

IoT Based Agriculture Monitoring System using Arduino Uno and Node MCU

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Abstract: Indian agriculture is diverse ranging from impoverished farm villages to developed farms utilizing modern agricultural technologies. Promoting application of modern information technology in agriculture will solve a series of problems facing by farmers. This system provides an intelligent monitoring platform framework and system structure to facilitate agriculture's ecosystem based on IOT. This will be a Catalyst for the Transition from Traditional Farming to Modern Farming. This also provides opportunity for creating new technology and service development in IOT (Internet of things) farming application. In INDIA, the population has tripled, but food grain production had more than quadrupled, thus as there has been a substantial increase in available food grain per capita. Modern agriculture practices have a great promise for the economic development of a nation. So we have brought-in this innovative project for the welfare of Farmers and also for the Best Quality of Crops. There are no such restrictions of Day and Night in our project. Using this Project, Farming can be done at any time.

Keywords: Modern Farming, IOT, Advanced Agriculture , Smart Agriculture Robot, Automatic Farming, Farming on fingers.

I. INTRODUCTION

Internet of Things (IOT) is widely used in connecting devices and collecting data information. Internet of Things is used with IOT frameworks to handle and interact with data and information. In the system users can register their sensors, create streams of data and process information. IOT are applicable in various methodologies of agriculture. IOT sensors can provide information about agriculture fields. We have proposed an IOT and smart agriculture system using automation. This IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensors deployed at various nodes and sends it through the wireless protocol. This smart agriculture using IOT system is powered by Arduino, it consists of Temperature sensor, Moisture sensor, water level sensor, DC motor and GPRS module.

When the IOT based agriculture monitoring system starts it checks the water level, humidity, and moisture level. It sends SMS alert on the phone about the levels. Sensors sense the level of water if it goes down, it automatically starts the water pump. If the temperature goes above the level, fan starts. This all is displayed on the LCD display module. This all is also seen in IOT where it shows information of Humidity, Moisture, and water level. For the purpose of increasing the efficiency and productivity of agricultural crops, an IOT based smart agriculture monitoring project using Arduino Uno is proposed.

The system will determine the Parameters that are monitored in irrigation systems Regarding water quantity and quality, soil characteristics, Weather conditions, and fertilizer usage and provide an Overview of the most utilized nodes and wireless Technologies employed to implement WSN and IOT based Smart irrigation systems.

Most of the Traditional Farmers perform agriculture in the most traditional way of farming which actually requires a presence of a human to execute certain Process of Farming. But certain Conditions that may arise where practically working in farms is not Possible. So, at that particular time an Automated System must perform Action or Processes of Agriculture that a farmer does in a Farm. Also there should be Certain Accuracy in the process of Farming resulting in Good Quality of Crops. For Example, if User want to check moisture level of a farm. User can set the level of moisture that is allowed according to the specification in the soil so their crops will always have a maintained moisture level.

With an availability of a simple user-friendly monitoring display, this system provides a display that can be easily understood by anyone who uses it. In addition, this type of technology is very helpful in terms of better productivity and reducing the burden on farmers

II. LITERATURE SURVEY

There is a growing body of literature on the use of IOT Based Smart Agriculture technology in the context of Sustainable Agriculture, Irrigation farming system, Irrigation Automation, Intrusion detection system, Here are some key findings from the literature survey:

Ramya Venkatesan and Anandhi Tamilvanan(2016) explains about a Sustainable Agriculture System Using IOT. This work developed a system a system which will automatically monitor the agriculture fields. The agriculture fields are monitored for environmental temperature, humidity at soil moisture sensor. IOT and wireless sensor node helps to decrease the efforts, for observing the agricultural fields. IOT also avoids the loss of agriculture parameters database and save in the storage device or cloud for long life.

Another study by M. Rohith, RSainivedhana(2021) explains about IOT Enabled Smart Farming and Irrigation system This paper consists of various components such as different sensors, Arduino board, power supply, LCD, relay and a motor. The main objective is to automate the process of watering to the plants. The various parameters of soil and plant are sensed by using different sensors.

