

Smart Irrigation System

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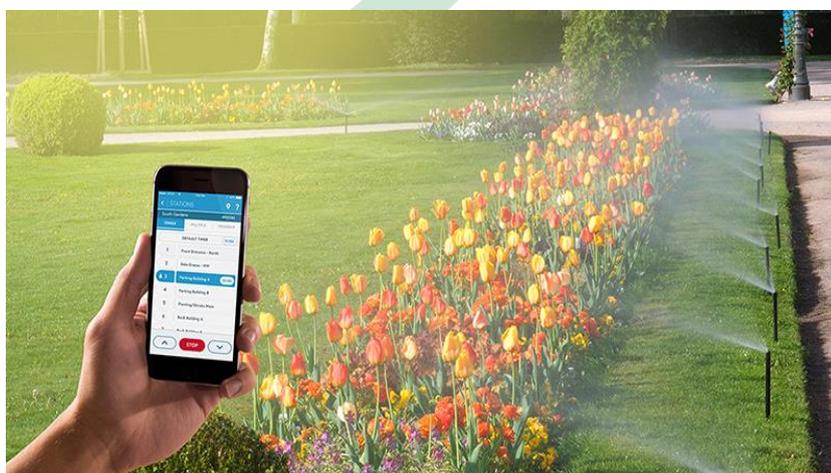
Abstract:

Agriculture plays an important role in the life of a Gross Domestic Product of every country. Many problems have been found in this field. As the most serious problem is the shortage of water resources for the present as well as future generations. It is necessary to adopt some smart techniques to preserve the water and to control the water supply to the agriculture fields according to their need. For this, soil moisture and DHT-11 temperature sensors are used. All the information is sent on the farmer mobile application using Wi-Fi Module and Arduino UNO R3.

INTRODUCTION:

Agriculture contributes a lot to the economy of India. It is observed that 70% of India's population depends on agriculture for employment. IoT (Internet of Things) is helping the farmers to fight with most of the agriculture problems. As India is the second-largest country in the growth of population so it is necessary to increase the rate of production of agriculture to meet the population food consumption rate.

Every year irrigation requires more water consumption than rainfall, which will lead to a critical problem of water resources for future generations. It is also difficult for farmers to find ways that need less water to grow crops.



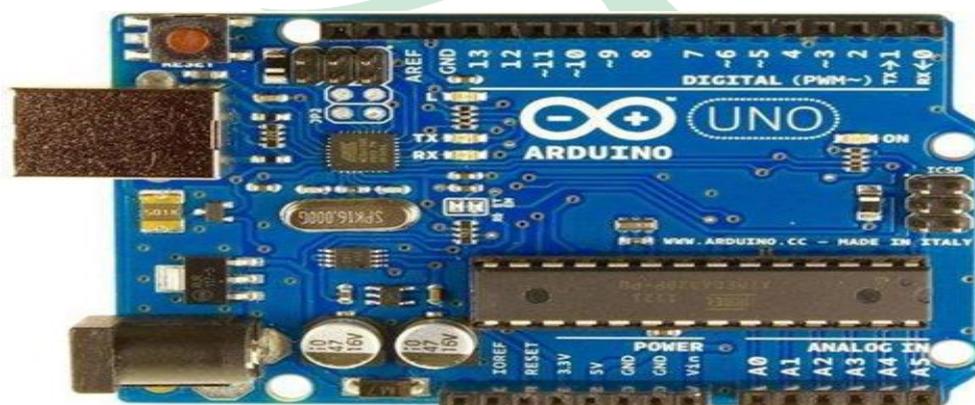
From many surveys, the report is that agriculture uses 85% of the freshwater. If this percentage of freshwater usage continues to grow, then it becomes a serious problem with respect to an increase in population growth and increases in demand for food.

To preserve water resources for future generations and for proper usage of water resources, it is necessary to adopt some strategies so minimal water is required as per requirement. There should be some techniques which must be implemented to stop the wastage of water resources.

IoT is a technology that enables us to adopt the strategies to monitor the usage of water resources in agriculture fields via connecting with android applications. The soil moisture sensor is placed in the soil with crops, which checks the moisture level of the soil and send signals to Arduino. Arduino takes the decision of whether to switch-on or switch-off the water motor. Using this smart technique to minimize the wastage of water in agricultural fields and increases efficiency which enhances the capability and helps to minimize the cost.

