



IOT Irrigation Monitoring & Controller System

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Abstract

Farmers typically work on massive parts of land to grow differing types of crops. it's not continually attainable for one person to be ready to keep track of the complete farmland all the time. typically it should happen that some portion of soil isn't wet whereas another portion would possibly excessive wet. In either of the cases, the crops will get broken and farmer could suffer losses. thus so as to unravel this drawback, we tend to propose Associate in Nursing "Internet of Things (IoT) based mostly Irrigation watching and management System". this can be a really helpful wherever in, the user will monitor and management the availability of water from an overseas location. this technique makes use of an idea referred to as net of Things (IoT). So for our, we tend to connect our system to the web employing a Wi-Fi module. we tend to use Associate in Nursing Arduino Uno board to send the management signals and to attach to our desired web site. On the web site, 2 things square measure displayed: a) Motor standing b) wet level. The system keeps checking the wet content of the soil mistreatment of a wet sensing element, and send the updates concerning the "Moisture level" on the web site. Then the user will check the present wet level from an overseas location and consequently it controls the water. For this, the user solely must toggle the "Motor status" from 'ON-OFF' or vice versa; and therefore the "water pump" are 'turned ON' or 'turned OFF' consequently. so the 'soil-moisture' gets monitored and therefore the 'water supply' are often controlled by checking the motor standing. therefore the user doesn't have to be compelled to worry concerning his crops or plants obtaining broken because of 'waterlogging' or 'drought'.

Keywords:- Wi-Fi, Arduino Node MCU, soil moistur sensor, etc.

1.INTRODUCTION

In Republic of India agriculture plays a vital role for development of country. In our country, agriculture depends on the monsoons that has meager supply of water. In Irrigation system, relying upon the soil sort, water is provided to plant. In agriculture, 2 things area unit important, 1st to induce data of concerning the fertility of soil and second to live wet content in soil . Nowadays, there area unit totally different techniques obtainable that area unit used to scale back the dependency of rain. And principally this technique is driven by electrical power and on/off programming. during this technique, water level indicator placed in water reservoir and soil wet detectors area unit placed at root zone of plant close to the module and entryway unit handles the sensor data and transmit knowledge to the managementler that in activates the control the flow of water through the valves. In crop production, irrigation helps in protective plants against frost, suppressing weed growth in grain fields and preventing soil consolidation. Irrigation systems also are used for dirt suppression, disposal of biodegradable pollution, and in mining. The previous technique used for irrigation was the employment of watering cans, water channels that have to be compelled to be opened and closed manually or backpack

sprinklers. during this case, heaps of water is wasted within the method . there's want for improvement on the prevailing or previous varieties of irrigation. an automatic irrigation system must be developed to optimize water use for agricultural crops. associate degree intelligent automatic irrigation system should have all the elements that autonomously monitor and management the extent of water obtainable to the plants with none failure or human intervention.

1.1 Need of irrigation monitoring & controller system

For drastically increasing demand and decrease in offer of food requirements, it's vital to speedy improvement in production of food technology. Agriculture is one and solely the supply to supply food. this is often the vital think about human societies to growing and dynamic demand in food production. Agriculture plays a very important role within the economy and development, like India. thanks to lack of water and scarceness of land water result the decreasing volume of water on earth, the farmer use irrigation.

1.2 Potential of IoT

The Internet of Things (IoT) holds the potential for major effects across a large style of market sectors. There square measure variety of vital horizontal policy problems that have an effect on the IoT across markets and use cases. The IoT can bank considerably upon maximising continuity of property. With the planet apace turning into wireless, establishing associate acceptable spectrum policy is crucial to make sure that the IoT are going to be undefeated.[1]

2. PROPOSED WORK

The Wi-Fi module should connect the net by exploitation mobile hotspot, Wi-Fi router that is usually called an online service supplier. initially Wi-Fi module checks standing of water level indicator, if water is gift then it issue otherwise it terminates. If water is gift, then it checks standing of soil wet detector one, If Region one is wet, motor are off. If Region one is dry, valve one can open and motor are on for ten seconds. If Region one is wet, valve one can open and motor are on for five seconds. throughout this, valve two can stay closed. once more module checks standing of water level indicator, if water is gift then it issue otherwise it terminates. If water is gift, then it checks standing of soil wet detector two. If Region two is wet, motor are off. If Region two is dry, valve two can open and motor are on for ten seconds. If Region two is wet, valve two can open and motor are on for five seconds. throughout this, valve one can stay closed. System is typically OFF state. it's potential to induce standing of the sphere. it's potential to form System ON whenever. Once System is ON, it'll check the standing and provide the water just the once solely. although System is OFF. it's potential to form System OFF. however sometimes System is often can OFF condition.

