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Farm Control Using Online Web Server (FCUOW)

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ABSTRACT: This project described the current modern technology of farming system for growing of crops by online monitoring parameter including Soil Moisture Contents and other parameter like temperature, humidity and PH of the soil. Farmer can regulate any of the parameter to the required amount for example soil moisture get lower than the farmer can switch ON and OFF motor remotely from the farm through webserver. Using this kind of farming system irrigation system will reduce the waste of water as known that more wastage of water can leads famine also this farming technology is aimed reduce number labours which cost a lot of money to pay them and the mostly interesting thing on this farming system is the minimization of time factor, it is known that the time factor is very important this in everyday life many people want to practice the farming, but they have no time or they have time limitation, so this proposed system can be practiced even if you are in office or in other economic activities, you can remotely control your farm by monitoring the soil moistures and all parameters required for the growth of your crops. This farm control using online webserver project brings into play by ESP8266 Module which will be used to build the powerful webserver that will displays important parameters on the farm like temperature, humidity and soil moisture with help of DS18B20 temperature sensor, humidity sensor and soil moisture detecting sensor, and buttons which can be used to regulate any parameter to require level either by switch ON or OFF motor and other parameter regulating devices.

KEYWORDS: Temperature Sensor, Moisture Sensor, Webserver, ESP8266 Module, Arduino IDE.

I. INTRODUCTION

One the of the most important factor in the farming activity is to ensure the required parameters for growth of the crops meet specific range (level), for the soil moisture content to ensure this parameter in require level the process is needed to regulate the soil moisture parameter. The irrigation is the process of controlling amounts of water to the plants at the required intervals. Irrigation helps grow, maintain, and disturbed soils in dry areas and during periods of inadequate rainfall. The Irrigation process also has other uses in growing of the crops, including frost protection, suppressing weed growth in grain fields and preventing. In contrast, that relies only on direct rainfall is referred to as rain-fed or [2]. Generally, in most of the farming system the irrigation systems and other parameter for grown of the crops are manually operated. These traditional techniques are now being replaced with semi-automated and automated techniques suggested concept of farm control using online webserver which include irrigation system in order to use the water in efficiently and effectively with less time consuming high production. Farm control using online webserver system is implemented either based on remotely control the soil moisture, temperature, humidity and soil PH by the user to regulate via webserver commanding system. Former method is an isolated irrigation system where the farmer doesn't update with some necessities condition (parameters) for the particular crop status and later lags in smart utilization of water due to user command without considering the condition of soil. From that ever-growing requirement of the population and time limitation, modern techniques are introduced to control the farm remotely. Many of farmers spend a lot of time in field for looking the crops and the soil for irrigation system and the improper use of water without considering the diversity of water and also may cause the soil to have more moisture level which leads the destruction of some crops on the farm. There local farmer they don't have knowledge to regulate the required humidity and



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temperature of the soil. It also helps in time saving, removal of human agriculture which still make errors in adjusting available soil moisture levels and other parameters [3].

II.LITERATURE REVIEW

In generally there are many works have been done to solve agricultural problems such R.Vagulabranan, M.Karthikeyan and V.Sasikala they prosed the Automatic Irrigation System on sensing Soil Moisture Contents that was intended create an automated irrigation system in which the pump can be turned ON and OFF due to the detected soil moisture contents on the earth. But the system was based only on the monitoring one parameter which soil moisture content, also the system was intended only for irrigation purpose. Another related work was proposed by Prof. Rashmi Jain, Shaunak Kulkarni, Ahtesham Shaikh, Akash Sood, which named as Automatic Irrigation System for Agriculture Field Using Wireless Sensor Network (WSN) their system was designed for monitoring agriculture environment for different factors such as soil moisture, temperature and humidity. This system was investigating a remote monitoring system using the RF module. This system characterised by the instability of wireless sensor during the communication and the system was not giving the real time parameters (data).