A research paper by Bhanu K.N. ,Mahadevaswamy H.S. ,JasmineH.J.(2020) Proposed a IoT based Smart System for Enhanced Irrigation inAgriculture. Implementing IOT in agriculture utilizes sensors and microcontrollers to make use of the system efficiently, where sensors have the potential to get a large amount of field information. By incorporating a distinctive sensor's data it is possible to decide on suitability and fertility of the soil. IoT helps in providing a better yield of the crop which improves productivity.

A study by Harika Pendyala, Ganesh Kumar Rodda(2021) discussed An IOT Based Crop-field monitoring an irrigation automation system describes how to monitor a crop field. A system is developed by using sensors and according to the decision from a server based on sensed data, the irrigation system is automated. Through wireless transmission the sensed data is forwarded to web server database.

A Research Paper by Ahmad Faisol Suhaimi, Naimah Yaakoob(2016) proposed IOT Based Smart Agriculture Monitoring, Automation and Intrusion Detection System. It is designed to develop a smart monitoring and automated irrigation system to provide not only efficient water consumption based on specific conditions, but also enables real-time monitoring of the environment. Furthermore, this system prevents damage to plants and reduces the likelihood of plant theft. This system uses Node MCU ESP32 as a microcontroller that collects environmental data such as humidity, temperature, soil moisture levels from sensors.

