A Secure Cloud Enabled Indoor Hydroponic System Via ThingsSentral IoT Platform

Jyothi Krishna P
Adi Shankara Institute of Engineering and Technology, Kalady, Kerala
@gmail.com

Naisa Rose Shajan
Adi Shankara Institute of Engineering and Technology, Kalady, Kerala
naisarose2001@gmail.com

Sebastine Stombel
Adi Shankara Institute of Engineering and Technology, Kalady, Kerala
thottappillysebestine@gmail.com

Prof. Sabitha M.G.
Adi Shankara Institute of Engineering and Technology, Kalady, Kerala
@adishankara.ac.in

ABSTRACT

The increase in population and rapid industrial development of a country, especially in urban areas, contributes to various urbanization issues such as housing, food demands, education, health, poverty, etc. An alternative method of farming utilizing minimized land areas with large crop produce is highly sought. This farming method is expected to be operated at a lower cost with easy monitoring of essential plantation necessities such as light, water level, temperature, and humidity. This paper discusses the design and development of an automatic monitoring of an indoor vertical hydroponic system. Three main components will be designed and developed to realize the system. First, it is an indoor hydroponic cultivation module with IOT technology. Second, a needs will be determined based on the frequency and pattern of eye blinks. We are using eye blinks for the patient to select from a set of general needs provided by us and also we are including a few general phrases that a patient may have, this can be used for general communication with the caretaker or loved ones of the patient. Also we are including a feature where alerts can be sent to the caretaker's mobile in case of any emergency.

KEYWORDS-IOT,2FA,Cloud based system,Indoor hydroponics system.

INTRODUCTION

The significant increase in population and improvement of a country has caused an growth in agreement call for and land crisis. Thus, the want to lessen large-scale land farming to offer greater housing and constructing improvement area is inevitable. Alternative farming practices were broadly utilized in maximum evolved international locations to assist ease problems at the same time as non supplying meals demands. One of the modern-day opportunity farming practices brought to reduce this is indoor vertical farming. Vertical farming is a powerful manner to provide a crop the usage of an

environmentally pleasant agriculture gadget.

When growing plants indoors, an indoor hydroponics farming system replaces the soil with a nutrient-rich water solution. Using sensors and other internet-connected devices, an IoT (Internet of Things) platform can be utilised to remotely monitor and manage several components of the hydroponics system.

An indoor hydroponics system using an IoT platform can have several advantages, including the potential to automate and optimize the growing process, increase resource efficiency, and remotely monitor and troubleshoot any difficulties that may develop.Incorporating sensors and other devices into the system to gather data and manage various components of the growing process, including as fertilizer delivery, lighting, temperature, and humidity, may be required to implement an IoT platform in an indoor hydroponics farming system. Through the IoT platform, this data may then be accessed and examined in order to acquire insights and determine how the system should operate.

In general, utilizing an IoT platform in a hydroponics indoor farming system can help to increase the productivity, sustainability, and efficiency of the growing process.

This improvement on an automated indoor vertical hydroponic farming gadget is made of 3 elements, namely:

1. An indoor planting module with IOT enabled controller.
2. Various forms of plant sensors are used to make it automated and may be monitored best through the usage of cellular programs

3. A cloud-primarily based totally gadget evolved the usage of ThingsSentral platform as a statistic server is used to store,collect, and acquire records from customers and flowers themselves.

Therefore, the person or proprietor of this farming gadget can get right of entry to the records approximately their flowers every time and anywhere. They can get the records through the usage of cellular tools that are related to the internet. A web based utility lets in customers to view and screen their plants in real-time.

TECHNOLOGIES USED

A.NodeMCU Microcontroller Module

Based on the ESP-12 module, the NodeMCU ESP8266 is a lightweight, complete and breadboard friendly board. The offers the same connectivity and functionality as the UNO board in the smaller form factor. NodeMCU ESP8266 and its pinout. A microcontroller NodeMCU ESP8266 is used to run the device connected to the WIFI. The

NodeMCU ESP8266 was chosen because of its small size and ease of use.With the Arduino integrated development environment (IDE), the system is coded in the and the code is uploaded to the NodeMCU ESP8266 to work.