III.PROBLEM STATEMENT

In nowadays life many people like to involve in more than one economic activities in order to increase their basic income, but due to time limitation or lack of enough time they can't do so. The new proposed farming method that called farm control using online webserver (FCUOW) came to solve that problem by allowing the single person to engage in farming activity while he is doing other jobs like business or civil servant works etc. the another challenge and difficult that faced many of the farmers working in the farm lands are solely dependent on the rains and bore wells for irrigation of their land and lack of knowledge for knowing the amount of moisture contents and temperature or humidity of the soil. In recent times, the farmers have been using irrigation technique through the manual control, but the proposed system will guide the farmer by monitoring soil moisture and other parameters in farm while he is absent in field area.

IV.PROPOSED METHOD

The increasing demand of the food supplies requires a rapid improvement in food production technology. In many countries where agriculture plays an important role in shaping up the economy, but still we are not able to make full use of agricultural resources. Also, the unplanned use of water inadvertently results in wastage of water. This problem can be perfectly solved if we use Farm Control using online Webserver which involve different kind of sensors for monitoring the crops requirement condition (parameters) on the farm land. This modern system contains the Irrigation technology which will take place only when there will be intense requirement of water, as suggested by the moisture in the soil [5]. The proposed system uses soil moisture sensor, temperature and humidity sensor, soil moisture sensor to detect the current parameters in farm. All parameters on farm will be displayed on the power full webserver designed by using the ESP8266 module, the parameters can be easily regulated on the webserver by switch ON and OFF water pump.

The farm control using online webserver allows farmers to apply the right amount of water at the right time based on crops requirement while he is far away from the farm. To control all parameters to the required condition (level) will be done using simple irrigation system within it, regardless of the availability of labour and physical visit the farm. In addition, farmers who will use the proposed system are able to reduce runoff from over watering saturated soils, avoid irrigating at the wrong time of day, which will improve the crops growing by ensuring adequate water and nutrients when needed. It also helps in time saving, removal of human error in adjusting available soil moisture levels and to maximize their net profits.

This system can make many people to get interest on farming activities hence, the system make easily to the farmer to know and monitor the crops parameters without going to firm field by accessing internet through mobile phone or computer even though he is in the office or at home at any time by writing the correct IP address of the system on web browser of local area at the farm filed, than the farmer can see the soil moisture level either low or high and other parameters and also can control the water pump for switch ON or OFF by pressing the button on webserver. The Farm

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Control using online Webserver that operated like this if the temperature or soil moisture is low or high the sensor sends the signal to the ESP8266 module then, the ESP8266 module also send signal to the motor driver so as to power ON or OFF water pump for irrigation in the farm.

The figure 1 below shows the block diagram of Farm Control using online Webserver system

