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An Enhanced Linear Regression model for Controlled Environment Agriculture

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Abstract

The agricultural sector is India's largest industry, providing jobs to India's fifty percent workforce. Each and every sector in India is directly or indirectly connected to the agriculture sector, despite this the technology development is much less. Farmers tend to use traditional farming techniques, the advanced technologies are either costly or farmer-needed. This paper seeks to address the framework of economic irrigation and create a greater impact on the agricultural sector. Depending on the soil type, temperature and humidity the water will be supplied to the field in this process. It uses a linear regression algorithm. It is planned to show all details in the cell phone of Android. Different nodes in exclusive locations are connected via IoT which transmits and acquires the data in a node which transmits the reputation of the crop region to the user via IoT to control the pumping device.

Keywords:,*Internet of Things (IOT), Arduino, Temperature sensor, Soil Moisture sensor, And Humidity sensor.*

1. Introduction

From the very beginning of human society, agriculture has become the most important activity. Over time, it has called several iterations of improving technical know-how. Still, a properly agricultural practice is an art. Completing many years of changing climate conditions, rising global temperature and emissions has led to strange environmental stipulations such as rain. Current agricultural practices are unable to cope with those two changes in the climate. Effective mastery over Environmental parameters such as temperature, humidity, and humidity plays vital role in plant boom. Humidity is responsible for plant moisture loss and prescribing temperature. Within such a tool, IoT can be used to improve its monitoring capabilities through the distribution of sensors in the subject matter and remote monitoring of environmental parameters. IoT consists of small nodes that function alone and have an embedded sensor. They acquire the information and transmit it to a central device via wi-fi network, which accumulates and processes place data from all nodes.The problems with regard to agricultural purposes can also be established from the deployment range decision. For example, when the agricultural area is separated by obstacles the transmitted sign by the sensor node is attenuated. The Zigbee wi-fi protocol used to be built to run with a varying degree of connectivity and low power consumption.

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be extended with a router node to resolve network deployment barriers in agricultural applications.

2. Related Work

Here we will explore some of the principles relating to the device idea and the drawbacks currently present. It says the reason why a smart irrigation system should be built by removing the drawbacks present in existing systems. In IoT-based method, describes the method to use sufficient quantity of water that prevents irrigation over / under. Using the GSMGPRS SIM900A modem, sensor information is periodically updated on a webpage from which a farmer can verify if the water sprinklers are ON / OFF at any given time. The hardware component consists of sensors for soil moisture, and PHP is used to build the webpage. Sensor information is forwarded to the arduino board.The arduino board consists of the ATMEGA328P microcontroller which is responsible for regulating the on / off switching of the motor on which water sprinklers can be installed. The farmer is not given the option of controlling the water pump i.e. he can turn on / off the pump to start / stop the irrigation process[1].

Another machine, without being present at the farm, automatically controls water motor at lower cost and selects the direction of water flow in the pipe. Here a sensor of soil moisture is used to sense field data. An algorithm called Local Shortest Path (LSP) which is used to manage multiple wireless networks.When the field is wet, the system is OFF and will start automatically when the field I d is dry. It does not rely on timing of daily water supply and the cultivated crops[2].

Third system, Remote Monitoring and Control System with Automatic Irrigation System using GSM Bluetooth is designed for low cost and efficient use of sensors for remote monitoring and control devices that are operated via SMS using a GSM module.GSM is used for sending and receiving SMS through GSM network for remote monitoring and control of devices over a mobile phone. Bluetooth is used for the same reason but just within a few metres. Even with Bluetooth module, it could be automatically ON or OFF by SMS, pump and fan. This concentrates mainly on the system's automatic on and off.Not on the humidity and other irrigation constraints[3].It is implemented using IOT in Smart Agriculture Monitoring System Using IoT.

Collectively, the Internet on things and cloud computing allows a structure which effectively controls the agriculture sector. This device will sense all the parameters of the environment and send the data to the user via cloud.User must take control action to ensure this is achieved using actuator. This helps the farmer to make the cultivation better in a way that the plant requires. It leads to higher crop yields, longer periods of production, better quality and less use of protective chemicals[4].

