International Journal of Innovative Research in Computer Science & Technology (IJIRCST)
ISSN: 2347-5552, Volume-8, Issue-2, March 2020
https://doi.org/10.55524/ijircst.2020.8.2.10
www.ijircst.org

A Review Paper on Smart Irrigation System

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ABSTRACT: Human demands are rising day by day as a result of the growing population. Simultaneously, the need for food materials is growing. In order to satisfy food demand, crop production efficiency must be improved in situations when labour and water are scarce. The necessity of the time is to make effective use of existing labour, water, and fertilisers in order to reduce the cost of yearly crop production. Luckily, technology today as well as practices may help you achieve your cost-cutting and quality-control goals. This preliminary research focuses on a low-cost automated smart irrigation system that conserves water and human labour while providing the desired quantity and quality of crops. The suggested system also includes a basic yet compact smart phone application that allows the farmer to carry out watering and fertilisation regimens. The experimental setup at the farm measuring 1 acre of sugarcane production demonstrated a 56 percent decrease decrease in water consumption, a 90 % decrease in labor expenditures for irrigation, and a 75 percent reduction in power consumption when compared to the conventional procedures. As a consequence, the proposed strategy produces a win-win situation for both farmers and the government, which is currently competing for water and power in our country.

KEYWORDS: GSM Module, Human, Soil, Sensor.

I. INTRODUCTION

A. Traditional Irrigation system

Agriculture is a significant source of income for several people in India. In many areas of India, sugarcane is the most important commercial crop. However, there are many issues in both regions with plenty of water and those with a shortage of water. The conventional method of irrigating sugarcane fields wastes more water, fertiliser, labour, energy, and other resources. Farmers often spend a significant amount of water, energy, time, as well as effort to irrigate their crops. They must physically examine the field and provide water to the farm based on the moisture content of the soil.

Manuscript received March 11, 2020

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They must first turn on the engine and then turn it off after irrigating the area. This whole procedure takes time, and the farmer is unable to do any other tasks. Furthermore, timely power supply is not assured, and there are many other issues that are significant roadblocks in the irrigation process. In a nutshell, conventional irrigation systems increase production costs while also having additional negative effects that lead to transformation into baron land [1], [2].

B. Drip Irrigation

Since its presentation during the 1970s, dribble water system for sugarcane has filled in popularity. Drip water system is as of now perceived as the most dependable, successful, and commonsense method of giving water and supplements to crops .Drip water system frameworks inundate individual plants straightforwardly at their root zone, keeping away from a great deal of contagious issues and squandering water. Dribble water system frameworks save time by watering immense districts of plants on the double [3]. It empowers ranchers to work on yield while diminishing asset utilization, driving in an extensively better pace of motivations (ROI) as far as quality and amount when contrasted with some other water system method [4]. Developing sugarcane utilizing trickle water system brings about significantly better yields with higher sucrose content; a more noteworthy number of ratoons from each establishing cycle; lower water utilization ,less expensive work costs (simple to work), and compost reserve funds, among different advantages [5]. Notwithstanding, most people will start with a less exorbitant, basic dribble water system framework. Trickle water system frameworks might help you flood troublesome territory, for example, inclines, where overflow and harm from traditional watering strategies can happen [6]. Dribble water system might be changed in accordance with give water in sluggish, infiltrating blasts that can be absorbed before the following burst, or it tends to be set to convey water in blasts that can be absorbed before the following burst [7]. Most of trickle water system issues come from helpless establishment or the utilization of the wrong sort of dribble water system for the area [8], [9].

