e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 5, Issue 7, July 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.54

International Journal Of Multidisciplinary Research In Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 5, Issue 7, July 2022 |

| DOI:10.15680/IJMRSET.2022.0507016|

Smart Irrigation and Fertilisation System Using Soil Moisture Sensor and Ph Sensor

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ABSTRACT: Farmers in India specially from Vidarbha region are reportedly facing a lack of rain and water. The main aim of the paper is the automatic irrigation solution for farmers. This helps to save them precious time and resources. Conventional irrigation technology requires more human action. Although peoples from the villages are migrating to Cities and thus finding the workers for spraying fertilizer is a very critical task If Nutrients is not feeded to the plant there may be a direct impact on agriculture production. Human interference can be reduced to a degree with the proposed automatic irrigation and fertilization technologies. The proposed programme accurately controls irrigation systems for agriculture. In the field, sensors are mounted to measure PH of a field and relative humidity that transports the signal to the computer for the calculation of crop water requirements. The population of India exceeds 1.2 billion and the pace of population rises daily, so there will be a significant food issue after 2030 years, so it is important to improve agriculture that can be accomplished by introducing these devices in the region..

KEYWORDS: Moistur sensor, pH sensor, Relay, Microcontroller;

I. INTRODUCTION

Power deficiency is one of the world's main challenges today, and irrigation is a challenging activity requiring plenty of water. A specialised delivery method which is responsive to groundwater uses is also relevant. In order to run an irrigation system, smart irrigation systems evaluate and measure existing moisture, conserve water when required and minimise excess water consumption . Tensionmetric and volumetric approaches are very basic and are used on the basis of soil moisture irrigation management , but these phases are bound to a unique soil type-specific water curve. Moreover, for suitable performance, the sensors used require repetitive maintenance . A hardware part is used by the system, which is threatened by inconsistencies Ecological circumstances. A realtime remote monitoring camera module was developed and tested to plan cotton irrigation for a realtime, intelligent moisture content and soil pH measurement sensor using components . This method is unique to a specific particular crop and thus its use is limited. Appropriate irrigated agriculture is crucial for successful water management in crop production, particularly during food insecurity. The amount of water required for irrigation, the frequency of irrigation and fertilisation are incredibly significant. There must be a correct irrigation scheduling technique to increase effective water use.

India enjoyed ample water supplies until quite recently. Yet, because of population increase and unsustainable uses of water sources, the need for water has been higher than supply . Water supply is in a state of difficulty. If this situation continues, then the nation will face extreme water shortages.

So, there's an immediate need for water management. The water needs of the plant or the crops are not controlled during irrigating crops. Even if the soil is wet, drainage is often given, which is not consumed by the plants and is thus lost.. A system for tracking the plant's water needs therefore is necessary. If the construction of the Smart Irrigation System is completed, so the operational cost of maintenance workers is minimized . This paper presents a simple means of automating the irrigation and irrigation by a micro-controller of small potted or manually limited crops.

II. LITRATURE SERVEY

In Sensor based Automated Irrigation System with IOT mentioned about using sensor based irrigation in which the irrigation will take place whenever there is a change in temperature and humidity of the surroundings. The flow of water is managed by solenoid valve. The opening and closing of valve is done when a signal is send through microcontroller. The water to the root of plant is done drop by drop using rain gun and when the moisture level again become normal then sensor senses it and send a signal to microcontroller and the value is then closed. The two mobile are connected using GSM. The GSM and microcontroller are connected using MAX232. When moisture of the soil become low moisture sensor sense it and send signal to microcontroller, then the microcontroller gives the signal to

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mobile and it activate the buzzer. This buzzer indicates that valve needs to be opened by pressing the button in the called function signals are sent back to microcontroller. Microcontroller used can increase System Life and lower the power Consumption. There system is just limited to the automation of irrigation system and lacks in extra ordinary features[1]. In Automated Irrigation System Using a Wireless Sensor Network and GPRS Module mentioned about using automatic irrigation system in which irrigation will take place by wireless sensor units (WSUs) and a wireless information unit (WIU), linked by radio transceivers that allowed the transfer of soil moisture and temperature data, implementing a WSN that uses ZigBee

