AUTOMATIC WATER IRRIGATION SYSTEM

B. Tech Mini Project Progress Report [BCC-351]

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1. Introduction

1.1 Motivation for Automatic water irrigation System

Automatic Plant Watering System as the name suggests uses a soil moisture sensor to sense the moisture present in the soil. In doing so it provides water supply to the plant when the soil isn't wet enough for plant and stops when it can be overdone.
An automatic plant irrigation system is a device or set of devices that watersplants without human intervention. It uses sensors to monitor soil moisture,temperature, and other environmental factors, and then automatically delivers water to the plants when needed.

1.2 Benefits of using an automatic irrigation system:

• **Saves water**: Automatic systems only water plants when they need it, which can save a significant amount of water compared to traditional methods of irrigation, such as hand watering or sprinklers.

• **Reduces labour**: Automatic systems eliminate the need for manual watering, which can save time and effort.

• **Improves plant health**: By providing plants with the right amount of water at the right time, automatic systems can help to prevent drought stress and other problems.

• **Provides peace of mind:** Knowing that your plants are being watered properly, even when you're not there, can give you peace of mind.

1.3 Types of automatic irrigation systems:

There are many different types of automatic irrigation systems available, each with its own advantages and disadvantages. Some of the most common types include:

Drip irrigation: This type of system delivers water directly to the roots of plants through a network of tubes or emitters. Drip irrigation is very efficient and can save a lot of water.

Sprinkler irrigation: This type of system uses sprinklers to water plants. Sprinkler irrigation is not as efficient as drip irrigation, but it can be a good option for large areas.

Subsurface irrigation: This type of system uses a network of pipes buried underground to deliver water to the roots of plants. Subsurface irrigation is very efficient and can be a good option for areas with high evaporation rates.

1.4 Choosing the right automatic irrigation system:

The best automatic irrigation system for your needs will depend on a number of factors, such as the type of plants you are growing, the size of your garden, and your budget. It is important to do your research and choose a system that is right for you. Dive into the Future of Plant Care: Automatic Irrigation Systems
Imagine a world where your plants thrive effortlessly, even when you're away. No more wilting leaves or missed watering days! This isn't a fantasy, it's the reality promised by automatic plant irrigation systems. These innovative tools are revolutionizing how we care for our greenery, offering a blend of convenience, efficiency, and sustainability.

What are these systems?

In essence, automatic irrigation systems take the guesswork out of watering. They use sensors to monitor your plants' needs, from soil moisture levels to temperature and sunlight exposure. Based on this real-time data, the system automatically delivers the precise amount of water each plant requires, ensuring optimal growth and health.

Benefits galore:

Water conservation: Say goodbye to water waste! These systems use only the water your plants truly need, minimizing precious resource consumption.Reduced effort: No more lugging watering cans or setting timers. Automatic systems handle everything, freeing your time for other pursuits.Improved plant health: Consistent, targeted watering leads to healthier, happier plants. You'll see vibrant blooms, bountiful harvests, and overall stronger growth.

Peace of mind: Whether you're on vacation or simply busy, your plants are never neglected. Automatic systems offer the ultimate peace of mind knowing your greenery is always well-cared for.

Beyond the basics: Modern irrigation systems are not one-size-fits-all. They can be customized to your specific needs, with features like-

- **Drip irrigation:** Targets water directly to the roots for maximum efficiency. Sprinkler systems: Ideal for larger areas or gardens with diverse plant needs.
- **Mobile app control:** Monitor and adjust your system remotely from your smartphone.
- **Weather-based adjustments:** Automatically adapts watering to rain or drought conditions.
- **The future is green:** The future of automatic irrigation systems is brimming with possibilities. Imagine AI-powered systems that learn your plants' individual needs and adjust watering accordingly. Or picture integrated sensors that monitor not just water, but also nutrient levels, triggering targeted fertilization for optimal growth.

2. COMPONENTS USED FOR IMPLEMENTATION OF SYSTEM

- **Arduino Uno:** Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input /output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with a AC-to-DC adapter or battery is connected to a computer begins.

Fig no. 1

- **Moisture Sensor:** Soil moisture sensor measures the soil water content. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used are:
  •Frequency domain sensor, such as a capacitive sensor.
  • Neutron moisture meter, characteristic of the use of water in the neutron moderator.
  • Soil resistivity. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content.