C. Proposed Automatic Drip Irrigation System

The recommended computerized dribble water system framework incorporates an assortment of one of a kind trickle water system advances [10]. It incorporates clocks that can be set, so you can be sure that your plants have been hydrated regardless of whether you are no more. It includes a few spouts that control water stream, permitting sugarcane plants to get less water while plants with more prominent water needs get more. It incorporates sensors

that alert the framework assuming it is coming down, making it quit running. Every one of the issues related with customary dribble water system frameworks might be tried not to buy use a brilliant water system framework, which centers on mechanization [11]. The rancher can give water to the land while sitting at home utilizing his Android telephone. The current valve will be turned off consequently founded on how much water or composts, and the following valve will be turned on, etc. [12]. Water will be conveyed to the field as such. At long last, contingent upon the level, the engine will be switched off consequently. All of this is controlled through a shrewd cell phone application. The rancher might deal with different undertakings or exercises simultaneously [13], [14].

II. LITERATURE REVIEW

WSN and GPRS Module based computerized water system framework, the essential point of a robotized water system framework using WSN and GPRS Module is to augment the utilization of water for rural harvests. This framework is comprised of a dispersed remote sensor organization (WSN) including dampness levels and temperature sensors. Entryway units are utilized to send information from sensor units to base stations, give orders to actuators to water system the executives, and keep up with sensor unit information. The calculation in the framework is utilized to control the amount of water as indicated by the necessities and states of the field. It is customized in a chip and conveys orders to the actuator to control how much water by means of the valve unit. Photovoltaic boards power the entire framework. Duplex correspondence takes happen by means of a cell organization. The water system is overseen by means of a web application that utilizes persistent checking and water system plan programming. It is feasible to do as such through pages [15], [16].

WSN-based Crop Monitoring System in this rancher might profit from a sensor network crop checking application for accuracy of the farming. Utilizing the Internet of Things, the program watches the entire ranch from a far off area (IOT) [17]. The application depends on a sensor organization and two sorts of hubs. To save energy, a hub utilizes an energy-saving calculation. For information gathering from hub to base station, a tree-based convention is utilized. The framework comprises of two hubs, one of which gathers all dirt and natural boundary values and the other of which has a camera for catching pictures and observing harvests. Climatic changes are not considered for sensor perusing in this framework. The framework client can't program the application [18]. There is no application control framework [19]–[21].

WSN and Data Mining Algorithm based Automatic Drip Irrigation System, in this information mining calculation are utilized to take choices on trickle water system framework. Robotized dribble water system framework having WSN put in all over ranch and different kind of sensors. WSN utilizes impromptu organization which gives self-setup and adaptability. Sensor information is given to base station and information is gotten utilizing zigbee. Information handling is done at base station for independent direction. Information min-ing calculation is utilized to take choice on information from sensor to dribble. All perception are remotely screen through web application. This framework deals with Naïve Bayes calculation for water system control. Calculation deals with past informational collection for navigation on the off chance that any characteristic isn't continuous outcome is zero [14].

III. DISCUSSION

A. Arduino

The Arduino stage is an open-source PC stage in view of a fundamental I/O gadget and a programming climate that supports handling dialects. The ATmega328-based Arduino-Uno is a microcontroller board. It incorporates 14 advanced I/O pins (six of which might be utilized as PWM yields), six simple sources of info, a 16 MHz ceramic resonator, a USB association, a power connector, an ICSP header, and a reset button. It accompanies all that you want to help the microcontroller; simply interface it to a PC through USB or power it with an AC-to-DC converter or battery to begin.

B. Electromagnetically actuated valve

A solenoid is an electromagnetic part of a valve that is comprised of a curl, center cylinder, center, and walled in area. A scope of 2-way, 3-way, and 4-way solenoid valves planned to deal with the most troublesome liquid control applications. Water enters the valve from the framework fundamental line and applies a power on the stomach's middle. Water streams by means of a little opening in the stomach to the upper chamber between the stomach and the hood. The water keeps on streaming to the solenoid locale through a port in the hat. Whenever the valve is shut, the solenoid includes a light spring-stacked metal cylinder that covers the admission port opening. Since the surface region with which the water comes into contact on top of the stomach is bigger than the surface region with which the water comes into contact on the lower part of the stomach, the valve stays shut until the water in the upper chamber is delivered.