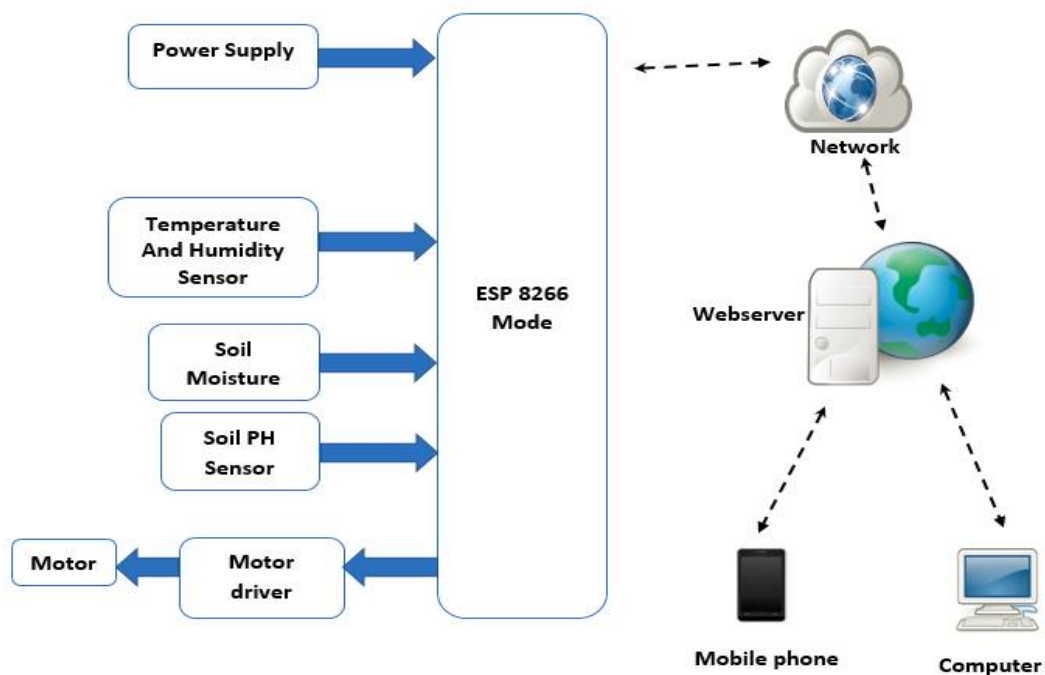


Fig. 1 The block diagram of Farm Control using online Webserver

V.SYSTEM DESIGN

The farm control using webserver system (FCUOW) was designed to continuously monitor the all necessary parameters on the farm on the absence of the farmer himself. The system will respond when the farmer adjusting any required parameter to that time through online webserver, the system is standalone webserver that can be accessed any device which has web browser in it and the device should be connected to your local network. The adjustment of any parameter on the farm will depend on the input of the farmer after reviewing the displayed parameters on the webserver for example, the soil moisture gets lower bellow the required amount based on needs of the particular crops on the farm, the user or farmer will regulate the soil moisture by switch ON water pump to increase the level of soil moisture to the required amount, the farmer will be guided by the current parameters displayed on the webserver. So, when the soil moisture reaches to required amount the farmer can switch OFF the water pump.

The reference level of the soil moisture made to be adjustable for two different soil samples, the one is wet soil and other is the dry one, the moisture sensors were designed using probes made from corrosion-resistant material which can be stuck into soil sample. Voltage levels corresponding to the wet and dry states of the soil sample were computed by measuring the resistance between the moisture detector probes and matching them to output voltages of a comparator circuit. A water pump was developed to deliver the water to the appropriate parts of the soil. The volume of water required for irrigation per time was computed by considering the amount of water required to that time to increase or decrease the required parameter to required amount. The required irrigation time was determined by considering the response time of farmer himself when he switch OFF the water pump the irrigation system will stop until it is initiated



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again.

A.ESP8266 Module

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to the Wi-Fi network. The ESP8266 has capacity of hosting an application or offloading all Wi-Fi networking functions from another application processor. Every ESP8266 module comes with pre-programmed an AT command set firmware, this meaning that you can simply hook up your Arduino device and get about as much Wi-Fi ability as a Wi-Fi Shield offers. The ESP8266 module is actually extremely cost-effective board with large, and ever growing, community [7].

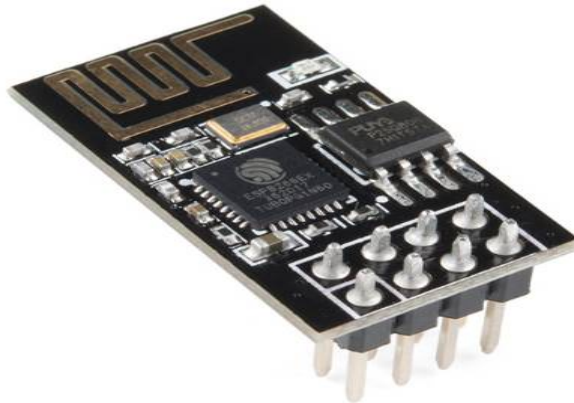


Fig. 2The ESP8266 module

B.Creating an ESP8266 Web Server

This part will explain short summary how to create the an ESP8266 web server. This web server is one that will be used by the farmer to monitor and regulate (adjust) all parameters on the farm to their required amount. This web server will display the current parameters on the farm and it will contain the button that can switch ON and OFF motor to allow irrigation, for regulation of soil moisture level on the farm. In this paper it will only contain one button. But the idea means that we can add more than one button to control other parameters instead of that soil moisture level. The designed ESP8266 web server will be mobile responsive type also it can be accessed by device that has web browser connected to your local network.