B.Potential of Hydrogen and Electrical Conductivity Sensor

The Hydrogen Potential (pH) Meter is a sensor that the measures the pH level of water. pH is an indicator of the acidity or

alkalinity level of a liquid. Without units, the reading is , ranging from 0 to 14. An acidic reading of less than 7, an alkaline reading of greater than 7, and a neutral reading of 7. Electrical Conductivity (EC) Meter is a sensor that measures the EC level of water. The EC meter measured millisiemens per centimeter with a symbolic unit of mS/cm. This conductivity meter sensor can read 1 to 20 mS/cm. In the water supply, EC represents dissolved ions.

C.Temperature and Humidity Sensor

DHT11 is used to collect temperature and humidity data for this system. It can manage environmental variables such as real-time and remote temperature and humidity data. The DHT11 is a composite digital temperature and humidity sensor with digital output for calibration. The use of a dedicated digital data acquisition technology module and the temperature and humidity sensor ensures the extremely high reliability and long-term stability.

D.Light Sensitivity Sensor

The LM393 Light Dependent Resistor (LDR) sensor module is used to measure light sensitivity in this project. The has both analog and digital output pins. This module operates when the LDR resistance decreases as the light intensity increases and the LDR resistance increases as the light intensity decreases. The sensitivity of the LDR to light can be adjusted using the potentiometer knob on the sensor.

E.Voltage and Current Sensor

The MAX471 is a voltage-current sensor module. Both voltage and current are used to measure the . The MAX471 is a sensor ideal for power measurements. Based on the design of the resistive voltage divider, the input voltage at then connector connected to the load is 5 times lower. The analog input voltage of the node MCU is up to 5V, and the input voltage of the voltage sensing module is less than 25V.

F.Organic Light Emitting Diode Display Module

The I2C OLED display module is a light emitting diode, and the light emitting electroluminescent layer is a organic compound film that generates light in response to current. In the dark, the OLED does not require backlighting, so very good contrast. Additionally, OLED displays consume less power than other displays, as the pixels only consume power when is on. The model used has only 4 pins and communicates with the Node microcontroller using the I2C communication protocol.

G.ThingsSentral Server Application

ThingsSentral is an IOT cloud platform developed by National University of Malaysia (UKM). Users can use the platform to create their own IoT cloud system that can be used to collect, store and retrieve data. This system platform uses the HTTP protocol on the Internet. You can send data from hardware microcontrollers like Node MCU, Raspberry Pi, etc. A channel containing a data field, location field, and status field is the heart of how ThingsSentral works.

H.Two Factor Authentication (2FA) Method

According to Fred B. Schneider, what the user knows and what the user has are the variables used for authentication. The reason for using the 2FA security method is that the electronic devices placed in the indoor

vertical hydroponics system use the Internet as a communication system. The electronic devices of the Internet-enabled hydroponics system are connected to the nearest available Internet connection. Since this hydroponic system is placed indoors in the user's home, the electronic device is connected to the Internet or WIFI at the user's home. Connecting devices over the Internet requires adequate network security to reduce the risk of becoming a victim of data theft and sabotage. The system implements a 2FA mechanism in the form of an access code on the gateway (NodeMCU) and an application that verifies access on the smartphone.

RELATED WORKS

L. Audahb, The purpose is to provide a vertical farming monitoring system to help keep track of the physical state of crops. L. Audahb, "Vertical farming monitoring system using the internet of things(IoT)". Various types of sensors will be utilized in this system to detect the physical conditions that are now present, and they will convey the data to the BeagleBone Black (BBB) microcontroller either in analogue or digital input. After that, BBB will process the data and upload it to the ThingspeakCloud.Additionally, the system will keep track of the location of the active equipment, making maintenance easier in the event that something breaks down. Additionally, the system offers limited remote functionality, allowing users to use a web-based application to turn on and off the LEDlight and the watering system. For easier understanding, the web-based application will also be created to analyse and present data acquired in the form of graphs, charts, or figures.

