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Automatic Plant Irrigation with Arduino

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Abstract –

"Automatic plant Irrigation with Arduino" project is useful the countries where economy is depends on agriculture and the climatic conditions lead to lack of rains. There are many devices in India which are operated with physical presence of a human being. irrigating fields is the most important and a very laborious task for the farmers, especially in the summer season. Manual watering increases the difficulty and is time consuming.

Thus, we need effective technologies to overcome these problems. Auto-watering systems can be efficiently used to water plants when needed, which controls when and how much watering needs to be done.

So the purpose of soil moisture monitoring system, is to detect if the moisture content in the soil is above or below a certain satisfactory threshold value. If it goes below a certain critical point, it is time to water the plant until the soil surrounding the plant is moist enough. For large scale implementation, we can use solar panels to conserve energy.

Keywords---Soil Moisture Sensor, Arduino UNO Board, dc motor

1. INTRODUCTION

Plants are an essential part of our ecosystem, and their proper care and nourishment are crucial for their growth and development. One of the most critical aspects of plant care is watering, which is essential to keep plants hydrated and healthy. However, manual watering of plants can be a time-consuming and labour-intensive task, especially when dealing with large plant collections or in situations where the caretaker is absent for extended periods .

To overcome these challenges, automated plant watering systems have been developed, which can provide a consistent and reliable water supply to plants, without requiring human intervention. These systems use a variety of sensors, such as soil moisture sensors, to detect the moisture levels in the soil and trigger the watering process when necessary. Automatic plant watering systems have become increasingly popular in recent years, and are now widely used in commercial and residential settings. These systems not only reduce the workload for caretakers, but also ensure that plants receive the optimal amount of water, which can result in better growth and higher yields .

In this paper, we will present a detailed overview of automatic plant watering systems, including their design, implementation, and performance evaluation. We will also discuss the various sensors and control strategies used in these systems. An arrangement of a DC motor and a servo motor is used to control the watering mechanism.

2. LITRATURE SURVEY

" Real-Time Automatization of Irrigation system for Social Modernization of Indian Agricultural System " by Mahesh M. Galgalikar proposes the use of ARM7TDMI core with the help of GSM technologies. This finds application in domestic agricultural field. In civilian domain, this can be used to ensure faithful irrigation of farm field.

M. P. Nair, et al.'s study on "IoT based smart irrigation system for agriculture" was to develop and evaluate a system that uses Internet of Things (IoT) technology to monitor and control irrigation in agriculture. The study aimed to demonstrate the feasibility and effectiveness of the system in improving crop yield and reducing water wastage.

"Design and development of automatic plant watering system" by N. K. Pareek et al. is to propose a system for automatic plant watering that uses a soil moisture sensor to detect the moisture level in the soil and triggers the watering process when the moisture level falls below a certain threshold.

The purpose of N. J. Kadam and P. D. Patil's study on "IoT based smart irrigation system using Raspberry Pi" was to develop and evaluate a system that uses Raspberry Pi, a low-cost microcontroller, and IoT technology to monitor and control irrigation.

J. K. Kim, et al.'s study on "An automatic plant watering system based on microcontroller" was to develop and evaluate an automatic plant watering system that uses a microcontroller to control the watering process based on the moisture level in the soil.

3. METHODOLOGY

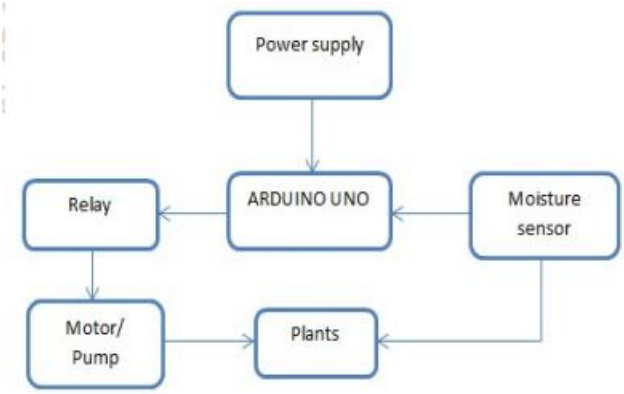


Fig 1. Block diagram of automatic plant watering system.

There are two functional components in this paper. They are moisture sensor and motor / pump. The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. Arduino board is programmed using the Arduino IDE software. Soil Moisture Sensor is used to detect the soil moisture content. The Arduino decides whether soil moisture is above or below threshold value. If moisture content is low, the servo motor does its job and the watering mechanism is activated else watering mechanism is deactivated.