This ESP8266 web server will be created using Arduino IDE, so the following are the steps involved.

1. We have to download and install Arduino IDE on our computer.
2. Then we have to install the ESP8266 add-on for the Arduino IDE. After open the Arduino Ide then go to File > Preference
3. Then we have to enter this link “http://arduino.esp8266.com/stable/package_esp8266com_index.json” to the displayed additional board manager URL then click ok button as shown below by the figure 3 below.

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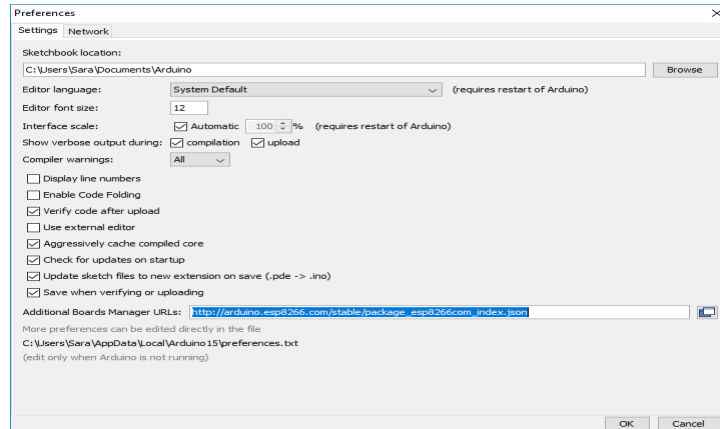


Fig. 3 Installation of ESP8266 add-on for Arduino IDE

- Now go to menu bar and select Tool > Board > Board Manager
This figure 4 explains the summary how user can select the Board Manager which will direct to another window where user can see the list of different boards that can be installed in the Arduino IDE.

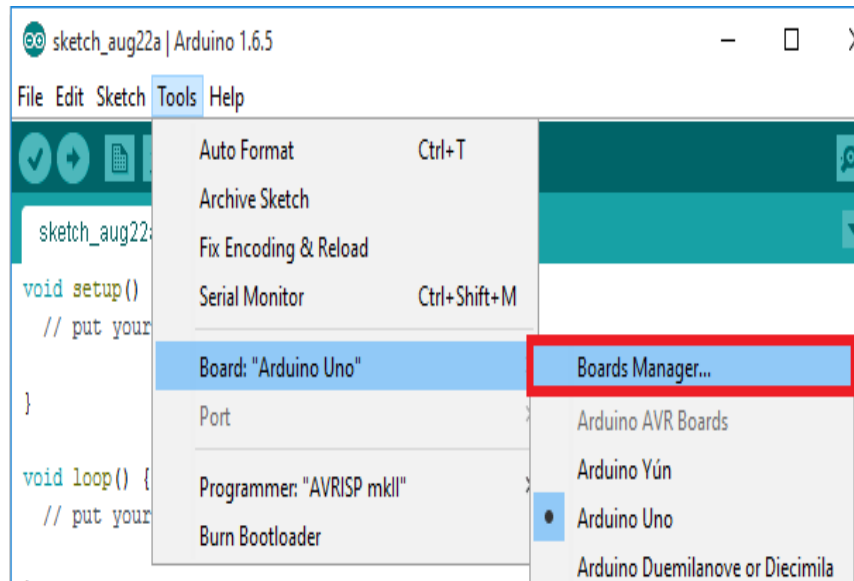


Fig. 4 Selecting ESP8266 board

- Here we have to select the ESP board menu in order to install the esp8266 platform as shown below
This is last step in the installation of the ESP8266 platform which involve the selection of the ESP8266 community to be installed in the Arduino IDE.