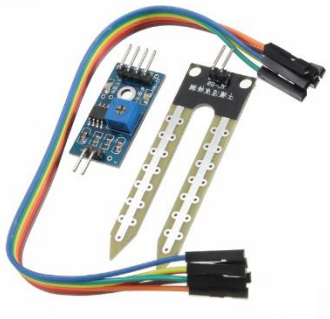

Fig no. 2

- **Water Pump:** Water is used to perform a specific task of artificially pumping. It can be controlled by an electronic microcontroller. It can be on 1 triggered by sending the signal and turned off as needed. Artificial process is called Water Pumping Station. There are many varieties of pumps. This project uses a small pump connected to the H-bridge.

Fig no. 3

- **The Relay Module:** Relay is an electrically operated switch. Many relays for switching solenoid mechanism mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.

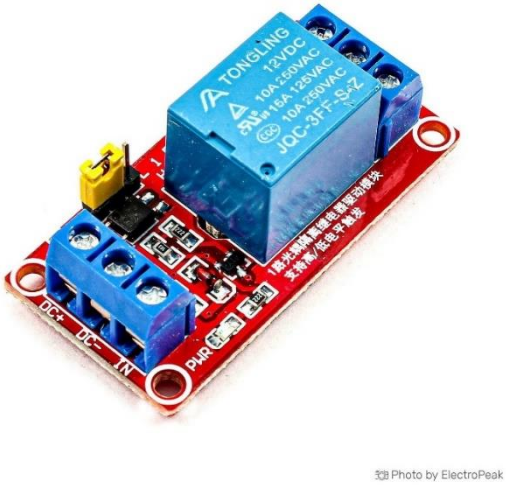

Fig no. 4

- **Arduino IDE Tool:** Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X and Linux. Environment is written in Java, and according to the processing, AVC-GCC, as well as other open source software.

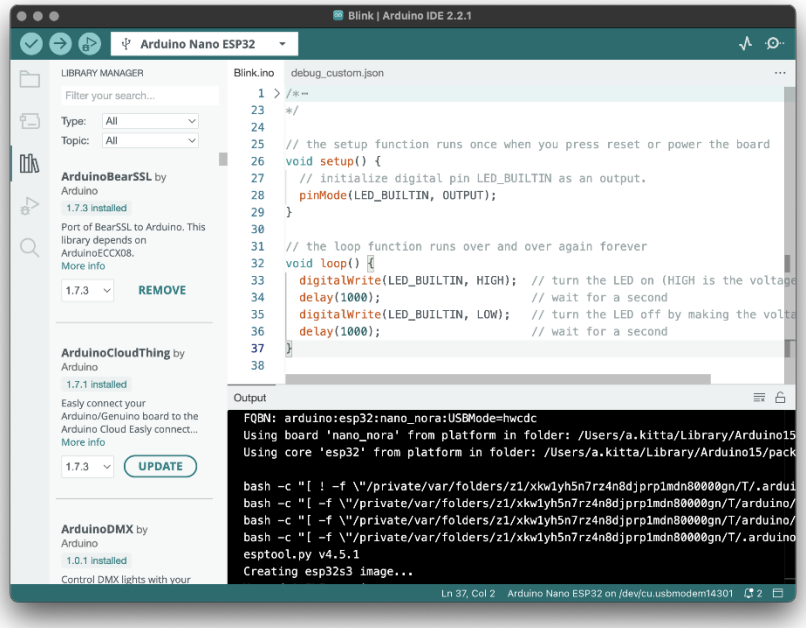

Fig no. 5

3. METHODOLOGY

- **Build System Relay:** We create connections to the solid state relays, Arduino, and small fountain pump system, Arduino allows the pump open or close automatically. A striped cut through the inner tube of the pump segment insulated wire, only half. Install the new cut wire, there are two output relays at both ends. We put on the bare electrical tape. Finally, the ground relay is connected to the Arduino ground and relay input to the Arduino digital pins.

- **Build up System Reservoir:** Submerged pump supplies a desired amount of water needed by the plant in order to work properly. Automate this process, we use a float valve, which you need to open whenever needed, close the connection when the water level rises and water hoses. Drilling is high enough to ensure that the float valve chamber, sufficient to accommodate the width of the tank float.

- **Build System tubing and connect:** Connection to plastic lob feed pumps and drilling small holes through which water droplets. All of the trunk circuit.

- **Code:** Automated plant watering system is programmed using Arduino IDE software. Arduino microcontroller checks soil moisture level, if low, triggering a water pump on until sensor reaches threshold. After this, the system will re-check the soil moisture between periodic intervals to see if you need more water. If the water in the initial inspection, no water or comment, the system waits 24 hours, and repeat the process.

