Automated Irrigation System For Agriculture

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***Abstract:** About 70% of Indian population does the farming, and hence the Research and Development in this area is very much needed. This article presents a beginner model of an irrigation system to increase agricultural productivity and quality. The significant variables influencing farm productivity, development and quality are temperature, humidity, carbon dioxide concentrations and many others. The proposed system periodically measures these parameters and is reported on the website. This study tries to automate the irrigation process in farmland by controlling the soil's water level relative to the grown plant and spraying water to simulate the impact of rain and mobile phones on simple access for farmers or farm professionals. By tracking these parameters on an ongoing basis, the farmer can evaluate the ideal environmental circumstances and act accordingly to obtain maximum crop productivity and further gain energy savings. The proposed system is tightly coupled with latest technological advancements including Cloud computing, Internet of Things and others.*

***Index Terms:** About four key words or phrases in alphabetical order, separated by commas.*

I. INTRODUCTION

Agriculture in India is playing dominant role to support the highest GDP rate. Hence, it is perceived that, it has been contributing a good share in annual GDP. Farmers working on agricultural land depend exclusively on rainwater and wells. Many situations, when there is insufficient rain water, the farmer is highly dependent on bore wells and electricity to operate motors fixed for bore wells. The whole process is manual and requires human attention. In order to operate bore wells, farmers have to travel to their farm lands and must be available almost all the time for reference it would be 24x7x365. To keep all these manual issues set aside, the proposed automated system would take care of the said issues with a single click on one's mobile phone. This paper presents an outline of the proposed automated irrigation system. In Section 2, the authors present Literature review, Methodology presented in Section 3, Results and Discussion are presented in subsequent sections of the paper. It is a solution to implement water conservation and irrigation practices through the use of wireless networks so that irrigation practices can be improved. The farm condition and controls is monitored using Arduino Uno microcontroller for the distribution of water on the farm.

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Factors such as excessive irrigation of saturated soils, which avoids irrigation at the wrong time of day, are used by farmers to reduce runoff by ensuring adequate water supply when this irrigation system needs it. The suggested system's outgoing functions:

- imple and simple to install and configure.
- ave power and resources to use properly and in amount.
- y automating the irrigation of farms or nurseries, farmers could spray the right amount of water at the right time.
- vite irrigation at the incorrect moment of day, decrease excessive irrigation runoff from saturated soils to enhance crop yield.
- he automated system of irrigation utilizes valves to switch on and off the engine. Using controllers, the motors can be readily operated without the need for labor to switch on and off the engine.
- t is a accurate irrigation technique and a precious instrument in the manufacturing of extremely advanced greenhouse vegetables for the accurate control of soil moisture.
- t is a time saver, by changing the accessible soil moisture concentrations, to eliminate human error.

II. LITERATURE SURVEY

Archana and Priya (2016) suggested placing soil moisture and moisture detectors in the plant's root region. Based on the identified value, s is used to regulate the field water supply by the microcontroller. This scheme does not intimidate the farmer with regard to field status [1].

To attain elevated soil output, Sonali D. Gainwar and Dinesh V. Rojatkar (2015) suggested to measure soil parameters such as pH, moisture, moisture and temperature. The amount of humidity on the ground automatically turns on and off the engine pump. The camp's current status is not associated with the farmer[2].

V. R. Balaji as well as M. Sudha (2016) suggested a scheme using photovoltaic cells to derive the energy of sunlight. This system is not electricity-dependent. The PIC microcontroller switches the pump engine on / off depending on the soil moisture sensor's measured values. This scheme does not include weather forecasts[3].

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R.Subalakshmi (2016) proposed a microcontroller and GSM automation scheme that would solve all manual problems. The GSM sends a signal to the farmer based on soil moisture, temperature and humidity sensor sensor sensing values. This scheme does not determine the nutrient content of the soil [4].

