

Smart Technologies For Precision Agriculture

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Abstract- This challenge is to develop a smart irrigation monitoring device the usage of raspberry pi. recognition place might be parameters such as temperature, soil moisture, humidity, rainfall detector by using the usage of WSN and it offers web interface (IOT) to the user. Presently the automation is one of the important position in the human life, so it presents consolation and additionally reduces electricity, increases efficiency and saves time. This paper designs a clever irrigation generation in low fee and the principle goal is to govern the motor mechanically.

Keywords- RASPBERRY PI, SENSORS, CAMERA AND TELEGRAM APP

I. INTRODUCTION

India is the biggest freshwater client on the planet, and the nation's aggregate water utilize is more prominent than some other landmass. The agrarian part is the greatest client of water, trailed by the local segment and the modern area. Groundwater adds to around 65% of the nation's aggregate water request, and assumes an imperative part in molding the country's monetary and social advancement. The prerequisite of building a computerization framework for an office or home is expanding step by step. Computerization makes an effective utilization of the power and water and diminishes a significant part of the wastage. Keen water system framework makes the productive utilization of water. This undertaking presents a keen water system framework for horticulture cultivate with the utilization of gadgets like raspberry pi. Python programming dialect is utilized for mechanization reason.

II. LITERATURE REVIEW

The more recent state of affairs of decreasing water tables, drying up of rivers, tanks and unpredictable surroundings for an urgent want of proper utilization of water. to manage up with this requirement, use of temperature and moisture sensor at suitable places for monitoring the crops is applied[1].

After the research within the agricultural field, researchers found that the yield of agriculture is reducing

daily. however, use of generation in the area of agriculture performs vital position in increasing the manufacturing in addition to in reducing the more man strength efforts. a few studies attempts are done for betterment of farmers which affords the structures that use technology helpful for increasing the agricultural yield.

Sensor networks are compact Wi-Fi networks with small and coffee fee sensors, which gather and distribute environmental statistics. Wireless sensor networks empower monitoring and controlling of corresponding physical environment from far flung areas with better performance and accuracy [2].

Automation may be used to lessen the quantity of manual labour and make the farming precise, leading to more agricultural increase. number of operations like irrigation machine, temperature managed machine for livestock and farm product may be managed[3]. This paper presents computerized lights & sprinkler machine, residence temperature control and safety in farm houses.

Automatic milking of farm animals has been introduced in Europe. The goal has been to degree the consequences of converting from conventional parlour milking to milking all cows by using an automatic milking system (AMS) [4]. Automatic hatcheries are also in use for incubating eggs and retaining health of newborn chicks. additionally it is counting and boxing of eggs, weighing of chicks and eggs and removal of terrible eggs. [5].

This paper aims to elevate consciousness that there are actually alternative approaches to help farming. Modern-day farming techniques are trying to find to diminish human involvement, strengthen yield and improve animal health.

2.1 EXISTING SYSTEM:

In olden days farmers manually irrigate the crop by using motors. From these, the quantity of furnished water does not usually suit the necessities of the irrigated crop, either over saturation or un saturation were done. The applied pesticides and fertilizers stick on one place and damage the overall crop.

Irrigation controllers along with climate or soil moisture-based gadgets, are capable of mechanically cause irrigation events depending on actual web site conditions. Soil moisture primarily based controllers for instance, trigger irrigation occasions primarily based at the soil moisture content within the root zone of the crop. making sure a soil moisture level among the sector capability of the soil and the wilting point of the crop, soil moisture-based controllers commonly decide the water necessities by comparing the soil moisture measurements with pre-defined threshold values. although smart irrigation controllers are capable of timely beginning irrigation occasions, there are numerous limitations associated with smart controllers available in the market, Many clever irrigation controllers lack the ability of automatically adjusting the irrigation runtimes i.e. the quantity of implemented water, based totally on actual-time soil moisture measurements as a substitute a preset amount of water is implemented for an irrigation event independently from the actual soil situations. In result, even well-designed and properly-controlled modern day sprinkler structures with most efficiency in between 20% and 75%. With the advancement in Wi-Fi communications and microcontroller technologies, wi-fi sensor networks are deployed in agriculture to overcome the practical boundaries and the excessive fees associated with traditional irrigation controllers.

2.2 PROPOSED SYSTEM:

The proposed machine is supposed to provide portable, scalable and cheap method to gain optimized utilization of water supply and motor manipulate. It collects on discipline statistics like environment temperature, humidity, soil moisture, rainfall with the help of sensors used inside the device. After verification of a majority of these parameters, the values are sent to the farmer to determine the want of water irrigation within the subject and thus motor and solenoid valve ON/OFF is to be achieved automatically. This project is accomplished by a SMS based alert system. It also captures the image to know the growth of the plant. The captured image is sent to the farmer through IOT. This venture gives a clever irrigation machine for agriculture farm with using gadgets like raspberry pi. Python programming language is used for the automation motive. This undertaking contributes an efficient and pretty cheap automation irrigation machine. As soon as the machine is mounted, the upkeep cost is less and is easy to use. It focuses on online tracking of agriculture subject with the help of wireless on android mobiles and parameters inclusive of temperature and soil moisture. it is more advantageous than the traditional agriculture techniques. Raspberry pi is the heart of the whole gadget. an automatic irrigation machine is advanced to optimize usage of water for agricultural vegetation. Automation allows us to govern home