C. The GSM Module

For controller, the GSM (Global System for Mobile Communication) module (portable) is used (for instance Gate Control, Temperature Control and so on) GSM/GPRS module comprises of a GSM/GPRS modem joined with a power supply circuit and PC association, (for example, RS-232, USB, etc.).The MODEM is the module's spirit. They produce, communicate, or decipher information from a cell network to lay out association between the organization and the PC. These are intended for a specific cell organization (GSM/UMTS/CDMA) or cell.

D. Timer for Water

Set the run span and recurrence of watering physically, and the water clock will consequently turn on and off in the wake of giving water to your plants through a trickle water system line. This unit just incorporates one Greenage water clock with a solitary source for mechanized trickle watering. The accompanying things were additionally included. Converter/Reducer 3/4" to 1/2" a 16mm pressure connector to join the clock to your 16mm polyethylene dribble water system line. Fix the strung fittings utilizing PTFE string fixing tape. The application's principle menu contains the accompanying things. Accordingly, as shown in the primary menu, the client might get the situation with water or composts. In light of the status, the client might

orchestrate the compost or watering plan for the plants in view of the period and temperature. The framework is computerized as in the water system plan is set in the evening on substitute days, besides during the stormy season. The application's menu is performed utilizing the SIM card in the telephone and the GSM module in the homestead's control unit. The arduino board is fastidiously intended to do each of the client's obligations without equivocalness. Figure 1 shows parts for the trial arrangement.

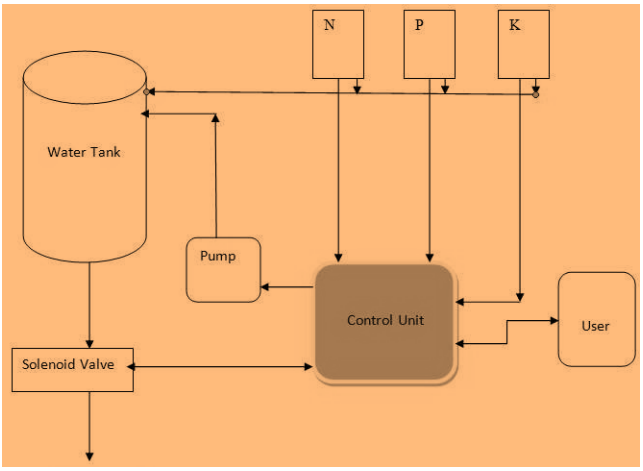

Fig 1: Components for the Experimental Setup

The trial arrangement is set up on 1 section of land of good quality ranch land that has been planted with 5000 excellent sugarcane plants. The trial arrangement is portrayed in Figure .The normal sugarcane crop term is thought to be 15 months (450 days). It is likewise expected that the blustery season endures 150 days, during which time conventional or trickle water system frameworks are not utilized. Labor is utilized to give manures at an expense of Rs. 50 for each pack, with a sum of 40 sacks utilized throughout the harvest. India is honored with a huge piece of cultivable land, however the result delivered doesn't do equity to the nation's true capacity. The World Bank information uncovers that around 60% of the land is under development. The utilization of innovation in horticulture is on the ascent, however an enormous part of farming, particularly water system stays a manual exercise. It is realized that the result of a plant relies upon different elements. The accessibility of ideal amount of water is profoundly basic in such manner. Connection with ranchers from Kerala Rice Station, and rural lovers uncovered that the current robotized water system offices are costly and erroneous somewhat. This was the driving component behind picking mechanized water system as a subject for our venture. The robotization of the water system framework, and giving a stage to screen the water system conditions, utilizing soil dampness, and temperature and moistness readings will everlastingly affect the result of the plant. A solenoid valve controls the watering.The opening or shutting of the valve relies upon the raspi input, as the valve is associated with one of the GPIO pins. The critical element of this venture is the utilization of a server, which does the handling part. We bought a server, and the information from the sensors were pushed to the server utilizing raspi. The opening and shutting of the not set in stone by the program on the server in view of the temperature and dampness remove that was fixed by us. This calms the raspi of the handling trouble, and guarantees that the information isn't lost. Thus raspi can be utilized for different errands like picture handling on the plant leaves. At the point when the dampness and temperature readings cross the remove, a sign is sent back to the raspi, which then, at that point, opens the solenoid valve for a period of say, 10 seconds. How much water required per plant can been determined, and the stream rate from the solenoid empowers us to decide how much an ideal opportunity for the valve to be open. Moreover, a web application named AutoGate was made, through which the client can screen the sensor readings and physically supersede the framework in the event that he wishes to [22]. The versatile innovation empowers the client to get to the readings from anyplace, with a web association, in this way making the framework universal. The control calculation for the valve activity depends on the information that has been gathered over a time of 2 months, i.e., the temperature and mugginess values [23]. The edge has been set by the water misfortune, as acquired by the Penman-Monteith Evapotranspiration recipe, considering the temperature and stickiness alone. The picture handling part comprises of the pictures of the leaves being shipped off the raspi by the client or by a raspi camera. The plant that we have picked is paddy, and the normal sicknesses influencing the species in Kerala is 'Bacterial Blight' and 'Earthy colored leaf Spot'. Picture handling is finished with the assistance of MATLAB [24]. At first, an information base is made, wherein the properties like difference, relationship, energy, homogeneity, mean, standard deviation and entropy are determined and every illness is signified by a comparing mark. Table.1 shows a bunch of test data set readings [25].