technology. It takes a measure of temperature and moisture using sensor and controlled by microcontroller. The WIU has also a GPRS module to transmit the data to a web server via the public mobile network. The information can be remotely monitored online through a graphical application through Internet access devices. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability and it is feasible system. But due to Zigbee protocol this system becomes more costly [2]. In Wireless Sensor Network based Remote Irrigation Control System and Automation using DTMF code mentioned about using automated irrigation system for proper yield and handled remotely for farmer safety. Wireless sensor network and Embedded based technique of DTMF (Dual Tone Multiple Frequency) signaling to control water flow for sectored, sprinkler or drip section irrigation. Circuit switching instead of packet switching used by SMS controlled devices available currently in the market. The farmer can use his cell phone or landline phone for the purpose of starting and controlling the irrigation and the pesticide spraying, just by dialing and sending the DTMF commands over the GSM network. This system will be very economical in terms of the hardware cost, power consumption and call charges. Farmers have to control (on/off) the valves time to time (even at night) which increases the running cost because every time we have to make a call to on or off the valves and it is also very inconvenient. Farmers are unable to know the status of power supply at the field. [3]. Smart Orchid soil moisture monitoring system based on wireless communication technology' by Ye Na & Liu Junfeng' Isight on the system cored with a low-power microprocessor. Insight on achieving a wide range of influence on soil moisture and intelligent control of data in fixed memory. Insight on achieving a 24hr uninterrupted monitoring. Insight on serial non-volatile data memory chip for storage and display device, that is based on I2C bus, in turn using multifunctional memory chip of the ferroelectric technology which contains RTC. [4].

Soil moisture is water that fills part or all of the soil pores above the water table. Another definition says that the soil moisture states the amount of water stored between the pores of the soil, which is very dynamic. It is caused by evaporation through the soil surface, transpiration and percolation. Soil water content is stated in percent volume i.e. percentage of water volume to soil volume. This method is very beneficial because it can figure out availability of water for the crop at a given volume of soil. The method of determining the moisture content can be done by using a number of wet soils dried in the oven at a temperature of 1000C - 1100 C for a certain time. The disappeared water due to drying process is the amount of water contained in the soil. The irrigation water entering the ground initially replaces the air in the macro pore and then the micro pores. The amount of water moving through the soil is related to the size of the pores in the soil. The next additional water will move down through the process of saturating water movements. Water movement not only happens vertically but also horizontally. The force of gravity has no effect on the horizontal movement. The uncertainty regarding the influence of soil moisture variability on atmospheric parameters on smaller scales concerns (a) operational forecast models, where soil moisture is often treated as a numerical parameter to constrain modelled 2 m temperature and humidity fields to observations, and (b) field observations, where the uncertainty of temporal and spatial soil moisture variability and its influence on atmospheric variables is high, as soil moisture is not directly operationally measured on a larger grid. [5].

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III. METHODOLOGY

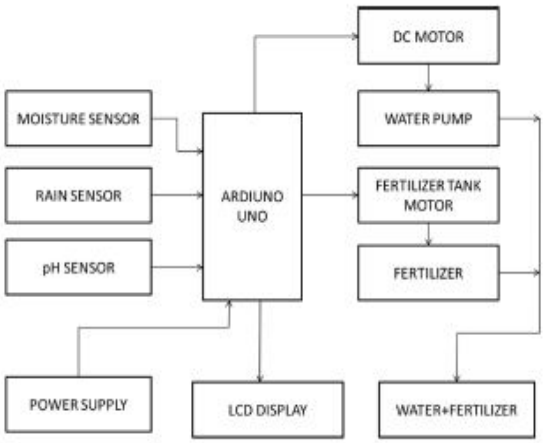

Fig. 1 Block Map of the system proposed

A. Description of proposed method:

The device proposed which is shown in Figure 1, is very useful for agriculture. The soil's fertility plays an important part in the calculation of the eminence of the soil, and it reflects its plant life. Soil fertility is determined by the sum of macro- and micronutrient presence, water molecules, pH, etc. Since each crop, soil nutrients are depleted and hence have to be replenished. Fertilizers are added to the soil to sustain nutrient levels in the soil in the event of insufficiency. Ultimately, farmers choose to estimate the volume of fertiliser and manually raise it. Adding fertilisers to the correct quantity, however, is of great importance as excess or inadequate addition of fertilisers may damage the plant and can decrease yield patterns and promises of technology to provide a solution to the above issue. While programmed methods for sowing, weeding, field reaping, etc. None of the methods aimed at maintaining soil fertility is formulated and implemented. The suggested scheme seeks to recover mineral quantities such as nitrogen, phosphorous, and potassium in the soil by measuring the amount of nutrients available. Chemical processes determine the presence of nutrients and enumerate those using sensors. In order to prevent excess / deficient soil fertilisers, an automated system for the regulated addition of fertilisers has been created. Figure 1 is the proposed system's block diagram. The Ardiuno Uno inputs are related to three sensors: humidity, rain and pH. As Arduino's built-in ADC is an analogue moist sensor, its digital resistance (0-1023) is converted.