Smart Agriculture, based in IoT, helps to evaluate and predict the type of crop that is best to grow in the specific agricultural field[5]. In the Internet of Things Based Smart Agriculture Program Using Predictive Analytics, emphasis on the use of powerful IOT devices and efficient algorithms for predictive learning to optimize sensed data decision making. The system will have automated solution for data acquisition deployed from the farm because of the use of IoT devices[6].

In a report on Smart Irrigation System Using IoT for Crop-Field Surveillance, the system is feasible and cost effective for maximizing agricultural water supplies. The mobile application can be configured to evaluate the obtained data and to test with the moisture, humidity and temperature threshold values. This system allows irrigation in places with a question of water shortage while enhancing sustainability[7].

The system helps the farmer in using IoT and Image Processing in the Smart Irrigation System, and makes their harvest commercial. The device provides full sensor monitoring operation, which is very easy to track in the field. Water wastage and motor power consumption should be minimized so that they can be maintained for future use.

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The sensor data and DC Pump status are sent to the Blynk andriod App to track the farms[8].Use Raspberry Pi in IoT Based Agriculture Monitoring and Smart Irrigation System, small pocket size computers are used to conduct small computing and networking operations (i.e. raspberry pi, soil moisture sensor, DHT11 sensor, and relay an electrically operated switch. The implementation of this system in the field can definitely help to improve crop yields and help to effectively manage water resources to reduce waste[9].

3. Proposed System

The paper motive is based on the Internet of Things (IoT) technology used for agriculture. Improvements to essential Internet of Things (IoTs) are used for agriculture in order to effectively construct such a clever agricultural environment. They need sensor hardware, middleware systems, routing protocols, and agricultural utility offerings.In the couple of years, building framework with IoTs has changed dramatically, adding a new dimension to the field of statistics and communication technologies. Cooperatively, the nodes sense and collect statistics from the included object over the network, make fantastic data processing and management, and finally generate accurate object information.

The proposed system would not only automatically irrigate the water depending on the soil and humidity level but will also take care of the power consumption. It takes time to send messages, too. It consists of a water pump to spray water on the ground depending on the state of the soil, such as precipitation, temperature and humidity. Previous system sends smartphone warnings but not IoT Cloud warnings. Besides this, the Rain alarm and soil moisture detector circuit can also be useful in the construction of a Smart Irrigation System. It is important to remember that the different crops need different conditions of soil moisture, temperature and humidity before beginning.

So, we're going to consider such a crop that will take about 50-55 % of soil moisture. And when the soil loses less than 50 % of its moisture, the motor pump switches on automatically to sprinkle the water and continues to sprinkle the water until the moisture goes up to 55 % and the pump is switched off afterwards. In a given me interval, the sensor data will be sent to he server so that it can be tracked from anywhere in the world.

