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SMART IRRIGATION ROBOT WITH WIRELESS MONITORING SYSTEM

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Abstract: Agriculture is done in every country for ages. Agriculture is the science as well as the art of cultivating plants. Agriculture was the key development in the rise of idle human civilization. Agriculture is done manually for ages. As the world is trending into new technologies and implementations it is necessary to upgrade with agriculture also. IoT plays a very necessary role in smart agriculture. IoT sensors can provide all information about agriculture fields. We have proposed an IOT based and smart agriculture system using automation. This IoT-based Smart Agriculture system makes use of wireless sensor networks that collects data from various 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 a Temperature sensor, Moisture sensor. When the IoT-based agriculture monitoring system starts it checks the water level as well as humidity and moisture level of soil too. Send data to a server and we can see this data on the android application then, water provide by the robot which has a water tank and water motor. We can operate this with an android application. This smart irrigation robot is used in farms as well as in gardens too. It helps to prevent sewer water.

Index Terms **– IoT, Smart agriculture, Irrgation.**

I. INTRODUCTION

Agriculture is the major source of income for the largest population in India and is a major contributor to the Indian economy. In the past decade, it is observed that there is not much crop development in the agriculture sector. Food prices are continuously increasing because the cropping rate declined. Several factors are responsible for this it may be due to water waste, low soil fertility, Fertilizer abuse, climate change or diseases, etc. This project uses IOT technology in agriculture, collecting crop moisture, humidity, temperature data in a fixed place to help farmers find problems in time. Agriculture experts give guidelines with specific information to increase the farmer's income and help them in the prevention and control of water wastage. Through the custom development of mobile phone apps, it has been implemented with agriculture technology. The primary occupation in India is agriculture. India is in second place in the agricultural output worldwide. In India, farmers cultivate a good diversity of crops. Different factors such as climatic conditions, soil conditions, etc. affect the cultivation of the crops. The existing method of Irrigation is very poor which needs to give attention, properly equipped Technology, cheap devices, etc. With this system, we can improve the quality and chances of surviving plants and crops. This system helps us to monitor every information about temperature, humidity, moisture so we can give properly take care of them with minimum water wastage.

- **Objectives**

1) To design such system that can read environmental parameter and send to the server.

2) Design a robot to supply water to the plant.

3) Design user interfaces for a farmer.

- **Motivation**

Many motivational factors have influenced and inspire me to script this article as mentioned below. −Agriculture is a mostly explored area concerning the application of IoT in improving the traditional methods of farming every day. The rapid growth in nanotechnology that took place in the last decade has enabled the creation of small and cheap sensors. The self-contained nature of operation and tasks, together with modular sized hardware platforms, scalable, and low-cost technologies, has enabled the IoT as a potential tool for the target self-organized, decision making, and automation system in the agriculture as well as farming industry. In this regard, precision agriculture, automated irrigation scheduling, optimization of plant growth, farmland monitoring, green-house monitoring, and farming production process management in crops, are among many key applications. However, IoT is in a nascent stage of development, hence it has some limitations.

- **Problem statement**

The agricultural monitoring system is complex. Any changes in one climate parameter could harm another climate parameter as well as the development process of the plants. Agricultural monitoring installations require a large number of wires and cables to distribute sensors and actuators. Agriculture fields are most likely far away from the central controlling station in which a suitable link between the field and central station has to be in place in order to effectively monitor and operate remote field station with our Smartphone.

II. LITERATURE SURVEY

A) A Crop Monitoring System Based on Wireless Sensor Network.

Wireless sensor network crop monitoring application is useful to farmers for agriculture. The application keeps track of the whole farm from a remote location using IoT (Internet of Things). Application runs on sensor networks and two types of nodes. An energy-saving algorithm is used to save energy. The system has two nodes, one node which collects all environmental and soil parameters value like soil moisture, temperature, air, humidity, light, etc. and the second node consists of a camera to capture images and monitor crops. Crop monitoring application consists of two sensor nodes in the first sensor is the image sensor and the second sensor is the environment parameter collector. These two sensors collect information about crops. The image sensor collects crop growth, height, etc. and the second sensor node collects data about humidity, soil condition, etc., and this information is collected at the base station and then gets sends to the internet (web application). Data analysis is done on the server-side.

