DESIGN AND FABRICATION OF DRIP IRRIGATION SYSTEM

Mr.K.Gopi[1],Dr.N.Manikandan[2] , J.Abinanth Karthick[3], L.Rahul Prasanth[3], S.Ramesh[3], M.Praveen Kumar[3]

1- Assistant professor -Department of Mechanical engineering P.A College of Engineering and Technology, Pollachi,Tamilnadu,India.

2- Associate professor- Department of Mechanical engineering P.A College of Engineering and Technology, Pollachi,Tamilnadu, India.

3-Department of Mechanical engineering , P.A College of Engineering and Technology, Pollachi, Tamilnadu,India.

Abstract--- This project on "Drip Irrigation System with sensor" the Design of Embedded system for the Automation of Drip irrigation is presented. The green house based modern agriculture industries are the recent requirement in every part of agriculture in India. In this technology, the humidity and temperature of plants are precisely monitored and controlled. Water is very precious to all the humans and as well as to the plants, trees. The major amount of fresh water is utilized by the agricultural industry for irrigation. By using drip irrigation, the water will be maintained at the constant level that is the water will reach the roots by going drop by drop. This is very important because this can only ensure the survival of the plants. Water can be applied at a single point on the land surface through devices called emitters or as a line source from either closely spaced emitters or tubes with continuous or equally spaced openings that discharge water a drop at a time. If the field is irrigated heavily with water, there are chances that the plant may die because of excessive irrigation. The water could also wash them away during irrigation if very strong force of water is released at the same time. On the other hand, if there is insufficient water, then also there are chances that the plants may die due to lack of water.

Keywords-Drip Irrigation,Microcontroller,Automatic watering system,Automation in small scale

1. INTRODUCTION

Drip irrigation technology uses weather data or soil moisture data to determine the irrigation needs of the landscape. Innovative irrigation technology includes: These products maximize irrigation efficiency by reducing water waste while maintaining plant health and quality. its potential to revolutionize water management practices and foster a greener, more sustainable future.

Drip irrigation is an advanced and efficient method of delivering water to plants in agriculture. It involves the use of sensors and technology to monitor and control the precise amount of water that is delivered to each plant, ensuring optimal growth and water conservation.

"Water is life" in true sense, the word has meaning. Every living being requires water for their survival such as human beings , plants .crops etc. requirement of water vary from region to region.in India as we all know that ,the only source of water is rain which fulfil this demand.it means we highly depends on the monsoon season but in India monsoon is not faithful .sometimes there may be heavy rain causing floods ,which destroys and damage crop, sometimes there may not be rain at all creating scarcity of water for crop .though water is renewable source of nature ,but if monsoon is not faithful ,then huge scarcity of water specially in Marathwada region, which is listed in drought region .hence to overcome these difficulties, there is need of implementing various methods and measures to store during period of excess rainfall and use that water during no rainfall or less rainfall. Hence there are various technics to conserve the water to overcome difficulties .we adopt the irrigation system or technique.

In India, where 60-70% economy depends on agriculture, there is a great need to modernize the conventional agricultural practices for the better productivity. Due to unplanned use of water, the ground water level is decreasing day by day. Lack of rain and scarcity of land water also results in decrement in volume of water on earth. In present drip irrigation system water is provided to root zone of plants drop by drop which results in saving of huge amount of water. Agriculture is the backbone of Indian Economy. Without agriculture living is impossible since agriculture produces the main source of food for us. Today the availability of labor for carrying out agricultural activities is less; therefore, the automation in agricultural process is needed. In the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. This problem can be perfectly rectified if we use GSM based automatic drip irrigation system in which the irrigation will take place only when there will be intense requirement of water.

Real-time monitoring of soil moisture can provide useful information for optimizing the amount and timing of irrigation [9,10]. Soil moisture can be measured using electromagnetic methods, such as time domain reflectometry (TDR) [11] and capacitance sensors [12], or using electrical resistance blocks [13], neutron probes [14], or tensiometers [15]. Among the range of different soil water sensing technologies, capacitance-type soil moisture sensors [16,17] are the most popular because of their cost, reasonable robustness and precision, low power consumption, and low maintenance requirement.