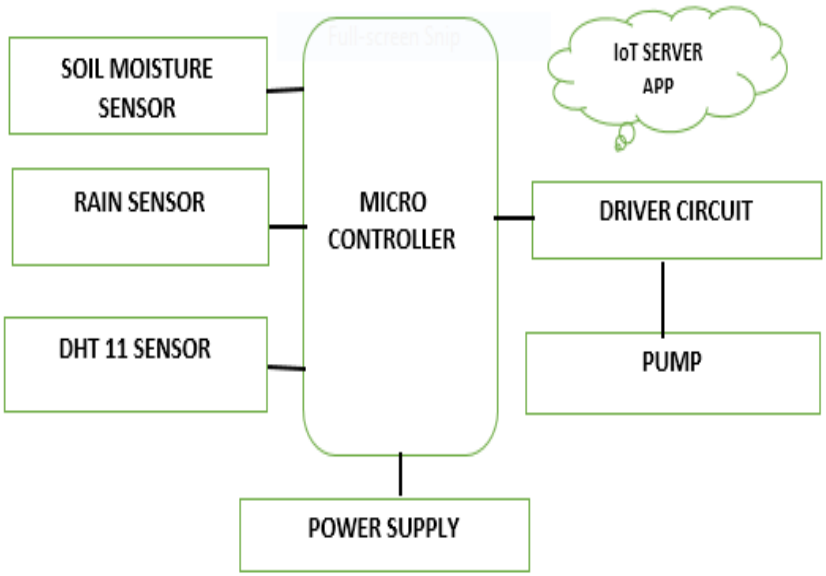

Fig 1.Block diagram for Controlled Environment Agriculture

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4. Working Methodology

In this portion, we have proposed a variety of layout-related aspects alongside the introduction of Managed Environmental Agriculture. The system of Controlled Environment Agriculture provides an integrated method of management and monitoring. The aim of this proposed work is to give ease of use and manipulate the machine with performance and reliability. It helps to reduce the required amount of water and electricity. This system will increase farmers' yield at both an average and accessible rate. The proposed system is modeling the use of the Arduino mega enhancement kit that connects to a mild sensor to calculate light intensity, temperature / humidity sensor in the surroundings for temperature and humidity in the environment.

In addition, this instrument can be used to continuously measure the temperature, the degree of water and the amount of light entering the plants that is important for the greenhouse system. Dimensions of temperature and humidity are needed for the inspection of plant environment. Various plant species have distinct perfect temperature and humidity ranges.Examination and monitoring of the flora's temperature and humidity from droughts and high temperatures. This system contains a wide range of sensors. The Arduino super enhancement kit consists of a built-in microcontroller, and lets us combine all the sensors and demonstrate that the sensor readings can also serve as system entry. The computer also has an IoT module, which sends the sensor readings over the Wireless Network to the server. The server also helps the user to access the details about the sensor at any time.

5. Environmental Set Up

We are designing the module that senses soil and rain frequency Humidity, Temperature, and Moisture. Soil moisture is measured via the FC-28 soil moisture sensor and the percentage soil moisture content data. The humidity and temperature are calculated in share and Celsius respectively via DHT11 a Humidity and Temperature Sensor. The rain frequency is determined using FC-37 in millimeters with a rain detector sensor. All physical parameters are sensed by sensors and the analog value is converted to digital. Moisture and temperature sensors are used to measure on-field humidity and temperature, respectively. Soil Moisture Sensor embedded in the soil is capacitive, and is used to measure the soil's moisture content.

5.1 Soil Moisture Sensor

Normally the soil moisture sensor or the hygrometer is used to realize the soil moisture. Use two parts, the sensor is set up: the electronic screen, and the two-pad probe which detects the water content.

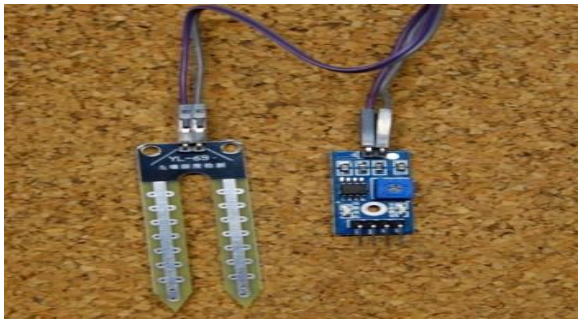

Fig 2.Soil Moisture Sensor

As a consequence of the water content material in the soil, the voltage which the sensor outputs changes. The output voltage decreases when the soil is wet, and when the output

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voltage increases, it dries. The performance may be a LOW or HIGH digital sign depending on the water material.The output can be an analog signal, so you'll get a value from zero to 1023.

5.2 DHT eleven Sensor

DHT11 sensor uses a thermistor with a negative temperature coefficient, which motivates a reduction in its resistance value with temperature amplification. The DHT11 temperature ranges from zero to 50 deg with a precision of 2 degree. Humidity ranges from 20 to 80 % of this sensor with 5% accuracy.DHT11 is small in size and has a working voltage of 3 to 5V. The most contemporary measurement used is 2.5 mA.

Fig 3.DHT 11 Sensor

5.3 Rain Detector Sensor

The rain sensor module is a tool for rain detection. It can be used as a change when raindrop falls via the raining board and additionally measures rainfall intensity.