B) Automatic Drip Irrigation System using Wireless Sensor Network and Data Mining Algorithm.

Data mining algorithms are used to make decisions for drip irrigation systems. Automated drip irrigation system consists of WSN placed all over the farm and different types of sensors like soil moisture sensor, wind direction, wind speed, soil temperature give reading to control station and base station. WSN uses an ad-hoc network that provides self-configuration and flexibility. Sensor data is transfer to the base station and data is received using ZigBee. All observations are monitor through the web application. Data mining Naïve Bayes algorithm is used for decision making on data set is nothing but the data of which real-time feed from field sensor. The algorithm checks the probability of each attribute. The previous data set of agriculture is provided as a reference to take the decision. All data of field is provided to web application for observation purpose.

C) Wireless sensor network with irrigation valve control.

Wireless sensor network with valve control unit is developed with the help of actuator hardware and software. Irrigation is control by the actuator. The web application is used for manual control as well as organize irrigation timing. Water meters indicate the requirement of water. The node unit consists of a soil moisture sensor and actuator. Two-way communications occur from the actuator to the node and base station. The packet consists of control commands that are transferred between node and actuator. Actuator control solenoid valve depending upon water meter value and organizing timing for water supply. Packet loss between the node and actuator communication brings down the performance of the system. The power consumption of the actuator and node unit is higher. Water requirement for a different crop is different also depends on another factor like soil type, temperature, etc.

D) Wireless sensor network infrastructure for agriculture.

Existing wireless sensor networks that monitor agriculture infrastructure measures various soil parameters as well as environmental conditions. This WSN is consists of a node with software and hardware units. The node consists of a control unit that controls sensors and communicates with a base station. At mega and ARM are used as control units. ZigBee, Bluetooth, and Wi-Fi are used to a transceiver in WSN.

III. METHODOLOGY

The sensor is in the interface with Arduino Uno such as DHT11 Temperature, Humidity, Soil moisture sensors is used. The data collected from sensors are transmitted to the web server using wireless transmission (WIFI module ESP8266). Data processing is the task of checking various sensor data received from the field with the already fixed threshold values. We make a robot which can operate remotely the tank and water motor attach to the robot so we can supply water to plants also robot have water level sensor to detect tank water level