equipment automatically. Thus all these available sensor values can be made available to the farmer by a message. In the proposed system “SMS on demand service” is provided to get the status of all parameters like water resource availability, soil’s moisture content, temperature, humidity, rainfall. The goal of this approach is to control the motor and solenoid valve routinely, reveal the plant increase using webcam and also can watch live streaming of the farm on android mobiles by way of using wireless.

III. ARCHITECTURE OF THE SYSTEM

3.1. HARDWARE REQUIREMENTS:

1. Raspberry pi
2. Soil moisture Sensor
3. Temperature Sensor (BMP180)
4. Humidity Sensor
5. Rain Sensor
6. DC Water Pump
7. Solenoid valve
8. Agriculture imaging(Camera)
9. LCD display
10. LDR Sensor

3.2. SOFTWARE REQUIREMENTS:

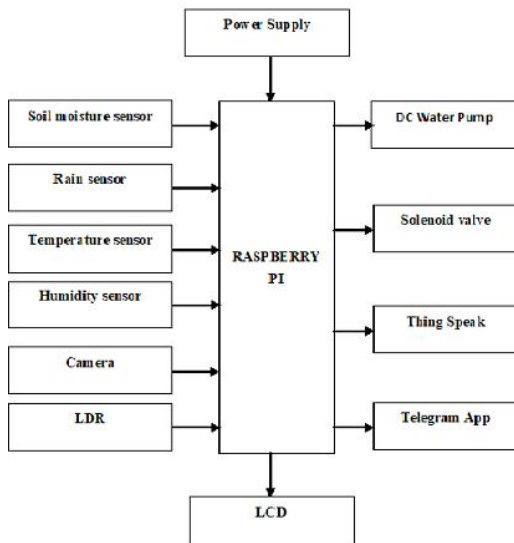
1. Python software:

Python software program is a extensively used excessive level language for popular purpose programming which emphasizes code clarity and a syntax which allow programmers to express standards in fewer lines of code in languages which include C++ or JAVA. The language provides constructs intended to permit writing clear programs on both small and huge scale. The basic gist is as follows:

1. Most production applications today use Python 2.7.
2. Python 3 is ready for the production deployment of applications today.
3. Python 2.7 will handiest acquire vital safety updates till 2020 .
4. The brand name “Python” encapsulates both Python 3 and Python 2.

considering that this version carry new and progressed general library modules, protection and trojan horse fixes ,so it has a big and complete preferred library.

3.3. BLOCK DIAGRAM OF HARDWARE:



3.4. DESCRIPTION OF HARDWARE:

From the above block diagram, it is clear that the controller collects all the information or values regarding the sensors and the collected information is processed and sent to the farmer in the form of message and the captured image is sent using IOT. The Raspberry pi2 is interfaced with the soil moisture sensor, Rainfall detector, Temperature sensor, Humidity sensor(DHT22), light intensity(LDR) and Camera. Based on the values obtained from each sensors, we can find whether the land is dry or wet & accordingly the motor is switched ON/OFF automatically. Later based on rainfall, the solenoid valve can be operated automatically. By using LCD, we can display the measured values. The captured image is sent to the android mobile through Telegram app by using WIFI. The data recorded is transferred by using WIFI and it is uploaded to IOT by using the website i.e., Thing Speak.

Raspberry pi:

The Raspberry Pi is a credit score card sized pc. It's basically a small pc which gives all of the primary features which might be supplied by way of a computer laptop. as an example, it offers functions like word processing, gaming and playing audio/video. In this project Raspberry Pi2 model B is used which is a successor of Raspberry pi.

Soil moisture Sensor:

Soil moisture determines either the soil water content or the soil water potential. It measures the water content in the soil in the units of volume. Since the direct measurement of free soil moisture requires steps for removing, drying, and weighting of samples. Soil moisture sensor measures the volumetric water content indirectly by using soil properties

like electrical resistance, dielectric constant or interaction with neutrons as a proxy for the moisture content

Temperature Sensor (BMP180):

BMP180 is a new generation high precision digital pressure sensor. It works, based on Piezo resistive technology. The BMP180 delivers the uncompensated value of pressure and temperature after receiving the start signal from the processor.

Humidity Sensor:

The DHT22 is a digital relative humidity and temperature sensor. The output of DHT22 is a calibrated digital signal. The DHT22 consists of one thermistor and one capacitive humidity sensor. The thermistor is used to measure temperature and capacitive humidity sensor will measure relative humidity levels in percentage. It will give accurate output readings and also can measure high temperature and humidity levels.