Karan kansara (2015) suggested an automated irrigation system where the soil conditions are sensed by the humidity and temperature sensors and the water flow is controlled on the basis of that microcontroller. Farmer is going to be intimated by GSM. This scheme does not monitor the soil nutrient content [5].

Prof. C. H. Chavan and P.V. Karnade suggested a network of smart wireless sensors using Zigbee to monitor environmental parameters. These nodes send the information wirelessly to a main server collecting, storing and analyzing the information, then viewing it as required and even sending it to the mobile client [6].

G. Parameswaran and K. Sivaprasath (2016) suggested an smart IOT-based drip irrigation system using moisture, temperature and pH sensors. The irrigation status is updated through a private computer on the server or local host. Without internet, the farmer is unable to access the camp conditions [7].

S. Reshma, B. A. Sarath (2016) suggested an IOT-based automatic irrigation system using wireless sensor networks to evaluate soil parameters using separate sensors. This system offers a remote monitoring and control of the system by a web user interface. In this scheme, climate surveillance is not carried out[8].

Joaquin Gutierrez (2013) has suggested a gateway for managing sensor information, enabling actuators and transmitting data to the web application. It is powered by photovoltaic panels and has a duplex communication link based on a cellular internet interface allowing information inspection and programming of irrigation through the internet page [9].

Yunseop Kim (2008) suggested a document in which six field stations spread throughout the camp were specifically tracked on the site by field circumstances. To intimidate the farmer, GPS and wireless communication were used. The farmer can not access data about the present state of the field without the Internet[10].

CONNECTIVITY AND COMMUNICATION

DHT sensor and Soil Moisture sensor are the hardware used for sensing information. The temperature and humidity values are measured by the DHT detector. The sensor of soil moisture is used to evaluate the concentrations of moisture. The communication is done with the internet and the hardware which is used to connect to a Wireless Fidelity (WiFi) network is a WiFi module named as NodeMCU. It connects to the internet and communicates with the cloud and Arduino. The temperature, humidity and the temperature levels are represented using the dashboard on the webpage.

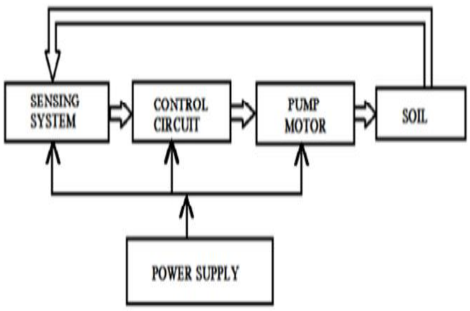
CLOUD SERVICE

A cloud service is any service produced accessible by a cloud computing provider's servers to customers on demand over the Internet, rather than being supplied by local servers of a company. The cloud service supplier (CSP) offers simple and scalable access to apps, resources and services that are managed. The cloud service which is being used in this paper is ThingSpeak, which is an open cloud service which is specially designed for Internet of Things prototypes and implementation through cloud. ThingSpeak provide Application Programming Interface (API) and a Representational State Transferful system (RESTful) for communicating from Arduino to cloud and cloud to any other retrieving device like website here.

The existing agriculture system is completely dependent on monsoon. As the farm lands are very far from the villages, farmers need to travel long distances to on/off the motor when the measures of the moisture levels is low or high. There might be over and under irrigation. And sometimes when the farmers need to on the motor and in the meanwhile they reach the farm land there might be a power cut. The farm lands need to be constant manual monitoring of the agricultural land for water and the power supply. The scheme suggested is to automate the secure system. In this automated system, the moisture, temperature and humidity levels will be constantly monitored through the webpage. The motor can be switched on and off observing the levels of the moisture in the webpage. With this there will be a notice to the power supply as well. The sensor data of the DHT sensor will also be helpful for researches to estimate and manage the conditions for the next crop.