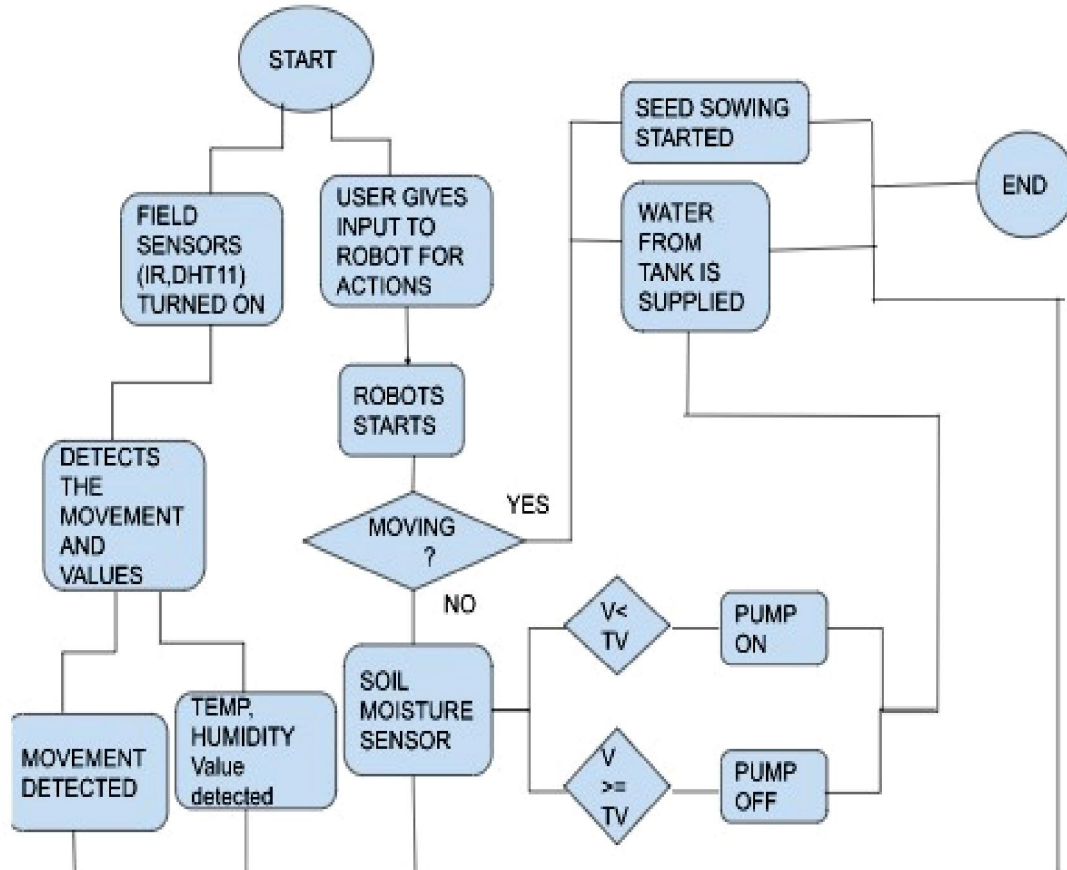
III. METHODOLOGY

An automated Smart Agriculture Robot is designed which will be operated by Wifi Module and Arduino UNO. A specialized application is designed for the user from where the user will give request commands and the Following Mechanism will be executed.

- Movement of the Smart Agriculture Robot: The motion of the smart agriculture robot is controlled by using the application created.
- Soil Moisture Level Sensor Mechanism: The Servo motor starts moving as the command has been received. This Servo Motor will make the Up-Down movement of this Soil Moisture Sensor and give the input value of soil moisture to the Water Pump for further irrigation process.
- Water Irrigation Mechanism :- Moisture Level Sensor will detect the Soil moisture from the soil. The result will recorded as well as the command to Water Pump will be given. Water Pump will get switched ON and water will be supplied to farm. Condition for Water Pump to Switch ON-“Moisture level < Threshold moisture”.

- Seed Sowing Mechanism: If a farmer wants to sow a particular seed, command will be given to this mechanism by farmer through application. The Sowing Plate will move back and forth by using Servo motor and helps the seed to be sowed into field with a particular rate.
- Movement Detection using IR Sensor: If any intruder or an obstacle comes in between the crops and farms will be detected by the IR Sensor and user will be notified with it.

3.1 Flowchart



3.2 Required Modules

Hardware Requirements

- Arduino UNO
- DHT 11 SENSOR
- IR Sensor
- Wi-Fi module(NodeMCU)
- Soil Moisture sensor
- Water Pump
- PVC Pipes
- L298 Motor Driver