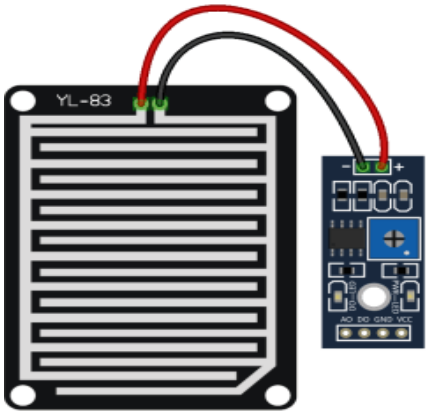

Fig 4.Rain Sensor Detector

5.4 ESP8266

ESP8266 is a low-cost Wi-Fi microchip, a small module that allows microcontrollers to access a Wi-Fi network and make simple connections to TCP / IP.

5.5 Relay Board

A relay is an electrically operated change that can be switched on or off, letting the present day go through or not, and can be controlled with low voltages, such as the 5V provided through Arduino pins.

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Fig 5.Relay Board

6. Linear Regression Algorithm

Linear Regression is an algorithm for laptop mastering, based entirely on supervised learning. It does the role of regression. Regression models a predictive target price basing mainly on neutral variables. This is ultimately used to assess the relationship between variables and forecasts.Different regression fashions fluctuate fully based on – the type of relationship between defined and independent variables, they are talking about, and the variety of impartial variables used.

Linear Regression implements the undertaking to predict a specified variable value(y) based on the unbiased variable(x) given. So, this technique of regression discovers a linear relationship between x (input) and y (output).The steps are

1. Start
2. Read Number of sensor Data (n)
3. For i=1 to n:
   Read INPUT X and OUTPUT Y
   Next i
4. Initialize the sensor data:
   Sensor Data =0;
   X= analog Sensor data
   Xi= Previous Data
   X2= Current data
5. Calculate Required Sum
   For i=1 to n:
      sumX = sumX + Xi
      sumX2 = sumX2 + Xi * Xi
      sumY = sumY + Yi
      sumXY =sumXY + Xi * Yi
   Next i
6. Calculate Required Constant a and b of
   y= a + bx:
   b = (n * sumXY - sumX* sumY)/ two (n*sumX2 - sumX * sumX)
   a = (sumY - b*sumX)/n
7. Display the output cost of sensor facts i.eV5=temperature, V6= Humidity
8. Stop.

6.1 IoT SERVER APP

Blynk is a platform for manipulating Arduino, Raspberry Pi and the likes using IOS and Android apps over the Internet. It is a digital dashboard where you can build a photo interface for our challenge by dragging and dropping widgets with certainty. Setting the whole up really is easy and you can start tinkering in less than 5 minutes. Blynk is not

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now attached to any particular board or shield. Alternatively, it supports the choice of equipment. If you are connecting your Arduino or Raspberry Pi to the Internet through Wi-Fi, Ethernet or this new ESP8266 chip, Blynk can get you online and ready for the Internet of Your Stuff. Blynk was formerly built for Stuff Internet. It can remotely control hardware, it can display sensor data, it can shop data, it can imagine.

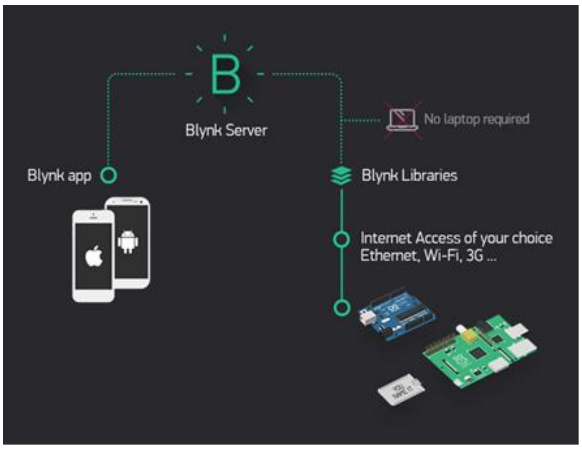

Fig 6. Blynk Server

7. Result And Discussion

Temperature and humidity are directly proportional, i.e., whether humidity rises additionally. Whereas the stage of the temperature and soil humidity is inversely proportional. If the degree of moisture is weak, the customer will receive a warning, and the user will be able to use the device.