2. LITERATURE REVIEW

Zoraida Muhammad.(**2020**)studied on microcontroller is a Raspberry Pi 4 Model B. The temperature and humidity in the surrounding region, as well as the moisture level of the soil, are monitored using the DHT22 and soil moisture sensor. The data will be available on both a smartphone and a computer.[1]

Divya J.(2017) researched on the agriculture is essential to India's economy and people's survival. The purpose of this project is to create an embedded-based soil monitoring and irrigation system that will reduce manual field monitoring and provide information via a mobile app.[2]

H.G.C.R.Laksir.(2019)studied on Development of an effective lot-based smart irrigation system is also a crucial demand for farmers in the field of agriculture. This research develops a low-cost, weather-based smart watering system.[3]

AnushreeMat.(2018) researched on Irrigation is the process of providing a certain amount of water to plants at a specific time. The purpose of this project is to water the plants on the National Institute of Technology Karnataka campus with a smart drip irrigation system.[4]

Dweepayan Mishra.(2018) studied on crop beds with ideal conditions and appropriate moisture can have a big influence on output. Traditional irrigation systems, such as stream flows from one end to the other, are usually used. As a result of this delivery, the moisture levels in the fields can alter.[5]

3. LIST OF COMPONENTS USED

Table.1.List of components

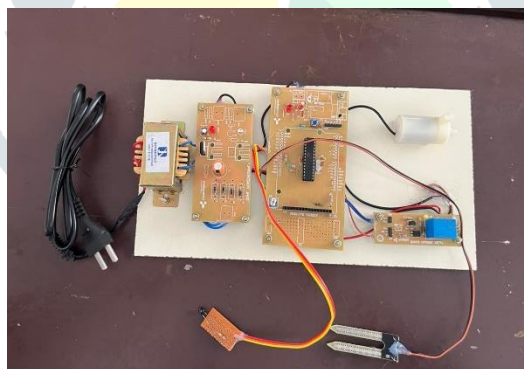| S.no	Name of the Component	Range
1	Pumping Motor	3 ~ 6V
2	Soil Moisture	10-bit ADC
3	Relay	30mA for a 12V
4	Microcontroller	ATmega328P
5	Power supply	12-0-12V

Fig.1.Pannel layout

Fig.2.Motor

Fig.3.Soil humidity sensor

Fig.5.Microcontroller PIC6F877A

5. WORKING PRINCIPLE

Now a day, every system is automated in order to face new challenges in the present-day situation. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of electronics automated systems are doing better performance increasingly.The project title itself indicates that the system checks the moisture content in the soil, based on that pumping motor will automatically pumps the water into the field. Here we are using soil moisture sensor.

By using this sensor, we can find whether the soil is wet or dry. If it is dry, pumping motor will pump the water. In this project, the main controlling device is ATMEGA328microcontroller. Here soil sensor is placed inside the soil which senses the water content. If the water content in soil reduces and becomes dry the sensor will give the status of the soil to the microcontroller, based on that microcontroller will switch on or off the pumping motor through relay. Also, if Temperature increased then the temperature sensor will give status of the Air temperature to the microcontroller, based on that microcontroller will switch on or off the pumping motor through relay. The pumping motor will pump the water into the field until the field is wet which is continuously monitor by the microcontroller by means of Soil moisture sensor.

APPLICATION

- Irrigation purpose
- Field monitoring system.
- Crop Rotation and Soil Health
- Improve Crop Yields.

ADVANTAGES

- High efficiency in the use of fertilizers.
- Low labor and relatively low operation costs.
- Soil erosion is eliminated.
- Improved infiltration in the soil of low intake.
- No runoff of fertilizers into groundwater.
- Less evaporation losses of water as compared to other methods.

6. CONCLUSION

Through the comparison, we can conclude that automatic drip irrigation system has lots of advantages then general drip irrigation. This system not just save the money, time, labor work but also increase the food production. It also reduces the soil erosion. Through this system dependency of labor can be neglected. If this technique adopted in region like marathwada, it will ensure the minimum losses of water and creating a healthy atmosphere to achieve the sustainable development goal for nation.

In areas with scarce water resources, maximizing efficiency is crucial for sustainable agriculture. Traditional drip irrigation systems, while a significant improvement over conventional methods, still require manual intervention to adjust watering

schedules based on weather conditions and plant needs. This dependence on human labor can be a significant drawback, especially in regions with limited manpower or unpredictable weather patterns.

Automatic drip irrigation systems address these limitations by introducing automation. These systems utilize timers and sensors to deliver water directly to plant roots at precise intervals and quantities. This targeted approach not only conserves water, but also demonstrably increases food production by ensuring plants receive the optimal amount of moisture throughout their growth cycle. Additionally, automatic drip irrigation minimizes water waste by eliminating evaporation from surface irrigation and helps prevent soil erosion by reducing water runoff. This reduction in water runoff also lessens reliance on manual labor for tasks like adjusting water flow or repairing erosion damage.

Implementing automatic drip irrigation systems in water-stressed regions like Marathwada holds immense potential. With minimal water loss and precise delivery, these systems can significantly contribute to achieving the nation's sustainable development goals. By fostering a healthy environment with improved water management and reduced soil erosion, automatic drip irrigation paves the way for long-term agricultural success and food security.

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