Proposed System:

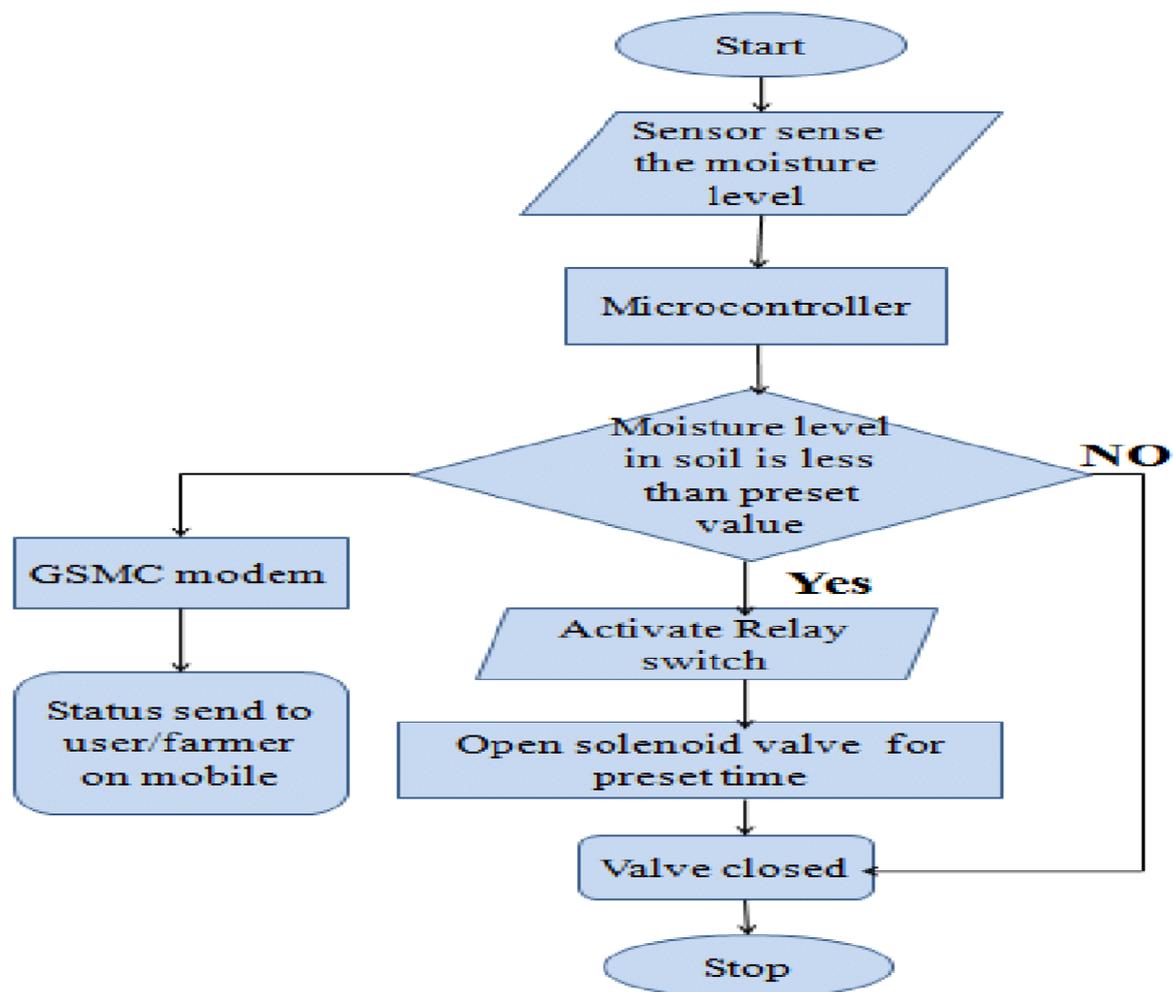
In this system, both the sensors DHT-11 Temperature and soil moisture sensors are connected to the input pins of the Arduino UNO R3 microcontroller board. The analog values produced from the sensors are converted to a digital output value by the Arduino UNO R3. The sensed values are displayed in the mobile application. The water motor gets switch-off or switch-on



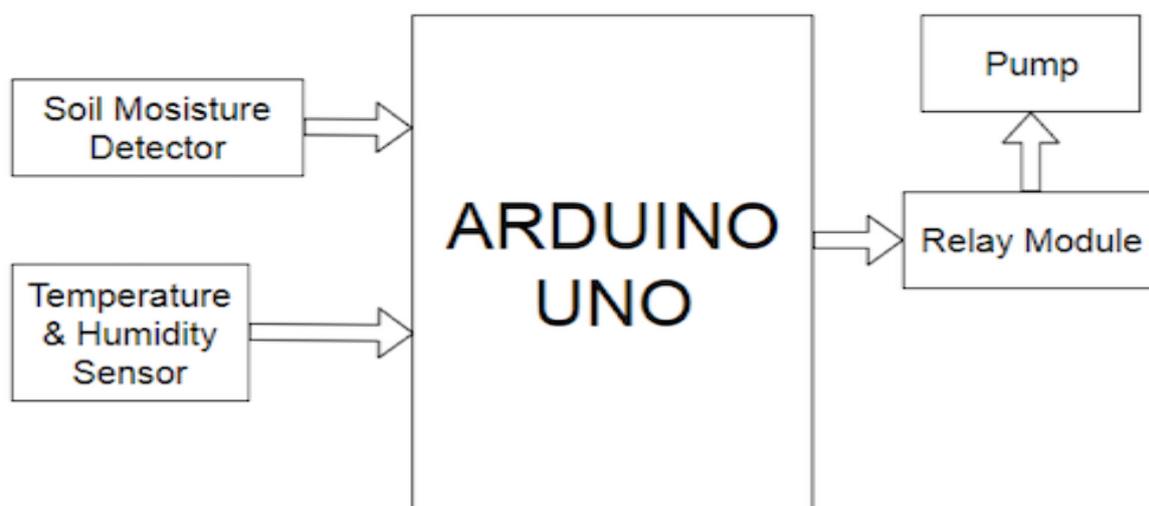
automatically based on the sensed value with respect to an already fixed threshold value

