) on COM10
Type here to search
13:40
19-03-2020


Blynk: a low-code IoT software
Blynk.Console
blynk.cloud/dashboard/164040/global/filter/1045501/organization/164040/devices/648339/dashboard
For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now...
My organization - 5858LS
Back
Search
1 Device
plant watering system
plant watering system
Offline
Venkata Teja
My organization - 5858LS
Add Tag
Dashboard
Timeline
Device Info
Metadata
Actions Log
Latest
Last Hour
6 Hours
1 Day
1 Week
1 Month
3 Months
6 Months
1 Year
Custom
moisture value
20
0
100
Temperature
28 °C
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100
Humidity
1 %
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water pump
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6.4 **RESULT AND ANALYSIS:**

Analysis for green house management:-

When it comes to green house management there are a few key factors to consider. These include temperature control, proper lighting, irrigation, and pest management.

Lets break it down:

1. TEMPERATURE CONTROL: Maintaining the right temperature is crucial for plant growth. This can be achieved through ventilation, shading, and heating systems.

2. PROPER LIGHTING: Providing adequate light is important, especially during the darker months. Supplemental lighting can be used to ensure plants receive the right amount of light for photosynthesis.

3. IRRIGATION: Watering plants in a greenhouse requires careful monitoring. Automated irrigation systems or hand watering can be used to ensure plants receive the right amount of water.

4. PEST MANAGEMENT: Preventing and controlling pests is essential for plant health. Integrated Pest Management (IPM) techniques, such as biological controls and regular monitoring, can help keep pests at bay.

These are just a few aspects of greenhouse management.

CHAPTER -7

CONCLUSION & FRAME WORK

7.1 CONCLUSION:

In conclusion, a well-implemented greenhouse management system can have several benefits. It allows for precise control of environmental factors, such as temperature, humidity, and light, which promotes optimal plant growth and higher crop yields. It also helps protect plants from pests, diseases, and harsh weather conditions. With proper management, you can create a sustainable and efficient greenhouse operation. It's an exciting way to nurture plants and maximize their potential.

7.2 FUTURE WORK:

When it comes to future implementations in greenhouse management systems, there are several exciting possibilities. Here are a few ideas:

1.AUTOMATION &AI: Integrating advanced technologies like artificial intelligence and machine learning can enhance the efficiency and precision of greenhouse operations. This could involve automated monitoring and control systems that adjust environmental conditions based on real-time data analysis.

2.ENERGY-EFFICIENT SOLUTION: Implementing renewable energy sources, such as solar panels or wind turbines, can help reduce the carbon footprint of greenhouse operations. Energy-efficient heating, cooling, and lighting systems can also be explored to optimize resource usage.

3.DATA-DRIVEN DECISION-MAKING: Collecting and analyzing data on plant growth, environmental conditions, and resource usage can provide valuable insights for making informed decisions. This can lead to better crop planning, resource allocation, and overall management strategies.

4.VERTICAL FARMING & HYDROPONICS: Utilizing vertical farming techniques and hydroponic systems can maximize space utilization and water efficiency. These methods allow for year-round cultivation and can be particularly useful in urban areas with limited land availability.

Remember, these are just a few potential future implementations, and the possibilities are vast. The field of greenhouse management is constantly evolving, and new technologies and techniques are being developed all the time. Exciting times ahead**!.**

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