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SMART AGROBOT USING IOT

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ABSTRACT: Agrarian sector in India is facing rigorous problem to maximize the crop productivity. More than 60 percent of the crop still depends on monsoon rainfall. Recent developments in Information Technology for agriculture field has become an interesting research area to predict the crop yield. The problem of yield prediction is a major problem that remains to be solved based on available data using wireless sensor network in farming from; independent power source distribution, monitoring valves and switches operation, and remote area control will efficiently produce excellent quality farm products in all season. Then in order to control farm power distribution and irrigation system, we propose a communication methodology of the wireless sensor network for collecting environment data and sending control command to turn on/off irrigation system and manipulate power distribution. The major problem faced in many agricultural areas is that lack of mechanization in agricultural activities. In India agricultural activities is carried out by manual labor, using conventional tools such as plough, sickle etc. Our Smart Farming System reduces the manual work and automates the agricultural activities.

KEYWORDS: To detect moisture of soil and provide water to crop, monitor agricultural land remotely.

I. INTRODUCTION

The greatest crisis in modern day and age is a great disparity in the agricultural sector turnover. The great losses incurred in agriculture: material losses or financial losses – most of them are attributed to crop health and quality. If the crops are determined to be not up to par, this may result in a loss. In order to prevent this, we need to maintain the quality of crops and keep them at maximum health. On a practical basis, this is nearly impossible for a farmer who has large lands to observe and maintain. However, this is currently being managed manually. There is a danger in this; many of the labourers are preferring to work at white collar jobs, and as a result, there is a large deficiency in manpower. This makes automated farming a necessary part of the future. The greatest cause for the crops being not on par is improper irrigation (other than natural calamities). If the irrigation issues are resolved, most of the problem is solved. Hence this is the pinnacle point that needs to be renovated with technology. Automating this part of the process will be extremely beneficial to farmers. The automated plant irrigation system will help to reduce the work load on farmers, and help to keep the farmlands well irrigated at all times. Most of the farmers all over the world suffer to maintain their crops with proper watering methods, but find themselves helpless. This system will help farmers irrigate their lands even single-handedly, without the need of additional manpower. Its user friendly simple circuitry will make the user feel comfortable in using this system. The user only needs to install the circuit and sensors and connect the pump to the circuit and I complete. The system will start functioning upon power-up, and will need no trigger to keep it running. In this project, we present an agricultural bot which will sense the soil moisture of one plant an accordingly it will water the plant, again it will move towards next plant and check the soil moisture and will decide accordingly about watering to the plant and so on.

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II. THE RESEARCH METHOD

A survey on application of data mining techniques to analyze the soil for agricultural purpose N. Hemageetha, published in: 2016 3rd International Conference on Computing for Sustain- able Global Development (INDIA.Com) this paper explores various proposed algorithms for analyzing soil using data mining techniques.

III. THE REFLECTIVE PROCESS

In this project, we present an agricultural bot which will sense the soil moisture of one plant an accordingly it will water the plant, again it will move towards next plant and check the soil moisture and will decide accordingly about watering to the plant and so on.

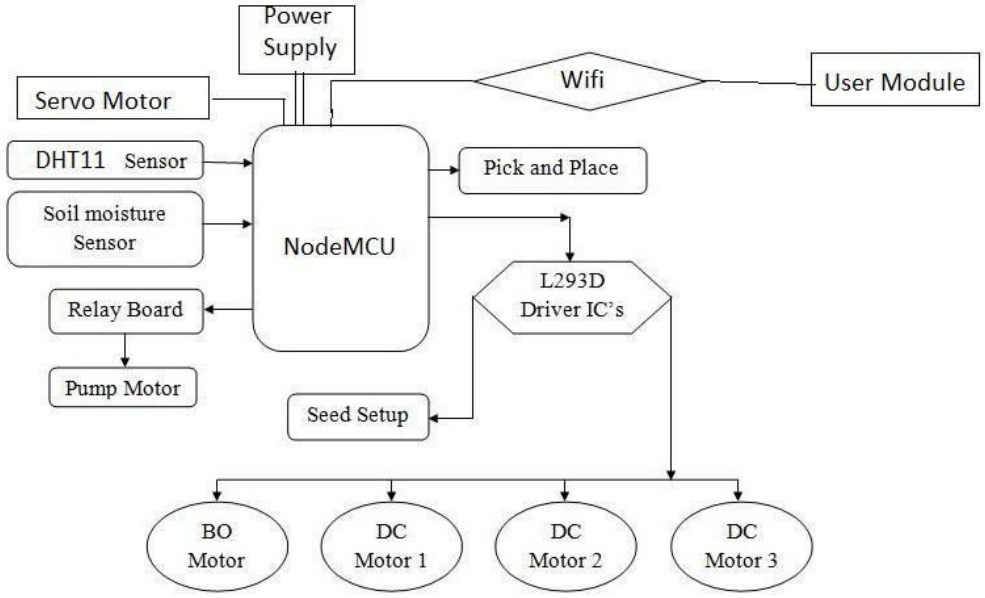

Figure 1. Basic Block Diagram

1. The Agrobot is developed using an Arduino microcontroller for task of irriga tion.
2. The Bot monitors crops and waters crops after sensing moisture in soil.
3. It moves along a predetermined path of a given farm, and senses soil moisture content and temperature at regular points.
4. At each sensing point, data acquired from multiple sensors is processed locally to decide the necessity of irrigation and accordingly farm is watered.
5. It harvests itself from solar power when not performing irrigation.