2.1 Methods of Irrigation

There area unit varieties |differing types |differing kinds} of technique for irrigating farm field for various types crop field. primarily Indian farmer use these 3 strategies channel system, system, drip system. Channel system could be a ancient technique of irrigation. however a sensible irrigation system could be a new technology to irrigating farm field mechanically.

2.1.1 Channel System

This system is wide employed in farming irrigation system. As this method may be a terribly low price system for irrigating an outsized space farming field. during this system pipes are connected with a pump and whereas pump started water flow through pipe a from lake, river, bore well to farming field. and also the farmer totally engaged for irrigating the crop field with variety of staff. vast quantity of water waste and enormous variety of staff are engaged throughout watering.



Fig no 1:- Channel System

2.1.2 Sprinkler System

This system is a lot of helpful whether or not the water is accessible in smaller amount. once pump started then water flow through main pipe and additionally flow through the perpendicular pipes. A nozzle on the highest of perpendicular pipe is joined and rotating mechanically at regular intervals. this method is extremely helpful on the sandy soil. Less variety of employee needed water waste is a smaller amount.



Fig no 2 :- Sprinkler System

2.1.3 Drip System

In this system falls come by drop at the position of the roots. it's the simplest technology for watering fruit plants, gardens and trees. Water flow through a main pipe and divided into sub pipes. Special ready nozzles square measure hooked up to those sub pipes . during this system waste of water is extremely less and No employee would like for irrigating. once the farmer is aware of the standing of the farm field then begin the motor and selected the direction from nozzles. Then mechanically watering the plants and once your time the farmer check the standing of the sector and while the full crop square measure irrigating then OFF the motor.[2]

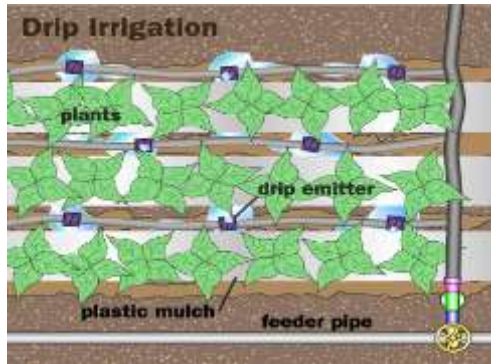


Fig no 3 :- Drip System

2.1.4 Smart Irrigation System

Above 3 systems square measure usually operate by a user however a sensible irrigation tells that the overall system is managementled by autonomous mean mechanically control the overall irrigation system whether or not the farmer isn't gift his farm field and send messages to the farmer concerning the knowledge of farm field and alter operating of the farm field. that need no employee for operational, and additionally less waste of water with compared to previous 3 strategies.



Fig no 4:- Smart Irrigation System

3.SYSTEM ANALYSIS

3.1.Hardware configuration

3.1.1Arduino Boards

Arduino is AN design that mixes Atmel microcontroller family with commonplace hardware into a board with intrinsic boot loader for plug and play embedded programming. Arduino package comes with AN IDE that helps writing, debugging and burning program into Arduino. The IDE conjointly comes with a Serial Communication window through which may simply get the serial information from the board.

3.1.2ESP8266 WI-FI Module

ESP8266 may be a complete self-contained Wi-Fi network answer that may carry code applications, or through another application processor uninstal all Wi-Fi networking capabilities. intrinsic cache memory can facilitate improve system performance and cut back memory needs. Another scenario is once wireless net access assumes the task of Wi-Fi adapter; we are able to add it to any microcontroller-based style. The ESP8266 is extremely integrated chip, as well as antenna switch balun, power management convertor. thus with nominal external electronic equipment, we have a tendency to includes front-end module, as well as the complete answer designed to attenuate the area occupied by PCB.

3.1.3Soil Moisture Sensor

The device that is employed to scan the quantity of wet gift within the soil referred to as Soil wet device. it's ideal for observance associate urban garden and could be a should have tool for a connected garden. This device uses the 2 probes to pass current through the soil, then it reads that resistance to urge the wet level. additional water makes the soil conduct electricity additional simply i.e. less resistance, whereas dry soil conducts electricity poorly i.e. additional resistance. it'll be useful to prompt you to water your indoor plants or to watch the soil wet in your garden.

