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Design and Implementation of IOT Based Automated Agriculture Monitoring and Control System

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ABSTRACT: Country like India, the majority of the people is employed in the agriculture sector. The physical presence of so many people cause low per capita income. Therefore, there is a need to have the methods of farming to be integrated with technology. In the present research work with the application of sensors, a smart irrigation system has been modeled. When the soil really needs water, the farmer can switch on the water supply system even when in a remote location. Also, monitoring of the same could be done round the clock. The results have been achieved using a hardware demonstrating model, in which sensors are programmed on the android platform with the software codes written in Embedded C programming. The results have been very encouraging in taking timely and swift action to have optimum production from the fields. In this model we have designed this in such a way where we can monitor temperature and humidity of field. When ever soil moisture level is low. Also, it has been found to be 30% more efficient in saving water in comparison to the traditional manner. When ever soil moisture level is low, the system automatically activates the water supply system through a relay and water pump when needed. The modernization of the agricultural field with the help of IoT technology leads to a new era of excellent productivity and decreases the expenses.

KEYWORDS: Node MCU controller, LCD display, DHT11 Sensor, soil sensor, Thing speak web page.

I. INTRODUCTION

The current agriculture system is fully dependent on the people and all human decisions are based on intuition. So, the overall quality and quantity of crops are based on human instinct. But what if the person is new to farming or the farmer is unavailable. So, the current irrigation mechanism is fully dependent on the human physically present on the sight/farm.

Sometimes this event may lead to wastage of water, which is also one of the scarce resources in the world. Although the drip irrigation system helps in optimum utilization of water, still it needs the physical presence of the farmer in the field. Today with the rapid increase in population causes the rapid consumption of natural resources. By using technology in the field of agriculture we can reduce the labor and also increase the overall profit for the farmers. In the author developed a system having different sensors such as soil moisture sensor, DHT11 sensor, controller Node MCU ESP826, and monitor all this data using blink application. But it is difficult to apply this model on large scale. Using 3rd party services like blink makes this model less flexible for large scale implementation. Sensors namely, Soil moisture, DHT11 sensor are presently being exploited. All the sensors send the collective data to the controller and after all processing, it will be sent the data on the online database. If all this data is being monitored properly we can increase the overall quality and quantity of the crop and this will reduce the overall resource consumption.

II. RELATED WORKS

The aim of this study was to develop a prototype mobile app for the detection of pneumonia through neural networks. Using a high-level tool like Create ML facilitates this process and eliminates problems like the number of layers in a neural network, initializing the model parameters, or which algorithms to use. The template is now accessible to everyone, everywhere, through a mobile app.

III. EXISTING METHODS

In the existing system a device was developed to monitor temperature and humidity level of felid. Temperature and humidity level is monitored to know whether the cultivated plant will be suitable or not. Whenever temperature and humidity level are raised then buzzer indication is given as alerting system.

IV. PROPOSED SYSTEM

The proposed system is a smart irrigation system designed to address the challenges faced by farmers in countries like India where the majority of the population is employed in the agriculture sector. The system utilizes sensors to monitor soil moisture levels, temperature, and humidity in real-time, allowing for precise irrigation management

The proposed system consists of the following components:

- Sensors: Temperature, humidity, soil moisture, and light intensity sensors to collect real-time data.
- Actuators: Irrigation valves, lighting systems, and ventilation fans for controlling agricultural processes.
- IoT Gateway: To transmit sensor data to the central server.
- Central Server: To receive, store, and analyze the sensor data.
- User Interface: Web mobile application for users to monitor and control the system remote

