Automatic irrigation system using IOT

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Abstract - In our country, agriculture plays an essential role for development in food production. Agriculture depends on the monsoons which is not a sufficient source of water so that the irrigation is employed in agricultural fields. Within the present era, food scarcity and water scarcity occurs because of the rise in population. So to avoid this problem we've to market the agriculture sector. But water wastage is more during this segment within the range of water cataloguing while watering the agricultural fields through irrigation. Therefore an automatic plant irrigation system needs to be designed for the right installation within the fields. It involves in monitoring the agricultural environment for various factors like soil moisture, temperature and humidity together with other factors may be of significance. This paper deals with an automatic plant irrigation system which automatically senses the moisture content of the soil and judge whether irrigation is required or not and the way much water is required for soil. This technique uses At Mega328 microcontroller. It's programmed to sense the moisture content if the soil over a period of your time. When the moisture content is a smaller amount than the limit which is predefined, it'll start supplying the required amount of water till it reaches the limit. So when the soil is dry the pump will automatically water the fields and when the soil is wet the pump will automatically turn out, there by eradicate the requirement of manpower and conserve the time.

Key Words: Irrigation System, Sensing Arrangement, Microcontroller, Solenoid valve, Automatic system.

1. INTRODUCTION

Agriculture is that the significant one for Indian economy. So as to enhance the quality of agriculture a brand new technology has been developed in terms of automatic irrigation system for better and advance agriculture system.. It also helps in time saving, removal of human agriculture and therefore the weather conditions are isotropic, still error in adjusting available soil moisture levels and to we aren't ready to fill up use of agricultural resources. Maximize their net profits. The most reason is that the lack of rains & scarcity of land Irrigation is that the artificial application of water to the soil reservoir water. The continual extraction of water from usually for assisting in growing crops In crop production earth is reducing the water level because of which lot of land is it's mainly utilized in dry areas and in periods of rainfall coming slowly within the zones of un-irrigated land and shortfalls, but also to shield plants against frost. Important reason of this is often thanks to unplanned use of kinds of Irrigation water thanks to which a big amount of water goes to surface irrigation waste. Localized irrigation in modern drip irrigation systems, the foremost significant Drip Irrigation advantage is that water is supplied near the foundation zone of sprinkler irrigation. The plants drip by drip thanks to which an oversized quantity of water is saved. Now farmers are using standard irrigation system like manual control sprinklers and drip irrigation. The complete soil this process sometimes consumes more water or surface is saturated and infrequently stays wet long after irrigation sometimes the water reaches late because of which crops is completed. Such condition promotes infections by leaf get dried. Water deficiencies are often detrimental to plants mould fungi. On the contrary the drip or trickle irrigation is before visible drooping occurs. Slowed rate, lighter a kind of modern irrigation technique that slowly follows small water deficiency

1.1 Objectives of IOT

➢ To under the concept of iot in agriculture
➢ To know the application of iot in agriculture
➢ To discuss the constraints for implementing iot in Indian agriculture scenario
➢ To sensing the volumetric content level in soil by using moisture sensor

1.2 Problem Identification

In our day-to-day life water is the most important compound. Our bodies consume water between 50% to 65% of our body mass. It also comprises 70%of the entire earth. Though, water is the most abundant resource on planet earth. Now a day's our farmers facing a huge agriculture water problem. By the activities of human like deforestation,

mining and dumping of waste into lake, rivers and oceans. By the research of World Wild Fund shows each year we consume 2500 trillion liters of water used in agriculture each year, about 1500 trillion litres' goes to waste.
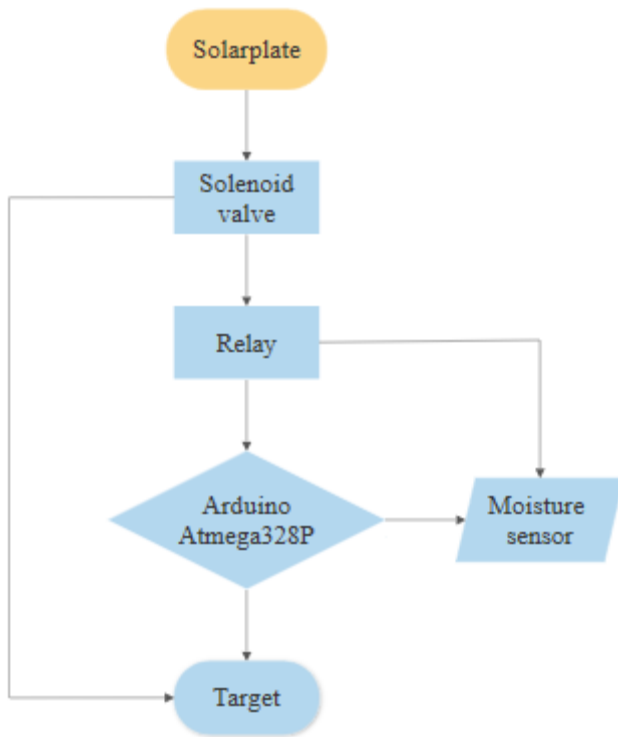
2. Methodology