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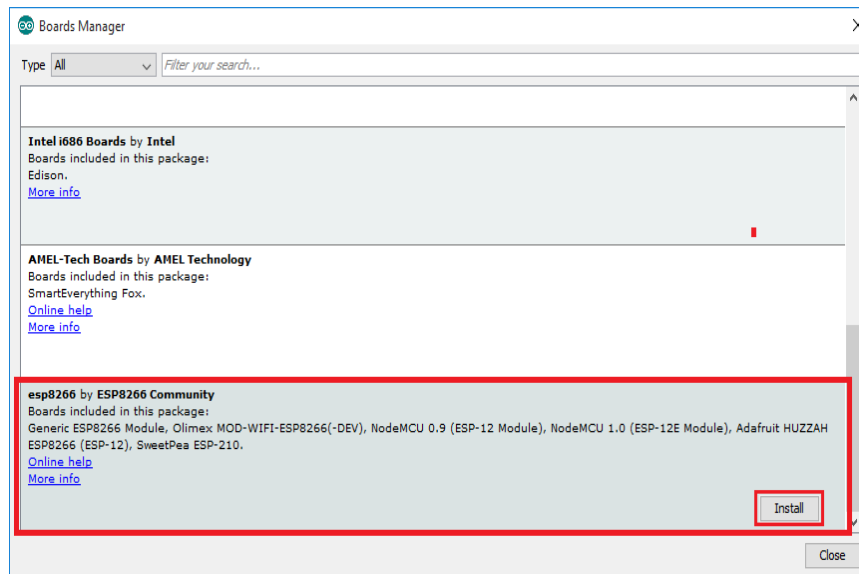


Fig. 5 Installation of ESP8266 community

C. Soil Moisture Sensor

In this paper the FC-28 soil moisture sensor was used to sense the amount of moisture contents in the soil, the FC-28 soilmoisture measures the volumetric contents of the water in soil and gives us the correct level of the moisture contents. The sensor gives us both analog and digital output. The soil moisture sensor consists of two prods that can be used to measure the volumetric content of water. Its two prods are used to allow the flow of the current in the soil, which gives the resistance value to measure the moisture value. When there is water, the soil will conduct more electricity, this means that there will be less resistance. And the dry soil conducts electricity poorly, So, when there is less water, then the soil will conduct less electricity, which means that there will be more resistance. This sensor can be connected in analog and digital modes.

D. The DHT11/DHT22 humidity and temperature Sensor

The DHTXX sensors one among Arduino tinkerers popular sensors, the DHT sensors are not very expensive sensors for measurement of humidity and temperature at same time. This type of sensors contains a chip that does analog to digital conversion and also splits out the digital signal with temperature and humidity. The output signals are easy to be readied by any microcontroller(MCU) [15].

E. PH sensor

PH is measure of acidity or alkalinity of a solution, the PH scale always range from 0 to 14. The PH indicate the concentration of hydrogen ion present in that particular solution. This can be accurately quantified by a sensor which measure the potential difference between two electrodes. The reference electrode (silver / silver chloride) and glass electrode that is sensitive to hydrogen ion. In fact, the PH value of the soil is very important factor that affecting the growth of crops on the farm. The suitability of the PH value for different kind of crops can be differ from one another. The PH value of fruits, meat and vegetables are also very important to indicate their quality.

VI. RESULTS OF PROPOSED METHOD

This type of farming system which is called Farm Control using online webserver was successfully developed and there are some results that were obtained during the experimental to measure the performance of the proposed method shown in the figures below.



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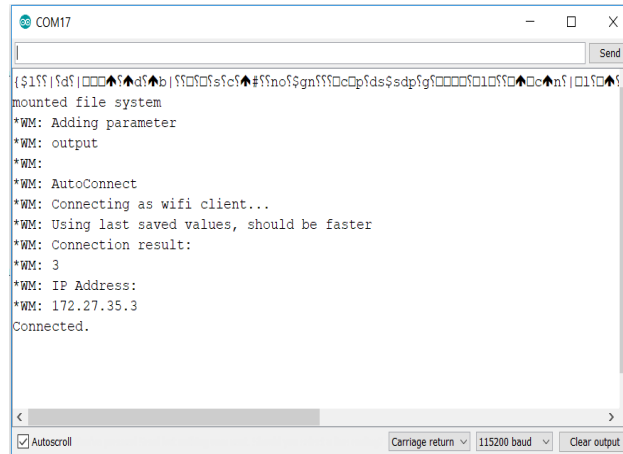


Fig. 6 the Network connection and IP address

In order to access the system, the ESP8266 Module should be connected to the internet, so this done by opening the serial monitor on the Arduino IDE as shown on the figure above, after the connection has been established, the IP address also will be displayed. Then we can use the displayed IP address by copy it and paste on the web browser the access the webservice.

