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Miltilevel Smart Irrigation System for in-house farming

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Abstract

The Project is developed for smart farming in indoor applications where presence of people in the house is irregular. Project implemented multilevel smart irrigation system using IOT. Wi-Fi Module ESP8266-12E connects this multilevel systemto internet. Information collected by the two soil moisture sensor DHT11 and water level sensor is supplied to motor and two water pumps and accordingly its functioning is controlled. This completedesign is controlled and monitored by web server (My HTTP-WEBAPP) via internet. Project implemented via IOT helps to achieve fore output from a very less fertile area. This project is useful in in-house or terrace gardening or farming.

Keywords: IoT, HTTP, Smart Irrigation, controller.

1. INTRODUCTION.

Agriculture is economic backbone of Indian farmers and hence plays an important role in its development. Because of slope of irrigation area or due to less availability of water throughout the cultivation season, farmers are not able to get good yield from the fields. Moreover in city scenario, where there is urgent need of availability of farm land, we need a multilevel farm facility on the terrace. It may happen that due to frequent travelling in cities or due to nature of the job if one has to frequently fly to multiple other locations then that person my not afford terrace cultivation. There is urgent need of a system that helps multilevel automatic water irrigation system that maintains enough moisture and does not let plants to die.

In the irrigation system, depends on soil type, four things are very important, fertility of soils, moisture, temperature of soil and the water level. IOT driven way to cultivate the plants in region with the help of sensors placed in the root zone and to measure the temperature, humidity, moisture and water level of the field suits best to such a scenario. Here sensors, sense that primary data and forwards it to the controller, which controls the circuit of sensors and flow of water through the valves [1-3].

This hardware is used to decrease the wastage of water, and maintain the crop productivity.

2. LIERATURE SURVEY

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In irrigation field, DHT11 sensor measure the temperature and humidity in root of plant and calculate the moister of the land, accordingly controller supplies water to the plant [4].Microcontroller handles the sensor information and transmit data through Wi-Fi module.Various sensors are placed in the near the roots of the plants, sense the moisture and humidity of the soil and water level continuously give the information to concerned though web page and mobile app. At the same time farmers controls the motor and get the data of every sensor and indicates the danger level, automatically sensor will handle the paddy field without involvement of the farmer.

Authors adopted the Idea of implementing the soil moisture andhumidity sensor on to the irrigation system.The major differences from this project to our project is that we used IOT and our project is cost efficient due to usage of Arduino UNO[5].Arduino based automatic irrigation system using IOT makes use of soil moisture sensor and humidity sensor. Purpose of the project is to irrigate the large area and in our case we are increasing yield from less area [6].Smart irrigation system using raspberry PI, from this project we have adopted the concepts of controlling the motor using relays over the IOT [7]. Microcontroller based automatic plant irrigation system: from this project we have adopted the concepts of the interfacing the Sensors and getting the data from the web pages [8]. Solar powered automatic drip irrigation system (SPADIS) using wireless sensor network technology gave the concepts of controlling the pump motor using relay [9].Passive irrigation controller created for efficient usage of water in low-income countries gave the idea to control the water usage to irrigate the crops and reduce the water wastage [10].Agricultural greenhouses makes usage of intelligent management system through internet of things spoke about the network connectivity (IOT) and data acquisition from the sensors and send them to the web page [11].IOT based smart irrigation system and nutrient detection with disease analysis helped us to interface the sensors and feed the data to the cloud servers or webpage. The main difference between the two projects is the effective price as we used Node MCU and Arduino UNO [2]. IOT based Smart Irrigation System helped us in choosing the web servers for the implementation of IOT on to our project [13].

3. Controlling the module using thing speak

In order to exploit the benefits of internet of things applications, we make use of Thingspeak webpageand it's API. This helped in storing the information online on a webpage which could be viewed from any location and is accessible through HTTP protocol using internet.

Connect to THINGSPEAK (Login with username and password)

Step 1: Initial login to the THINGSPEAK (ANDROID APP is also available).

Step 2: Go to Channels >> press "My Channel">> and create NEW CHANNEL in the webpage.