PROCESS:

1. Soil moisture sensor senses the moisture level of the soil (less than or more than).
2. If the moisture sensed value is greater than the fixed threshold value than no need to switch on the motor.
3. If the Moisture level is less than the threshold value, then the water motor is switched on automatically.
4. Once moisture level comes equal to the threshold value, it moves to its initial state (switch off the water motor).
5. End the process.



Flow Chart of Proposed Smart Irrigation System



Components Description:

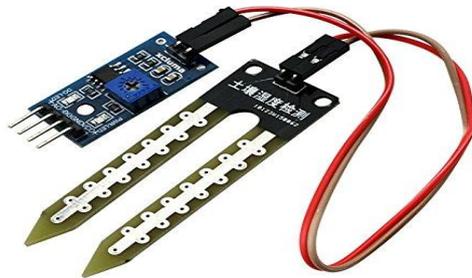
1. Arduino UNO R3:

The Arduino UNO R3 (also called ATmega328) is a dual-inline-package (DIP) microcontroller. Arduino IDE 1.8.9 is the open source Arduino software which is used to Arduino based code and upload it to an Arduino board. It can run on any platform like on Windows, Mac OS X, and Linus.

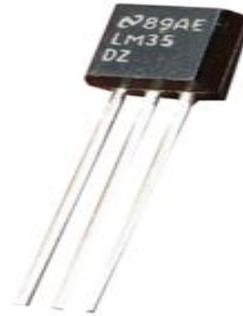
2. Sensors:

- a. **Soil moisture sensor:** It has two probes which are used to sense the water level of the plants. The current is passed from these two probes then it estimates the resistance value of the moisture level. If the water level of the soil is then the resistance value is less and vice versa.

SOIL MOISTURE SENSOR

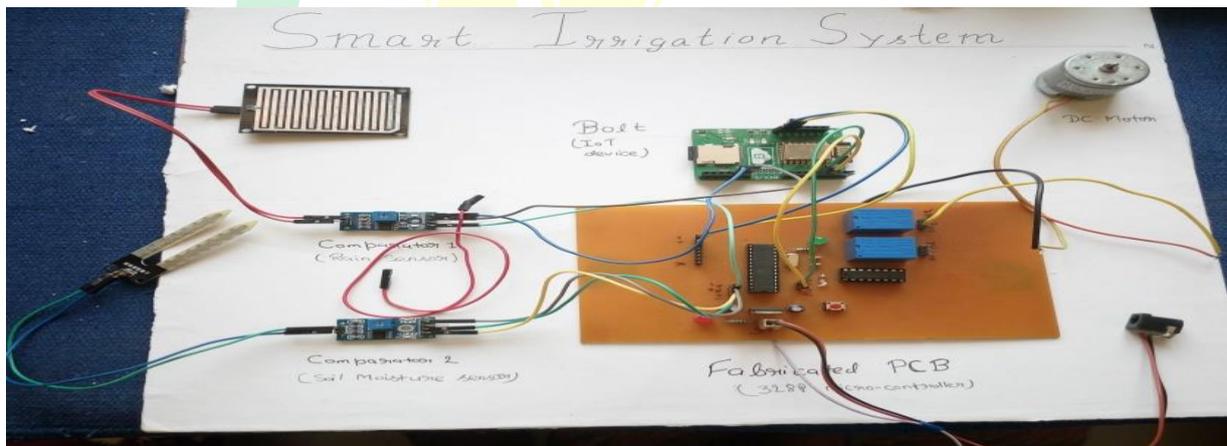


TEMPERATURE SENSOR



- b. **Temperature sensor:** The temperature sensor LM35 used to measure temperature in Celsius. The advantage of using the LM35 temperature sensor does not require any external calculations.

Smart Irrigation System Using IoT:



Conclusion and Future Scope:

This automated Smart Irrigation System using IoT is found to be cost-effective for enhancing the techniques to preserve water resources and to optimize them for agriculture production. This system helps the farmer by working automatically and smartly. With placing multiple sensors in the soil, water can be provided only to the required piece of land. This system requires less maintenance, so it is easily affordable by all farmers. This system helps to reduce water consumption and increases crop production to a great extent. As per future perspective, this system can be the more intelligent system which predicts user actions, nutrient levels in the plants, time to harvest, etc.

Future SMART Agriculture using IoT – Big PictureView