Fig.1: Schematic diagram for irrigation system

3. EXPERIMENTAL WORK

3.1 Arduino atmega328p

Arduino at mega328P is a microcontroller. This type of microcontroller is employed in arduino UNO board. It absolutely was manufactured by mega MVR family, it's designed for managing larger program memories and every microcontroller during this family contains different sort of ROM, RAM, input and output pins and other facial appearance. It's pretend in several outputs from 8 pins to many pins. Mega328p is premeditated with low current utilization features. The chip contains 32 kilobytes of domestic non-volatile storage, 1 kilobytes of EEPROM and a pair of kilobytes of SRAM. The memories which save the data. The saved information still exits every the ability is disconnected or off, but the SRAM could be a memory which only saves the data until the facility is supplied and when the ability is disconnected all the data saved in SRAM are going to be erase There are several programmers software's are available to program the chip, one amongst the best

thanks to program the chip is by using arduino board and also the arduino software named Arduino IDE. After install the required software the user must write the functions within the IDE or IDP programmer. There are quite lot of guides and tutorials are available.

Fig.2: Arduino atmega 328P

3.2 Moisture Sensor

The soil moisture sensor is one reasonably sensor won't to gauge the volumetric content of water within the soil. These sensors measure the volumetric water content indirectly with the assistance of another rules of soil like dielectric constant, resistivity, otherwise interaction with neutrons, and replacement of the moisture content. The relation among the calculated property moreover as moisture of soil should be adjusted & may change supported ecological factors like temperature, kind of soil, otherwise electric conductivity. The microwave emission which is reflected may be influenced by the moisture of soil likewise as mainly employed in agriculture and remote sensing within hydrology. These sensors normally accustomed check volumetric water content, and another group of sensors calculates a brand new property of moisture within soils named water potential. Generally, these sensors are named as soil water potential sensors which include gypsum blocks and densitometer. This sensor mainly utilizes capacitance to measure the of water content of the soil. The working this sensor are often done by inserting this sensor into the land or soil and therefore the status of the water content within the soil will be reported within the sort of a percent.
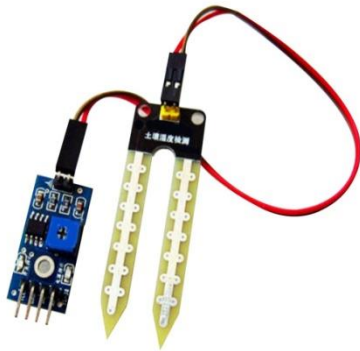
Fig.3: Moisture sensor

3.3 Relay

Relay is known as electrically operated switch. Relay is consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. Its works on the principle of electromagnetic induction. When an electromagnet is applied by passing current it produces a magnetic field around it. Mostly it is used to apply DC current to the load. Where copper coil and the iron core acts as electromagnet. When the coil is applied with DC current it starts attracting is known as energizing of relay. When the current is removed it retrieves back to the original position. In our project we use 5V relay for supplying the current to the solenoid valve motors for distribution of water, when the land is dry.

Fig.4: Relay

3.4 Solenoid Valve

Solenoid valve decides the flow of the fluid. It is an electromechanical device used for controlling liquid or gas flow. Whenever they are energized they allow the fluid flow or vice-versa. They are functioned by building up a magnetic field which in turns pulls the pivoted armature adverse the spring action.