India is principally an agrarian country. Agribusiness is the main occupation for a large portion of the Indian families. In India, horticulture contributes around sixteen percent (16%) of complete GDP and 10% (10%) of absolute products. More than 60 % of India's property region is arable making it the second biggest country as far as complete arable land. Water helps in the happening, which is extremely fundamental for keeping up with the ingestion of supplement from the dirt. Water directs the temperature and cools the plant. In this way, water is applied remotely, assuming that accessibility appears to be restricted through soil, not adequate to meet the necessity because of dry season or overabundance misfortunes. We call the outside utilization of water to the dirt to enhance the necessity as 'Water system'. In India the majority of the water system framework are worked physically. These method are supplanted with semi-computerized and robotized strategies. The accessible methods resemble ditch water system, terraced water system, trickle water system and sprinkler framework. The worldwide water system situation is sorted by expanded interest for higher farming usefulness, horrible showing and diminished accessibility of water for horticulture. These issues can be fittingly amended assuming that we utilize mechanized water

system. Robotization of the water system framework is acquiring significance as there is need to utilize water assets effectively and furthermore to expand the field efficiency. The framework is utilized to turn the valves ON or OFF naturally according to the water prerequisite of the plants. The framework is utilized for detecting, checking, controlling and for correspondence reason. Various sensors are utilized to identify the various boundaries of the dirt like dampness, temperature, moistness, pH of soil and nitrogen content of the dirt. Contingent on the sensors yield the ARM9 processor will make the important move. The dampness sensor result will assist with deciding if to flood the land or not relying on the dampness content. Alongside dampness sensor the temperature sensor result can likewise be thought about while flooding the land. Assuming the dampness content of soil is extremely low and the temperature is exceptionally high then there is need of water system for plants, yet the ideal opportunity for which water system will be given is different to various temperature range. Since, supposing that the temperature is extremely high then the dissipation rate is likewise exceptionally high and thus we need to give water to additional time to achieve the legitimate dampness level in the dirt. Consequently for various temperature reach and dampness content level in the dirt the land will be inundated for various time stretch.

IV. CONCLUSION

The utilization of dribble water system has shown that water, energy, and work may be in every way fundamentally diminished. Notwithstanding, inferable from the actual work expected in cultivating, dribble water system is just used by a couple of ranchers. The savvy phone based computerized dribble water system framework might convince a lot more ranchers to construct and use trickle water system frameworks to expand creation at a lower cost. The trial setting showed that the proposed technique might save a lot of water, energy, and work. The cost of a one-time arrangement is extremely low, and it is easy to keep up with. More sensors might be added to the framework to additionally computerize watering and treating in the homestead contingent upon dampness and temperature levels.

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