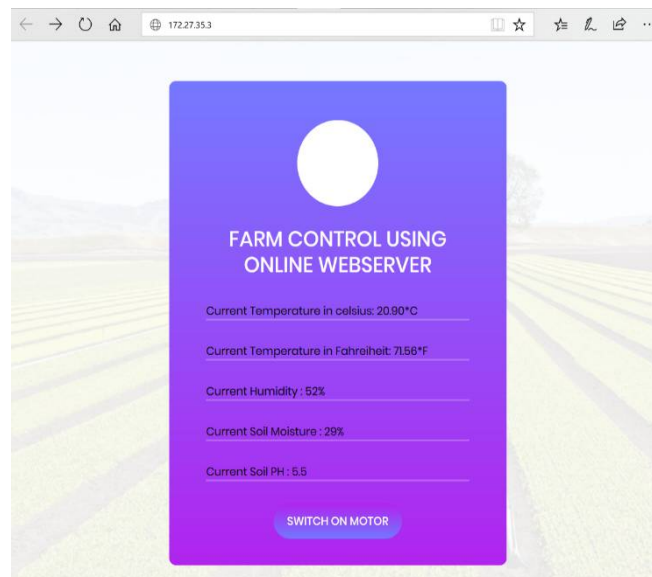


Fig. 7 Displayed parameters on the farm

The figure above shows the current parameters on the farm, so that the farmer can monitor all parameters on the farm and he can regulate the parameter, for example if the soil moisture content (amount of water in the soil) get lower this means the soil is dry, so the farmer himself can switch on the motor by pressing the switch ON button on the webservice.



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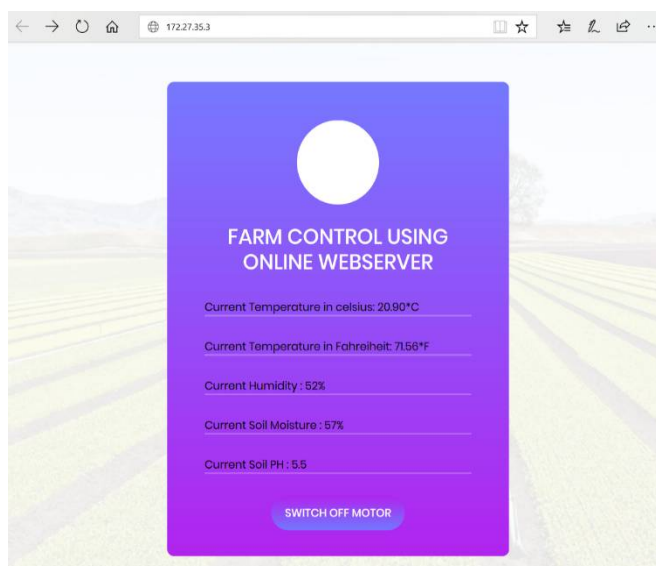


Fig. 8 Displayed parameters on the farm

The above figure represents the current parameters on the farm, from figure 8 we have seen the moisture content was low then the farmer switch on the motor to increase the water content of the soil, now is shown that soil moisture level has been raised from 29% to 57%, so, here now the former can decide that if the level of water contents in soil is enough he can stop the motor to stop the irrigation on the farm.

VII. CONCLUSION

To practice the farming with other economic activities at same time becomes easy hence the new proposed technology provides the better environment for single person manage multiple economic activities including farming, so that the can contribute allot in growth of the economic. Also proposed system ensure the proper use of the natural resources like water etc. the system promote the production the crops by ensure the require parameter for the growth of the crops are available at right time. The more features can be studded and implemented to this farming system for more improvement and achievements.

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