III. METHODOLOGY

The soil moisture level is continuously controlled by the automatic irrigation system. The system adequately reacts by watering the soil with the precise quantity of water needed and then closing the water supply when reaching the necessary level of soil moisture. The soil moisture content reference level was produced adjustable based on[3]. The system operator can adjust the quantity of irrigation (light, nominal and high). The advanced system's block diagram is shown in the figure.



The samples used in the moisture detectors are produced of material that is resistant to corrosion and can be blocked in the soil sample. By evaluating the strength between the probes, the dry and moist voltage levels were calculated and these were paired with output voltages.

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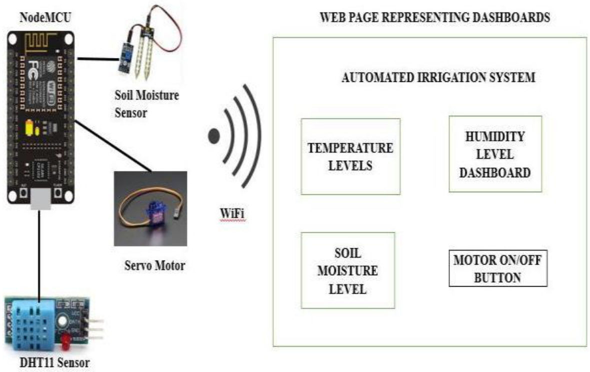
The low-noise micro-water pump was created on these grounds to supply water to various components of the land (plant base). Considering the ability of the water pump and water channels, the amount of water needed for irrigation was calculated over time. The necessary irrigation time was determined based on the response time of the water pump and the quantity of water needed per irrigation example. A timing circuit controls the duration of each irrigation example. Simulations were carried out using the software for simulating the circuit of Proteus. Construction of the circuit was performed on a board of Vero. The components we used to establish the System are:

- ✓Node MCU.
- ✓Soil Moisture Sensor.
- ✓Servo Motor.
- ✓WIFI.
- ✓DHT 11 Sensor.

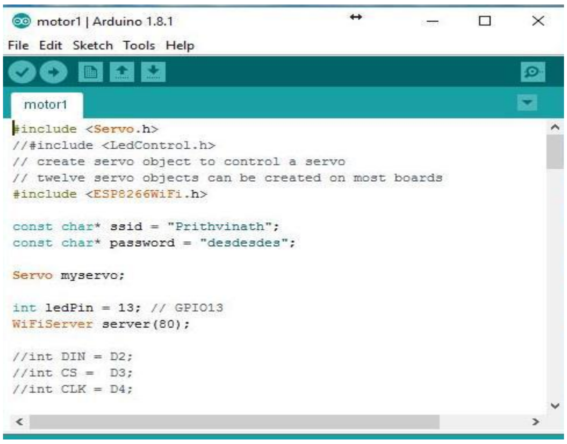
IV. ARCHITECURE

The Architecture shown is below:



One can understand the flow of data from the sensor to the application for representing the levels of humidity, temperature and soil moisture the content on webpage will be displayed via cloud service ThingSpeak. In this the data from the soil moisture levels will come from soil moisture sensor, temperature and humidity levels come from DHT sensor and both are represented on a web page via a cloud service ThingSpeak. When the levels of the soil moisture are low or high, we can on/off the Servo Motor from the distant places with a control button on the webpage by observing the moisture levels. The temperature, humidity values are helpful for the researches to make the observations and estimate the approximate suitable average levels which could give the best productivity the coming years.

V. RESULT



VI. CONCLUSION

The paper presented an efficient and novel approach to automate the irrigation system that would help farmers. The scheme suggested prevents excessive irrigation, soil erosion and water waste reduction. The primary benefit is that the system's action can be changed depending on the scenario (crops, climate, soil, etc.). Agricultural soil, horticulture, parks, gardens and golf courses can be irrigated with the application of this scheme. In addition, this scheme is more cost-effective and effective than another form of automation scheme.

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