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Step 3: In that NEW CHANNEL >> Enter the "PROJECT NAME ">> Give Description (it is optional).

Step 4: Select how many fields as your requirements >>enter the Field Name >>and PRESS "SAVE CHANNE">> next a page is open>>In that we can entered the field name (Like: field boxes will be opened).

Step 5: Go to public view>> Next go to "sharing" >> in that Channel sharing settings >>press the "Share channel view with everyone".

Step 6: Go to API Keys >> in that WRITE API key is there >> Note down the API key to the code. >> Go to the "Get a Channel Field">>enter to the code.

Step 7: Go to the code and compile>>Send the code to NodeMCU>>Then connect the NodeMCU to internet>>Sending the code through data cable and burn the code into it.

Step 8: Then the server will connect to the host>>Data will transfer to the webpage>> Shown in the fields as we are entered.

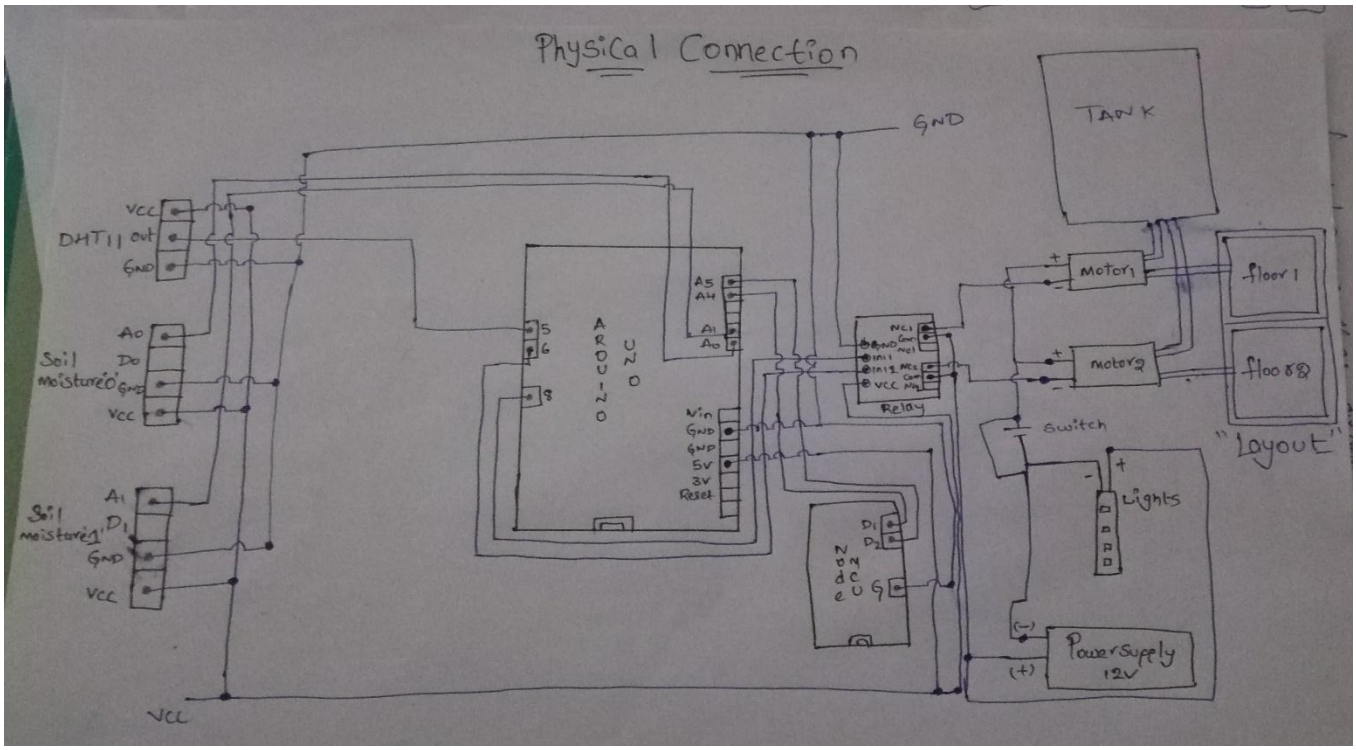

Fig.1 Block diagram of multilevel smart irrigation system for inhouse farming

Working: We make use of services of internet service providers such as mobile Hotspot, Wi-Fi inorder to connect to internet as shown in Fig.First and foremost sensor for water level indicator gives its output to the controller and is evaluated. In case water is found then process goes further to next level else it terminates.