4. System Requirements

Following are the Software and Hardware Components require for this project

- **Hardware description**
- Atmega 328 Microcontroller
- 12V DC motor
- Relay module
- Jump wire
- Power Supply
- **Software Description**
- Arduino IDE

Fig 2. ATmega 328 microcontroller

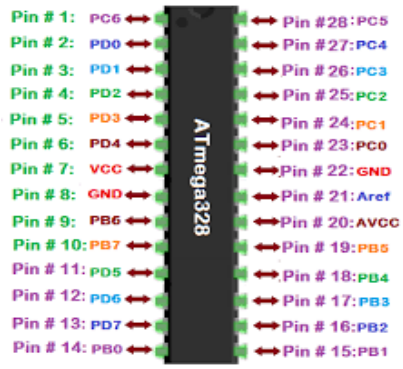


Fig 3. ATmega 328(AVR) pins

Fig 4. 4 Moisture sensor

Soil moisture sensors measure the volumetric water content in soil. Soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil.

Fig 5. Relay module

Fig 6. 5V Relay Terminal and Pins

Fig 7. 12V DC motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power . The most common types of DC motors rely on the forces produced by magnetic fields . A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

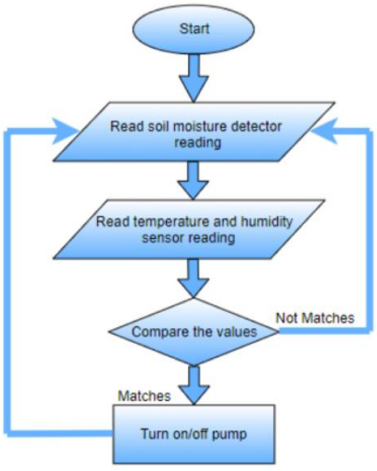
Fig 8. Arduino UNO Board

The Arduino is an open-source microcontroller based kit for building digital devices and interactive objects that can sense and control objects in the physical world .The Arduino board provides sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits .The Arduino Uno board is versatile, easy to use, and can be connected to a variety of sensors, actuators, and other electronic components to create a wide range of projects**.**

5. PROGRAM USING ARDUINO IDE

```
int moisture_sensor = A0;
int moisture;
int limit = 40;
int WATERPUMP = 13;
int sets;
void setup() {
Serial.begin(9600); // opens serial port, sets data rate to 9600 bps;
pinMode(moisture_sensor,INPUT);
pinMode(WATERPUMP,OUTPUT);
}
void loop() {
moisture = analogRead(moisture_sensor);
moisture=map(moisture,550,0,0,100);
Serial.print("Moisture=");
Serial.print(moisture);
v Serial.println("%");
if (Serial.available()); {
 int speed= Serial.parseInt(); {
analogWrite(WATERPUMP,speed);
}
if (moisture>limit) {
digitalWrite(13,LOW);
}
}
else
digitalWrite(13,HIGH);
}
delay(400);
}
```

6. FLOWCHART



7. OUTCOMES

8. FUTURE SCOPE

In this project, we have merely built a prototype. But the advantages of this project are numerous. If we can implement this technology in the real world, a lot of water can be saved. The world uses about 70% of freshwater for irrigation and on the other hand irrigation multiplies yield of most crops by almost 2 to 5 times.The best solution out of this is controlled usage of water for irrigation purpose - a purpose successfully fulfilled by this project.

The System is intended for small gardens and residential environment. By using advanced soil moisture sensor, the same circuit can be expanded to large agricultural fields.

9. CONCLUSION

An automatic plant watering system is an efficient and convenient way to ensure that plants receive the proper amount of water without the need for constant manual monitoring. This system can be designed using various technologies such as sensors, microcontrollers, and water pump.

an automatic plant watering system is an innovative solution for plant maintenance that utilizes technology to improve efficiency and sustainability. By measuring the soil moisture level and activating the water pump when needed, this system can save time and effort, improve plant growth, and reduce water usage. It is a valuable project that combines technology and plant care to rovidea convenient and eco-friendly solution for maintaining healthy plants.

10. ACKNOWLEDGMENT

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11. REFERENCES

[1] N. K. Pareek, et al., "Design and development of automatic plant watering system," Journal of Chemical and Pharmaceutical Sciences, vol. 7, no. 2, pp. 72-75, 2014.

[2] S. S. Kadam and M. D. Dhanokar, "Automatic plant irrigation system using soil moisture sensor," International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, vol. 3, no. 8, pp. 1-4, 2015.

[3] J. K. Kim, et al., "An automatic plant watering system based on microcontroller," Journal of the Korean Society of Agricultural Engineers, vol. 60, no. 3, pp. 97-102, 2018.

[4] M. P. Nair, et al., "IoT based smart irrigation system for agriculture," International Journal of Emerging Trends & Technology in Computer Science, vol. 5, no. 2, pp. 262-266, 2016

[5] N. J. Kadam and P. D. Patil, "IoT based smart irrigation system using Raspberry Pi," International Journal of Computer Science and Mobile Computing