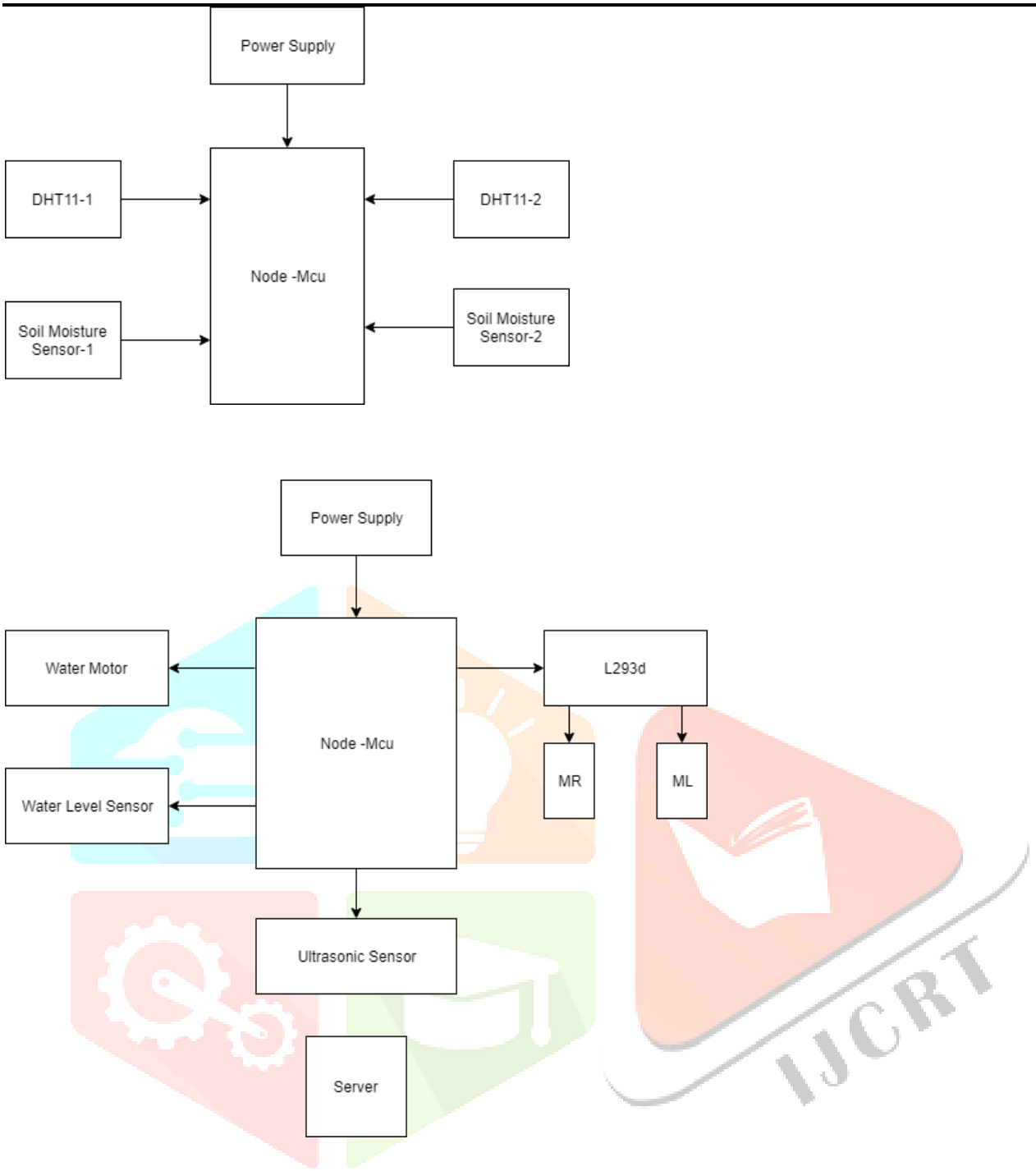

Fig.1.System architecture

Node-MCU:-

Node-MCU is an open-source IoT platform. Node-MCU includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems which is predicated on the ESP-12 module. We use the c program for getting data from the sensor and send it to the server as well as to use to controlling robot movement.

DHT11:-

The DHT11 is basic, low-cost, digital temperature as well as humidity sensor. It uses a capacitive humidity sensor as well as a thermistor to measure the surrounding air and gives a digital signal on the data pin. It's fairly simple to use, but also requires careful timing to grab data.

Soil-Moisture:-

Soil moisture plays a key variable in controlling the exchange of water and heat energy between the land surface and the atmosphere through evaporation and plant transpiration. Soil moisture data has many uses like reservoir management, early warning of droughts, irrigation scheduling, and crop yield forecasting

L293d:-

The L293D is a 16-pin Motor Driver IC it can control a set of two DC motors simultaneously in all directions. The L293D provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!). We control the robot movement and direction using l293d

Ultrasonic:-

Ultrasonic sensors work in the same way as radar and sonar. Ultrasonic transceivers (consisting of a set of an ultrasonic transmitter and receiver) convert energy into ultrasound. They generate high-frequency sound waves and also evaluate the echo which is received back by the sensor. The time interval used between sending the signal and receiving the echo (time-of-flight, TOF) is calculated to determine the distance to an object. It helps a robot to detect the obstacle.

IV. OTHER SPECIFICATION

A. Advantages

1. This IoT based system is easy to use and anyone with basic knowledge of smartphone can use this system.
2. This IoT based system is easy to install and it is consist of Arduino kit as well as some sensors.
3. This IoT based system is user friendly as well and good, easy to use user interface of android application make it more user friendly.
4. This IoT based system is low cost too.

B. Limitations

This system is dependent on the Sensor network

C. Applications

- This IoT based system can be used in farms.
- This IoT based system can also use in gardening of home, hotel, etc.
- This IoT based system can use in nursery where health of plant is more important for buisness.

V. CONCLUSIONS & FUTURE WORK

Internet on things and cloud computing collectively make a system that controls the agriculture sector effectively. This system will sense all the environmental parameters and send the data to the user via the cloud. The user will take necessary controlling action according to the situation. This will be done by using an actuator. The proposed system is developed taking in mind the benefits of the agricultural sector.

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