IV. SYSTEM DEVELOPEMENT

1. HARDWARE DESCRIPTION

2. 1.ESP8266 WI-FI MODULE

The ESP8266 is a low-cost Wi-Fi microchip module, with full control in a TCP/IP stack and microcontroller capability. ESP8266 module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using commands.The ESP8266 with 1 MiB of built-in flash, allowing the building of single-chip de- vices capable of connecting to Wi-Fi. The ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having a TensilicaXtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. It has 128 KB RAM and 4MB of Flash memory to store data and

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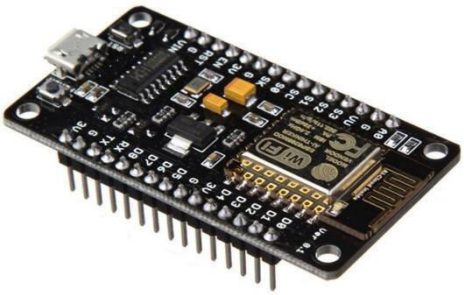
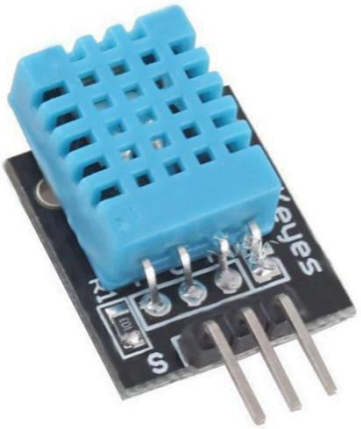
programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. The ESP8266 can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.



2. 2.DHT11 Sensor

The DHT11 is a low-cost, and easy to handle digital temperature and humidity sensor. This sensor used to measure temperature, and humidity in the surroundings. It has an 8-bit microcontroller to output the values of temperature and humidity as serial data.

The sensor is calibrated and easy to interface with the microcontrollers. The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of ±1°C and ±1 %. So if you are looking to measure in this range then this sensor might be the right choice for you. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins are needed). It is simple to use but it requires grabbing the data on timing. Because the temperature and humidity go change ran- domly. The only real temperature and humidity it measures. This works by taking the temperature from the surroundings and pass it to the controller. The DHT 11 has generally 3 pins VCC as PIN 1, data as PIN 2 is used for transferring the data, and the third is the ground pin.



3. 3.Moisture Sensor

The soil moisture sensor used to measure the moisture in the field, and consists of two probes that are used to measure the volumetric content of water. These two probes allow the circuit to pass the current to pass through the soil and then it gets the resistance value to measure the moisture value. And when the water level is more, the soil will conduct more electricity which means that there will be less resistance on that soil. Therefore, the moisture level will be higher. In the case of dry soil, the probes conduct electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance and good results. And hence the level of moisture becomes low.

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Soil Moisture Sensor Module

SOFTWARE DEVELOPMENT

1. OPERATING SYSTEM : Microsoft Windows 7 and Above

Microsoft Windows, also called Windows and Windows OS, computer operating system (OS) developed by Microsoft Corporation to run personal computers (PCs). Featuring the first graphical user interface (GUI) for IBM-compatible PCs, the Windows OS soon dominated the PC market. Approximately 90 percent of PCs run some version of Windows.

4. 2 JDK

(Java Development Kit) A Java software development environment from Oracle. It includes the JVM, compiler, debugger and other tools for developing Java applets and applications. Each new version of the JDK adds features and enhancements to the language.The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

5. 3 IDE : ARDUINO

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

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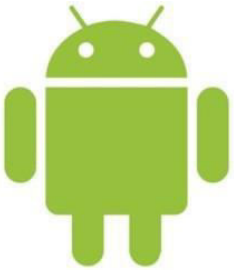
4.Android APP

Android App is a software designed to run on an Android device or emulator. The term also refers to an APK file which stands for Android package. This file is a Zip archive containing app code, resources, and meta information. Android apps can be written in Kotlin, Java, and C++ and are run inside Virtual Machine



OPERATIONAL DETAILS

Algorithm

Step 1: Input: distance D.
Step 2: Start Agrobot.
Step 3: Initialize NodeMCU controller.
Step 4: Move forward by D distance
Step 5: Move servo motor by 90 degree.
Step 6: Check Moisture value(m) of soil
Step 7: If: Moisture(m)¿1000
Step 8: Start water soluble motor.
Step 9: Else : Move BOT forward by D distance.
Step 10: Send temperature to farmer
Step 11: Send Moisture to Farmer
Step 12: If Task Completed
Step 13: STOP
Step 14: Else:
Step 15: GOTO step 3.

V. CONCLUSIONS

Irrigation becomes easy, accurate and practical with the idea above shared and can be implemented in agricultural fields in future to promote agriculture to next level. The output from moisture sensor and level system plays major role in producing the output. Thus system has been designed and tested successfully. It has been developed by integrating all the features of all the hardware components used. Presence of every module has been reasoned above and placed carefully in order to contribute to the best working of the unit. The system has been tested to function automatically, and to the best of its ability. The moisture sensors measure the mois ture level (water content) of the different plants. If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the controller which triggers the DC Motor pump to turn ON and supply the water to respective field area. When the desired moisture level is reached, the system halts on its own and the DC Motor pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

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