V. BLOCK DIAGRAM:

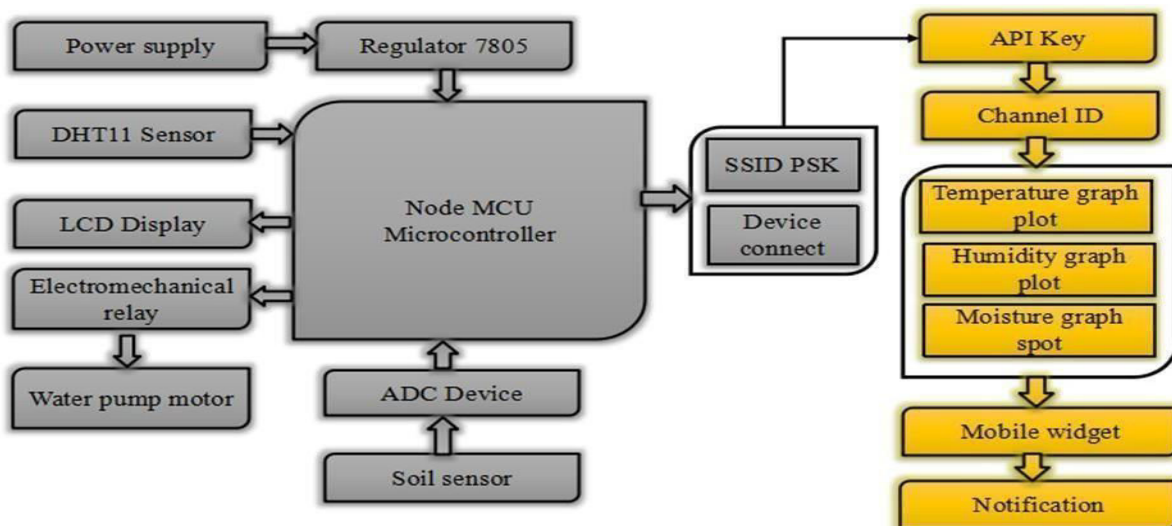


Figure 1 block diagram

- The above circuit components of LCD Display, regulator 7805, power supply, Nodumcu controller, temperature

sensor, soil sensor, and ADC Device, DHT11 sensor, power supply, regulator 7805, relay and water pump motor

- In 12v input power source is given to regulator for voltage regulator it converting 12 v to 5v, then 5v connected to controller and negative pin connected to GND and 5v connecting to controller.
- Electromechanical relay has 3 pins positive pin, negative pin and 12v supply.(+) pin connected to 5v in controller to digital, pin is connected to GND and water Pump motor has 2 pins is connected to relay.
- Liquid crystal display are 8 pins. The positive pin is connected to 5v, negative pin connected to GND and remaining data pins are connected to controller digital d2, d3, d4, d5, d6, d7.
- Temperature sensor has 3 pins. VCC pin connected to 5v, GND pin is connected ground and out pin is connected to controller digital pins. Soil sensor has 3 pins. VCC pin connected to 5v, GND pin is connected ground and signal pin is connected to controller digital pins. LM358 sensor three pins, positive pin connected to regulator 5v, negative pin connected

NODE MCU:

The Node MCU (Node Microcontroller Unit) is an open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266.

HUMIDITY SENSOR:

DHT11 Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor complex. Its technology ensures the high reliability and excellent long-term stability. A high-performance 8-bit microcontroller is connected. This sensor includes a resistive element and a sense of wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high cost performance advantages.

SOIL-MOISTURE-SENSOR-DEVICE:

These [sensors](#) normally used to check volumetric water content, and another group of sensors calculates a new property of moisture within soils named water potential. Generally, these sensors are named as soil water potential sensors which include gypsum blocks and tensiometer

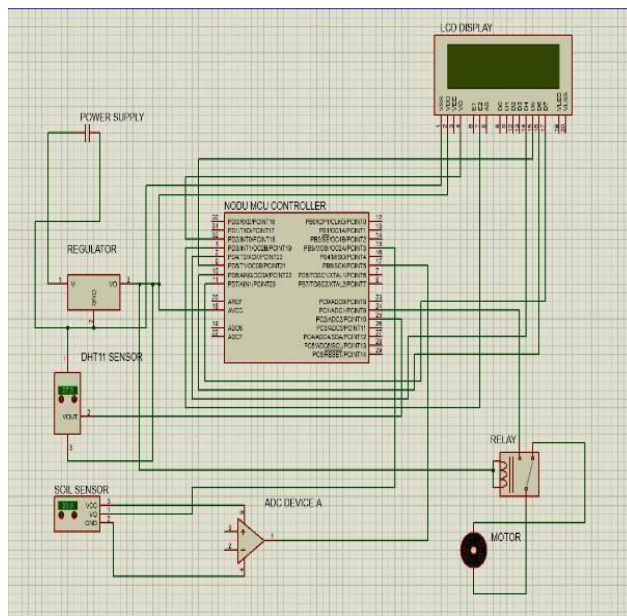
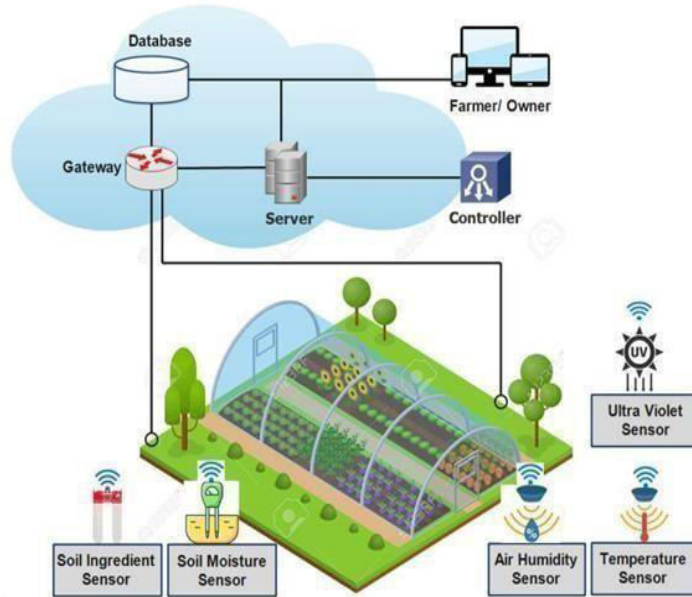
PUMP MOTOR:

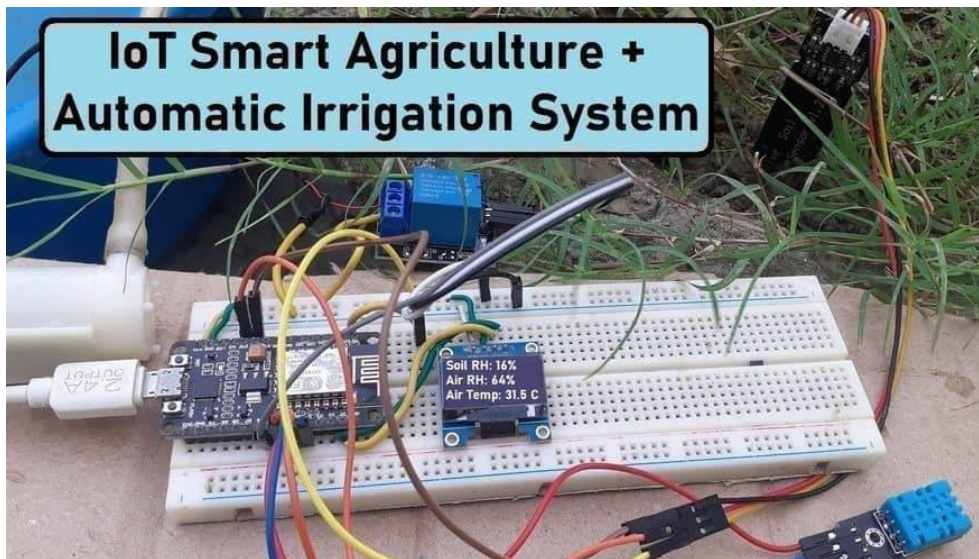
- R385 6-12V DC Diaphragm Based Mini Aquarium Water Pump is an ideal non-submersible pump for variety of liquid movement application. It has enough pressure to be used with nozzle to make spray system. The pump can handle heated liquids up to a temperature of 80°C and when suitably powered can suck water through the tube from up to 2m and pump water vertically for up to 3m.
- Possible uses/projects include; a small aquarium pump, automatic plant watering system, making a water feature or music activated dancing water features to name but a few. When pumping a liquid the pump runs very quietly

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VI. EXPERIMENTAL RESULT





VI. FUTURE SCOPE

Future Scope for IoT-Based Automated Agriculture Monitoring and Control System:

- **Integration of AI and Machine Learning:** Implementing AI and machine learning algorithms can help in analyzing the data collected from sensors more effectively. This can lead to predictive analysis for better decision-making in agriculture practices.
- **Enhanced Sensor Technologies:** Continual advancements in sensor technologies can improve data accuracy, reliability, and real-time monitoring capabilities. Integration of new sensors for detecting soil nutrients, plant health, and weather conditions can further enhance the system's effectiveness.
- **Remote Monitoring and Control:** Future systems can enable farmers to monitor and control their agricultural operations remotely through mobile applications or web interfaces. This can provide more flexibility and convenience to farmers in managing their farms.
- **Integration with Drones and Robotics:** Integrating drones and robotics into the system can enable automated data collection and agricultural operations such as planting, irrigation, and pest control. This can lead to increased efficiency and reduced labor costs.
- **Data Analytics and Decision Support:** Implementing advanced data analytics techniques can provide farmers with valuable insights into their operations. Decision support systems can help in optimizing resources, improving crop yields, and reducing environmental impact.

VII. CONCLUSION

The main motto of this paper is to visualize the different convolution neural network frameworks and their respective performances towards the disease: pneumonia. More than couple of techniques, Vgg16, Vgg19, ResNet50, Inception, Modified CNN, ChexNet, R-CNN, CNN, Mask-RCNN, Transfer Learning (CNN), Dual Net architecture, were discussed in this paper including some transfer learning algorithms. From our work, Mask-RCNN showed better results in pneumonia detection with max accuracy. The machine learning algorithms has its benefits when comparative to

machine learning algorithms. But the main problem is computational cost and is high. In each and every problem, like detection, prediction, classification, recommendation systems in medical industry adopting machine learning algorithms for better precise decisions..

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