Fig.5: Solenoid valve

3.5 Solar plate

Solar panel is a device is used to absorb the sun ray and convert them into electricity or heat energy. Actually solar plate are collection of photovoltaic cells, it used to generate electricity through photovoltaic effect. Basically this type of cells is arranged in network pattern on the surface of solar panel. Mostly solar plates are made up using crystalline silicon solar cells. By installing of solar panel in agriculture helps in combating the harmful emissions of greenhouse gases and thus helps reduce global warming. The major drawbacks of solar panel are that they are quiet costly.

3.6 Jumper Wire

Jumpers are the electrical wires with or without pins or connectors at each end. They are subjected in handling the connection between components without soldering. Jumpers are employed to connect breadboard or test circuits. Here, a typical male to female jumper is used .As is the custom a male end has a pin to poke into and a females are into plug things.
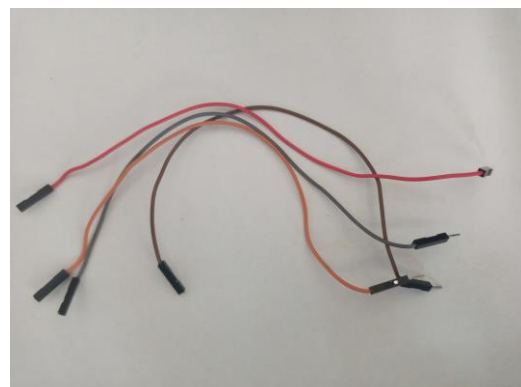

Fig.6: Jumper wire

3.7 Working

The automatic water irrigation system is working by the following procedure. the soil moisture sensor is connected

with arduino by using jumper wire, where the vcc pin is connect in 5v pin in arduino ground pin is connected in ground ,output is taken from digital output is connected in 8v pin.

Relay is connected with arduino by apply 5v supply here we use 4-channel relay control board module with up to coupler .By connecting solenoid vale motor with relay.

After the connection, install the code in arduino by using required software is shown in the bellow table. From the code int sensor =8 is declare a variable and initialize it with 8 (Input pin connected to soil moisture sensor); pinmode(13, OUTPUT) is defined use pinmode function to set pin 13 as output pin; pinMode(8, INPUT) = use pinmode function to set pin 8 as input pin;val = digitalRead(8) is declare take input from the soil Moisture sensor. digitalWrite(13, Low) is declare if soil moisture sensor send LOW value send LOW signal to DC solenoid valve. digitalWrite(13, HIGH) is declare if soil moisture sensor send 'HIGH' valve send 'HIGH'signal to DC solenoid valve. Therefore when the soil is dry by sensing the soil moisture it induced electromagnetic field in the solenoid valve,it supply an water to the plant ,if it's wet is break the electromagnetic field in the solenoid valve by using moisture sensor.

3.7.1 Program Code:

```
int SOLENOIDVALVE = 13;
int sensor = 8;
int val;
voidsetup ( )
{
 pinMode (13, OUTPUT);
 pinMode (8, INPUT);
}

    Voidloop ( )

     {

       Val = digitalRead(8);

        if (val == LOW)

      {

digitalWrite(13, LOW);

       }

else
```

```
     {

          digitalWrite(13, HIGH);

     }

delay(400);

   }
```


Fig.7: Prototype of Automatic Irrigation System

4. CONCLUSION AND FUTURE WORK

The thought of giving life to objects has been among humans since a long time throughout the history. This fiction became fact in the middle of 20th century when they coined the term "Artificial Intelligence". Giving human qualities like thinking and prediction to machines via a programmable code is artificial intelligence. Artificial intelligence has a humongous potential beyond the level of human imagination. While thinking of making a humanoid artifice AI comes handy considering it's enriching techniques to find the surreptitious arrangements for a given data.

We are living in a millennium where data is everything, still agriculture is the exigency. Smart agriculture can be accomplished by big data comprising the amassment of agriculture. AI model can be set up by employing the data acquired. An unsupervised model suits well to anticipate the crop cycle when the model is fed with data where parameters like climatic change, soil wealth, rain patterns, market happenings are taken into account. Agrobots are adequate to take care of the field once the predicted data is implemented in deciding the crop cycle. Sustainable agriculture is possible with the future smart farms.

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