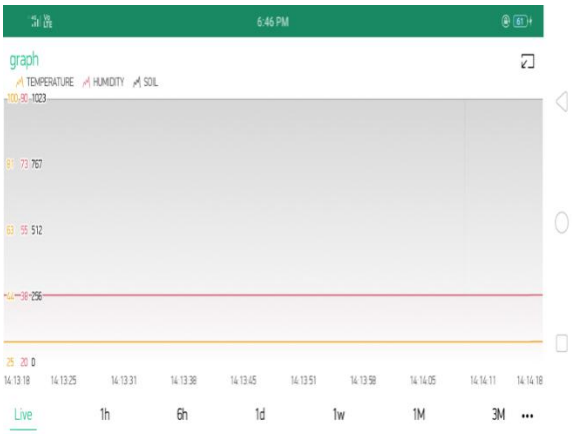

Fig 7. Results

8. Conclusion and Future Work

The system operated as designed and planned, it regulated the water pump optimally and greatly reduced farm electricity consumption and farm production is increased due to managed water supply to crops. It's easy access, cost, efficiency and accessibility make it flexible and therefore ideal for various populations, making it perfect for use in residential vegetation, greenhouse, etc. In the future, more sensors will be used to monitor the water pump and to collect different climatic condition data to analyze and improve the efficiency.

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9.References

[1] Srishti, IoT primarily based Smart Irrigation System Department of Computer Science, VIT University, International Journal of Computer Application (0975-8887), Volume 159- No 8, February 2017.

[2] Chandan, Pramitee, A Low Cost Smart Irrigation Control System two Dept. of Electronics and Communication Engineering, Sambalpur University Institute of Information Technology, Sambalpur (768019), India, IEEE Sponsored 2nd International Conference on Electronic and Communication System (ICECS 2015).

[3] Purnima, Reddy, Design of Remote Monitoring and Control System with Automatic Irrigation System the usage of GSM-Bluetooth. Department of Electronics & Communication & Computer Science IGIT, GGSIP University, Delhi, India, International Journal of Computer Applications (0975-888), Volume 47-No.12, June 2012.

[4] Sanjay, Maduri, Smart Agriculture Monitoring System Using IoT. Associate Professor, Electronics Engg. PVPIT two twoBudhgaon, Sangli, Maharashtra PG Student, Electronics Engg. Department, PVPIT Budhgaon, Sangli, Maharashtra, International Journal of Advanced Research in Computer and Communication Engineering Vol.8, Issue 4, April2019.

[5] Sidhanth, et al., IoT based totally Smart Agriculture UG Student, Department of Information Science and Engineering Assistant Professor, Department of Information Science and two twotwotwotwotwo Engineering NMAM Institute of Technology, Nitte, Udupi, Karnataka, India, International journal of Science, Engineering and Technology Research (LISETR), Volume 8, Issue 4, April 2019, ISSN:2278-7798

[6] Suhas, Sakkaravarthi, Internet of Things Based Smart Agriculture gadget Using Predictive Analatyics School of Computing Science & Engineering, VIT, Chennai, TamilNadu, India. Email: patil.suhas16@gmail.com,sakkaravarthi.r@vit.ac.in.

[7] Ashwini, A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field, Assistant Professor, Dept of ISE, Brindavan College of Engineering, Bangalore.

[8] Balaji, Smart Irrigation System Using IoT and Image Processing, International Journal of Engineering and Advanced Technology (IJEAT), ISSN: 2249-8958, Volume 8, Issue 6S, August 2019.

[9] Valavala, Kezia, A Novel IoT Based Solution for Agriculture Field Monitoring and Crop Prediction Using Machine Learning Dept. of CSE, Adikavi Nannaya University, Rajamahendravaram, Andhra Pradesh, India Asst. Professor, Dept. of CSE, Adikavi Nannaya University, Raja mahendravaram, Andhra Pradesh, India.

[10] Vineela et al, IoT based Agriculture Monitoring and Smart Irrigation System using Raspberry pi, Assistant Professor, Student, Department of ECE, VVIT, Andhra Pradesh, India.

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