Software Requirements:-

- Arduino IDE

IV. RESULT

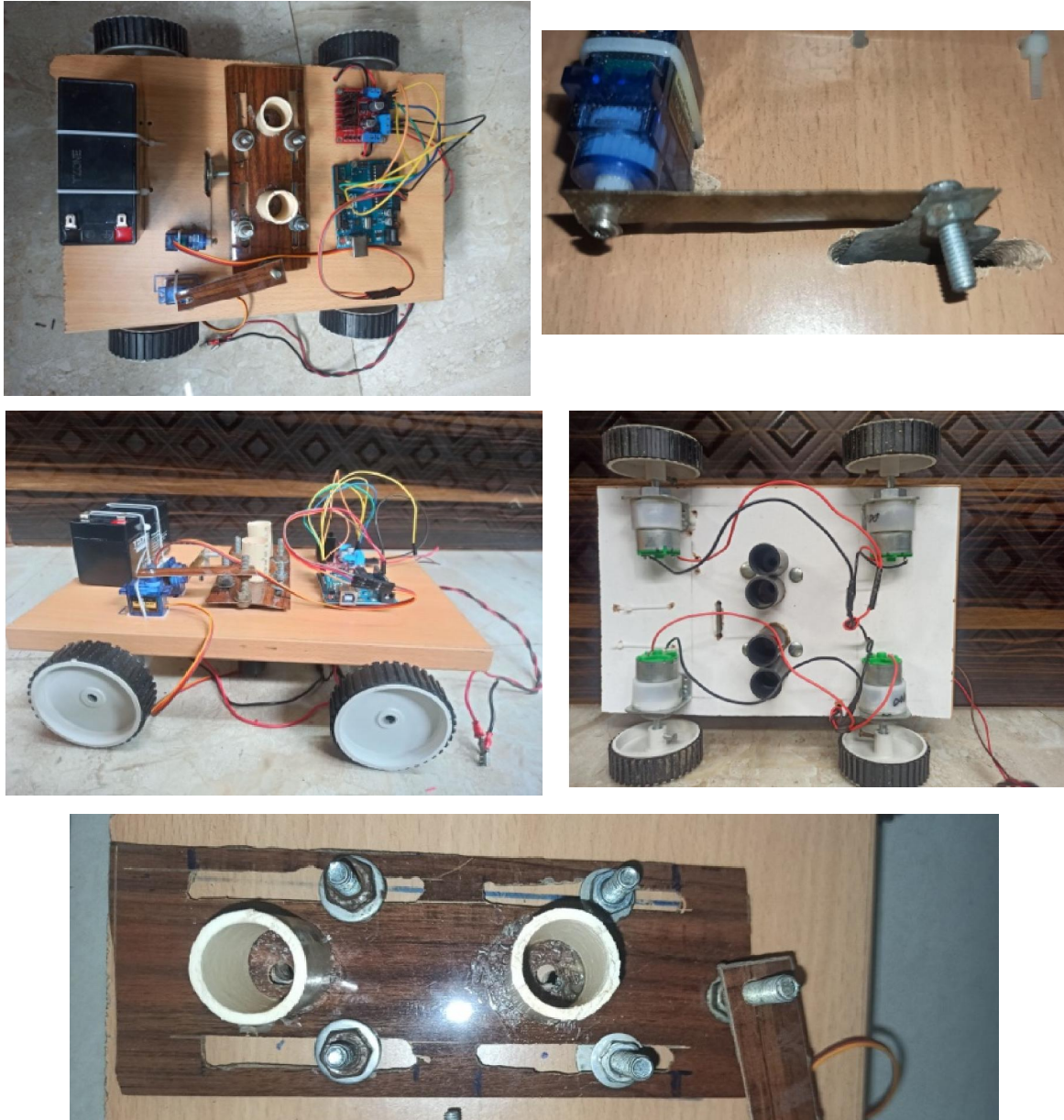


Figure 5 Seed Sowing Mechanism

V. WEB OUTPUT

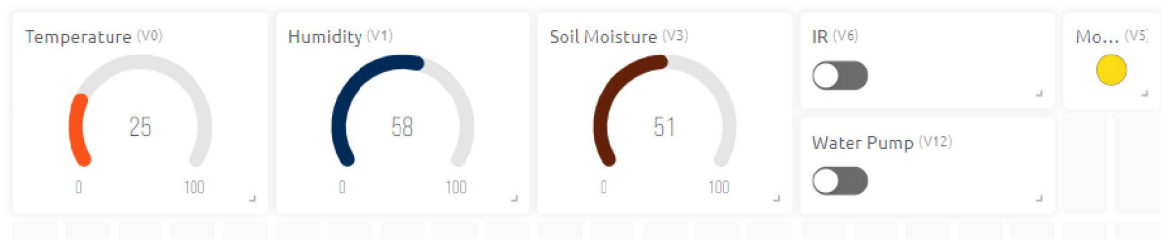


Figure 6 Web Output

VI. CONCLUSION

IOT replaces humans in continuously monitoring, testing and evaluating the conditions. Over the last dozen years, technology has come a long way with the booming Smart agriculture IOT system and can help the agricultural sector in many ways and make significant improvements to the way of use water and monitor crops, helping industries like agriculture become more efficient and save money. The point of smart agriculture technology is to get farmers to work smarter rather than working harder. The key factors farmers want to monitor are temperature and humidity, Soil moisture sensors. IoT will help to enhance smart farming. Using IoT the system can predict the soil moisture level and humidity so that the irrigation system can be monitored and controlled. IoT works in different domains of farming to improve time efficiency, water management, crop monitoring, soil management and control of insecticides and pesticides. This system also minimizes human efforts, simplifies techniques of farming and helps to gain smart farming. Besides the advantages provided by this system, smart farming can also help to grow the market for farmer with single touch and minimum effort.

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