1. Motor 2 will stay closed during this process.
2. Now controller looks for next input from moisture sensor 1.

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3. One finding adequate water content, motor will be off and will be on otherwise for next 10 seconds.
4. On finding humidity, motor will be on for next 5 seconds.

Similarly such process keep taking place in order to have better utilization of water and more production.

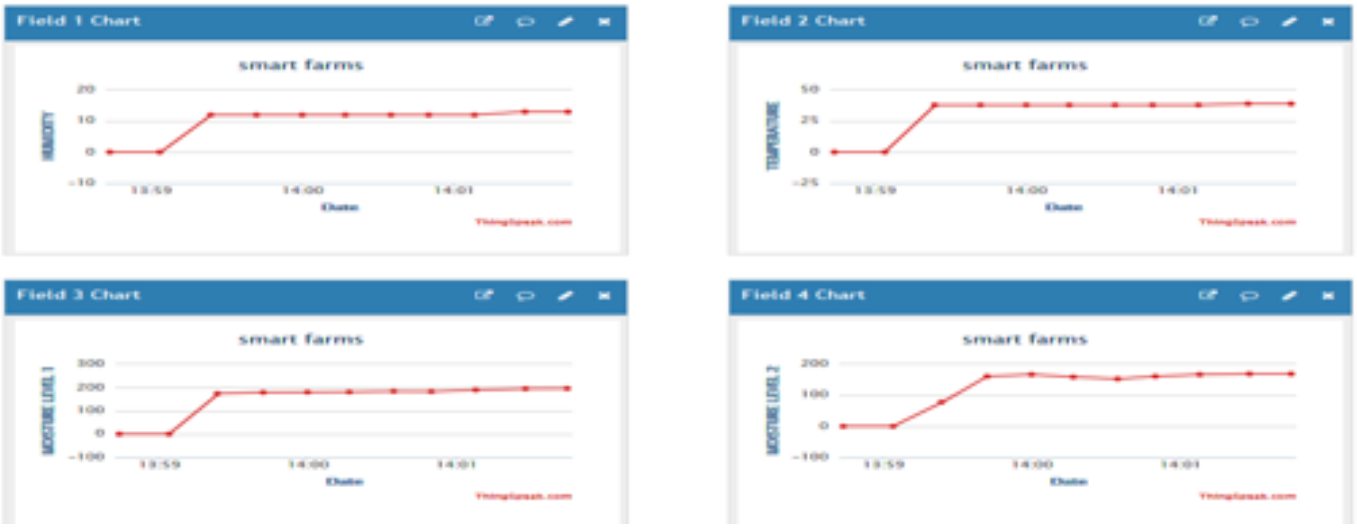

Fig. 2 Project Working through webpage

The smart farms is monitored and controlled at the user end through THINGSPEAK webpage as indicated in Fig. 2. The NodeMCU is available at the terrace to send data through WEB and get the network and manipulate it to receive the data and show the message on the webpage. After that, it will transfer the output to the webpage.

4. CONCLUSION AND FUTURE SCOPE

NodeMCU has inbuilt Wi-Fi Module and a microcontroller and it stores the data and further we want to increase the floors. We can use a technology called “periscope” it will help the get the sunlight to the plants.In case we want to increase the floors then the amount of sunlight at the bottom levels will be reduced gradually. To replace the sunlight some of the projects uses the UV blasters or UV lights to regulate the temperature and artificial sunlight. This leads to very high cost which cannot be affordable by a farmer. So we are replacing UV blasters with the total reflecting mirrors with the periscopic principles. By this we can pass the sunlight to the lower levels and which makes the whole system cost efficient. Our main motive is the increase the productivity of farms in small region using step farming and water conservation.

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