Rain Sensor :

The rain sensor module is an smooth tool for rain detection. Rain sensors are used inside the detection of water past the humidity sensor can discover. it could be used as a switch while raindrop falls through the raining board and additionally to degree rainfall depth.

Agriculture imaging(Camera):

Webcams are video taking pictures devices related to computers or laptop networks, frequently using USB or, if they hook up with networks, Ethernet or wi-fi. they are famous for low manufacturing fees and flexible packages.

LCD display:

A Liquid crystal show is a passive tool, which means it doesn't produce any mild to display characters, images, video and animations. But it honestly alters the mild travelling via it. The inner creation of liquid crystal display describes how the mild is altered whilst it passes via it so that you can produce any characters, photos, and so on.

LDR Sensor:

A light dependent Resistor (LDR) or a picture resistor is a tool whose resistivity is a feature of incident mild electromagnetic radiation. Subsequently, they're mild touchy gadgets. They may be additionally referred to as picture conductors, picture conductive cells or without a doubt

photocells. They're made from semiconductor substances having high resistance.

Power Supply:

A power deliver is an electronic device that resources electric powered electricity to an electrical load. The primary function of a power deliver is to transform one form of electrical strength to every other and, as a end result, strength supplies are sometimes called electric energy converters.

DC Water Pump:

Water pumps are easy gadgets. They force coolant via the engine block, hoses and radiator to remove the heat the engine produces. it is most normally driven off the crankshaft pulley or in some instances the pump is tools-pushed off the crankshaft. The coolant trapped among the impeller blades is thrown outward from centrifugal force. A suction (vacuum) is created in the center place of the pump housing. Coolant is drawn from the radiator via the lower radiator hose into the water pump. The coolant is then circulated thru the engine in which it selections up heat from the combustion manner after which is sent lower back into the radiator where the warmth is transferred to outdoor air.

Solenoid Valve:

Solenoid valves are the most regularly used control factors in fluidics. Their obligations are to shut off, launch, dose, distribute or mix fluids. they're located in many utility areas. Solenoids offer fast and secure switching, excessive reliability, lengthy service life, top medium compatibility of the materials used, low manipulate electricity and compact layout.

Thing Speak:

The internet of things presents to get admission to the broad range of embedded gadgets and internet services. issue talk is an open records platform and API for the net of things that permits to collect, shop, analyze, visualize and act on data from sensors or actuators along with Arduino, Raspberry Pi, Beagle Bone Black and different hardware.

Telegram Bot:

Bots are actually Telegram accounts this is operated by software – no longer human beings – and that they regularly have AI functions. they are able to do whatever – train, play, search, broadcast, remind, join, integrate with other services, or even pass instructions to the net of factors.

IV. EXPERIMENTATION AND RESULTS

To obtain the relevant information, the system is implemented using Raspberry pi.



Here the soil is tested using soil moisture sensor, if it is wet then the pump will OFF or if it is dry then automatically the pump will be ON.

The rain detector helps to find the rain drops and also water level in the farm, there by the solenoid valve will be opened/closed.

The growth of the crop is monitored and message can be received through Telegram app using camera. The parameters such as temperature, pressure, humidity..., are also measured & displayed in the LCD using different sensors.



V. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

1. .The proposed agriculture land monitoring machine with digicam isn't always so pricey.

2. This makes growth in productivity and reduces water consumption.
3. Reduce soil erosion and nutrient leaching.
4. Energy consumption may be very low even it operates on DC battery
5. Device may be operated at night time, water loss from evaporation is minimized.
6. Cameras might be positioned in the agriculture fields.

DISADVANTAGES:

1. High initial price of equipments.
2. Operating charges are typically higher than irrigation by surface strategies.
3. Winds disturb the sprinkler sample giving choppy distribution of irrigation water.
4. Beneath certain climatic situations illnesses can be encouraged.

VI. CONCLUSION AND FUTURE SCOPE

Agriculture management device is expected to play an essential position in improving farming sports. In the course of the past years, state-of-the-art farm control structures have emerged to update previous complicated and monolithic farm systems and software program equipment. The state-of-the-art trend is to enable this control via understanding all the parameters being away from the field. In this proposed work we attempt to permit a farmer to step right into a reality, to control the water motor mechanically wherein person can monitor his farm without definitely being there by way of the use of webcam and he can also watch live streaming of farm on android mobiles with the aid of using Wi-Fi. This system so one can assist a farmer to know his subject repute in his home or he may be living in any part of the arena. It proposes a automatic irrigation system for the agricultural lands.

The destiny scope of this assignment is more suitable packages with the addition of the required capabilities.. Such Sensors can be incorporated within the design. it may also be designed to locate the unique ailment at the plant and propose the proper healing measures on it. By using the use of processors, the video of the agriculture is captured and that video is sent via a multimedia message provider (MMS). Agricultural Robotics performs a great function in society meeting 2050 agricultural production wishes. greater currently, farmers have began to test with autonomous structures that automate or augment operations along with pruning, thinning, and harvesting, as well as mowing, spraying, and weed elimination. • Irrigation and nutrient requirements.

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