3.2 Software configuration

3.2.1Arduino Compiler

First, the Arduino surroundings performs some minor pre-processing to show your sketch into a C++ program. It then gets passed to a compiler, that turns the human decipherable code into computer readable directions (or object files).The Arduino Integrated Development surroundings - or Arduino Software (IDE) - contains a text editor for writing code, a message space, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to transfer programs and communicate with them.

3.2.2 Ubidots Cloud

The basics parts of any net of Things application hopped up by Ubidotsare:Devices, Variables,Synthetic Variables, Engin dash-board and Events. inside this text we'll address every of those ideas as they relate to UbidotsIoT Development and readying Platform and the way you'll be able to higher organize your Ubidots Apps to best connect with the users. Once your devices, variables, and general Application is assembled, provide your App some layers with Ubidots Device Management to be told additional concerning Ubidots internal design and the way you'll be able to use Apps, Organizations, and Users to expeditiously connect your information with those that ought to be mistreatment it.

4.SYSTEM OPERATION

The automatic irrigation system was designed to continuously sense the wet level of the soil. The system responds fittingly by watering the soil with the precise needed quantity of water and then shuts down the installation once the required level of soil wet is achieved. The reference level of soil wet content was made to be adjustable for the 3 mostcommon soil samples (sandy, loamy and clayey soils – the samples used for this project were taken from round the Covenant University EIE building, Nigeria). conjointly the number of irrigation, i.e. the degree of water delivered to the soil, will be adjustable by the system operator (mild, nominal and high levels). The diagram of the system developed is shown in figure 4

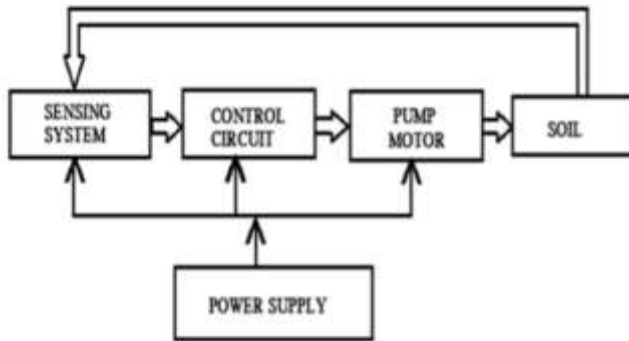


Fig no 4:- System block diagram

The wet sensors were designed victimization probes made up of corrosion-resistant material which can be stuck into soil sample. Voltage levels equivalent to the wet and dry states of the soil sample were computed by mensuration the resistance between the wet detector probes and matching them to output voltages of a comparator circuit. A submersible low-noise micro pump was developed to deliver the water to the acceptable components of the soil (the base of the plants). the degree of water required for irrigation per time was computed by considering the capability of the pump and the water channels. the specified irrigation time was determined by considering the response time of the pump and therefore the water volume required per irrigation instance. A temporal arrangement circuit was designed to use The wet sensors were designed victimization probes made up of corrosion-resistant material which can be stuck into soil sample. Voltage levels equivalent to the wet and dry states of the soil sample were computed by mensuration the resistance between the wet detector probes and matching them to output voltages of a comparator circuit. A submersible low-noise micro pump was developed to deliver the water to the acceptable components of the soil (the base of the plants). the degree of water required for irrigation per time was computed by considering the capability of the pump and the water channels. the specified irrigation time was determined by considering the response time of the pump and therefore the water volume required per irrigation instance. A temporal arrangement circuit was designed to use the specified irrigation time to control the length of every irrigation instance. Simulations were done victimization Proteus™ circuit simulation software package.

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5.CONCLUSION

The farm field is being monitored and controlled by MyMQTT golem app by user. The ESP8266 is that the device at farm that receives the messages and manipulates it and can perform the perform mentioned in message. once it'll send the messages to user network and successively it'll be revealed to the user.

This system may be helpful for individuals having tiny gardens, whereas it should not be doable for someone to be endlessly gift at his/her garden and guarantee correct water even from a distance. this technique is planned to supports aggressive water management for the farm. it's time saving, diode to removal of human error in adjusting obtainable soil wet levels and to attenuate information superhighway profits in accordance to factors like sales, quality and growth of product.

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