D. Yendri,Lockers are frequently used to temporarily store luggage. Lockers come with standard lock keys that may be used to keep them secure. There are numerous ways to improve security by making the most of two-factor authentication, a new developing technology. The PIN(PersonalIdentification Number) code must be entered to start this procedure, and confirmation access by smartphone is required to unlock the lockers. Because of the security measures in place,no unauthorized users are able to attempt to open the locker. Furthermore, the owner would be able spot any unusual access right away. The study's findings demonstrate that by entering the right PINang obtaining a success rate of 100%, the system could open the locker and verify access. The Average Response time is approximately 6.647 seconds, and any attempt to open the locker with an incorrect access code will result in a 100% success rate

Data centre temperature monitoring based Wireless Sensor Network and cloud based dashboard with real time alert system. This paper is an advanced solution for monitoring the temperature at different points of location in a data centre, making this temperature data visible over internet through cloud based dashboard and sending SMS and email alerts to predefined recipients when temperature rises above the safe operating zone and reaches certain high values.

Internet of Things (IoT) in Agriculture:The Idea of Making the Fields Talk, The objective of smart agribusiness research is to ground a dynamic emotionally supportive network for the management of

farms. IoT is being used in agriculture to get to know the crop field by utilizing sensors for monitoring, controlling in the field. It is used to get to know the crop field by utilizing sensors for monitoring, controlling in the field, etc. Recent developments in IoT, comparison between traditional and smart agriculture, and the roles of IoT in agriculture were analyzed in this study. The articles were purposively inspected while the qualitative data gathered was dissected utilizing content analysis. Summarily, the rise of smart agriculture has lowered the practice of traditional farming, as it has enhanced it in no small way. The research likewise showed that the lacuna in agriculture can be filled with IoT. Scalability in technology should be encouraged without affecting the functionalities of the existing infrastructures

Future internet of things :Agriculture using geospatial technology,The Internet of Things is allowing agriculture, here specifically arable farming, to become data-driven, important to more timely and cost-effective production and management of farms, and at the same time dropping their environmental effect. In this research paper, we are mainly concentrating on classification of crops using geo special technologies and satellite images. The method we use for the classification of the crops is Supervised and Unsupervised Classification. To validate crop classification, we are using ground truth data and the GT point of the crops, which we got from the Surveyor and they use Map-inr app for the location of crops. With the support of this technique, we can simply find out the crops type according to area

IoT Temperature Based Fan Speed Control & Monitoring System, This system will make Temperature Based Fan Speed Control & Monitoring System using ESP8266 WiFi Module & observe the data on IoT App Blynk. The fan speed increases based on the increase in temperature. The Blynk App will show the current temperature & Fan speed in percentage. Using the Blynk, we can also set the threshold value at what temperature the fan should turn ON.To sense the room temperature, we will use a DS18B20 Waterproof Temperature Sensor. For the fan part, a 12V fan is perfect for this application as it is easy to control the speed with the PWM signal. The 16x2 LCD Display will display the instantaneous temperature and fan speed as wel

CONCLUSION

The preliminary design and implementation for the proposed indoor vertical hydroponic farming system has been executed successfully as shown above.It was able to secure the indoor hydroponics system The current research only focuses on one hydroponic system to one web based server. In the future, this research will be further enhanced with many farming systems to one web-based server. Furthermore, the study of edge and fog computing in smart farming to deal with challenges associated with conventional centralized cloud solutions such as high communication latencies, lack of support for real-time response to detected events, and wide bandwidths may be another interesting future research path. This project can help you to serve multiple houses with healthy food .

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