Dry soil is the highest resistance, and wet soil the least resistance. If the soil is dry, the moisture sensor resistance value is high, so that if it exceeds the threshold, the system will be triggered and a switch will be flipped on and off. This is true to wet soil in contrast. The pH sensor tests the soil pH content and provides the appropriate fertiliser volume.

IV. HARDWARE

A single moisture sensor, rain sensor and pH sensor will be included in our prototype. The amount of humidity sensor & pH sensors that can be attached to the panel can vary based on the number of smother sensor sends resistance values to the soil in which it is engrossed when the water level sensor is attached to the plate. Arduino's built-in ADC is used to transform the soil moisture sensor into its digital form (0-1023), since it is an analogue unit, reflects soil resistance. The highest resistance will be to moist ground and the least resistance to damp soil will be there. The moisture sensor value is high whenever the soil dries, so that the pumps is activated by a switch & disabled when the values exceed the mark. The same is true for the wet dirt. When the surface of the rain sensor detects the water on the rain sensor, the rain sensor will transmit the Ardiuno warning, and then the engines are shut off, regardless of their state. The pH sensor is switched on to read the pH of the soil, based on the crop requirement.

V. SOFTWARE

In our project, the programme used is Arduino. A variety of libraries are available to make programming simpler. The AtMega328 controller is programmed by Arduino in our prototype. For both the humidity and the pH sensor, the Arduino programme designates a set number of digital resistance values from 0 to 1023. Any aberration in the set range flies to the area of the pump.

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VI. FLOW CHART

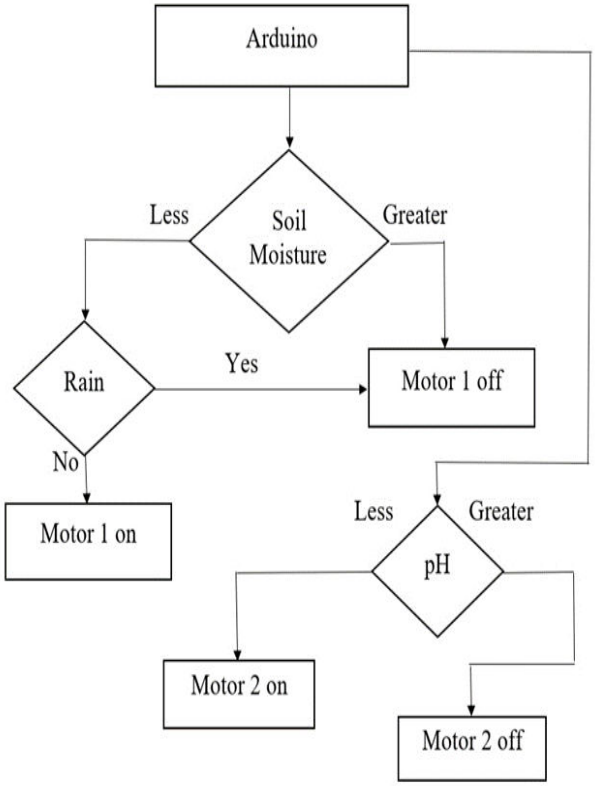

Fig.2 Flow chart of proposed system

VII. CONCLUSION

To provide sufficient irrigation and fertiliser, three sensors were used. The sensors are linked effectively to Arduino and wireless connectivity is accomplished. Interpretations and investigational experiments indicate that this research offers a systematic approach to the problems of field irrigation. The implementation of such a process in the field would certainly lead to better crop yields and to effective water conservation by reducing its use.This research concludes that agriculture production will be increases in low cost,with minimum human interference using minimal water and expensive fertilizer wastages by feeding nutrients whenever it requires.

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