4. EXPERIMENT AND RESULT

From this work, we can control the moisture content of the soil of cultivated land. According to soil moisture, water pumping motor turned on or off via the relay automatically. This saves water, while the water level can be obtained in a preferred aspect of the plant, thereby increasing productivity of crops. Servo motor from vegetation water uniformly dispersed in water, in order to ensure the maximum utilization of absorption through. Thus, there is minimal waste of water. The system also allows the delivery to the plant when needed based on the type of plant, soil moisture, and observed temperature. The proposed work minimizes the efforts of major agricultural regions. Many aspects of the system can be customized and used software to fine-tune the requirements of the plant. The result is a scalable, supporting technology. Using this sensor, we can see that the soil is wet or dry. If it is dry, the motor will automatically start pumping water.

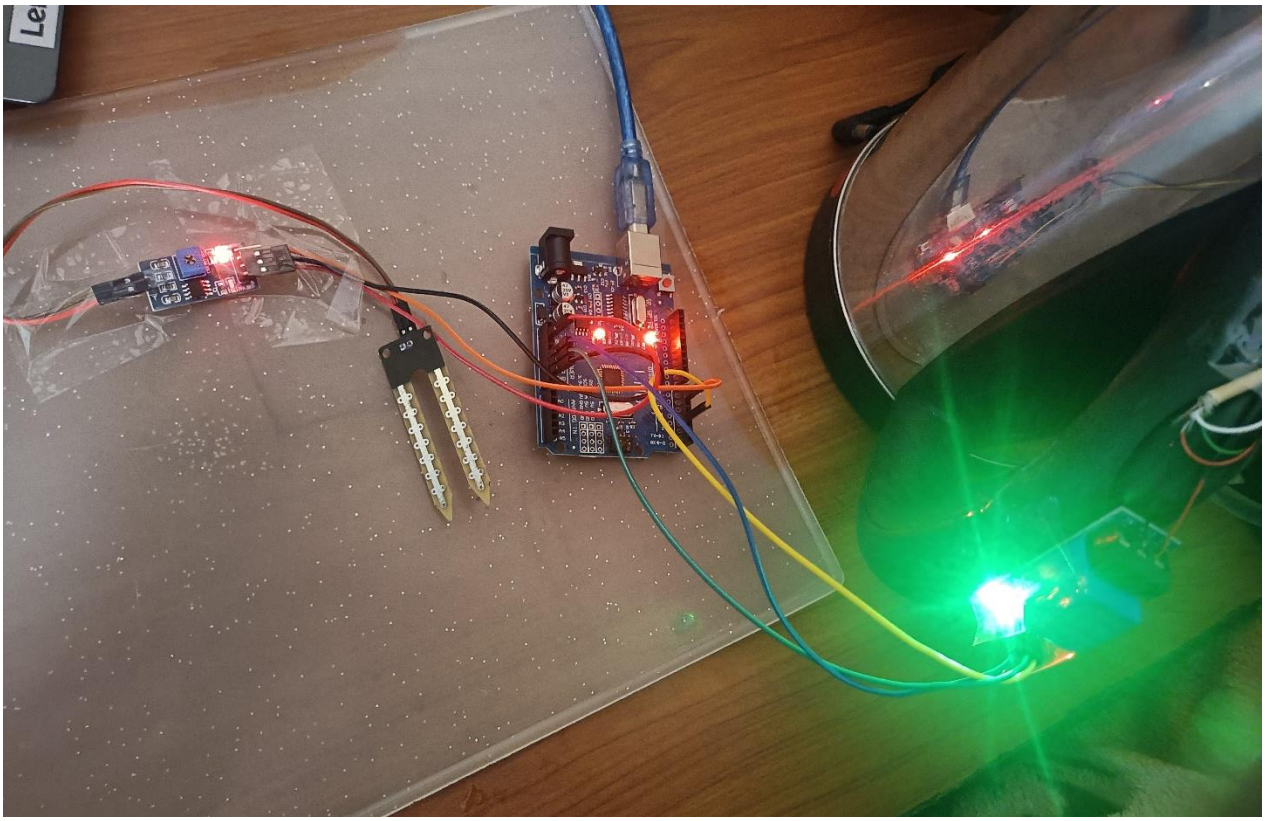

Fig no. 6

5. FUTURE SCOPE

The future of automatic water plantation systems is poised for significant advancements, focusing on sustainability and efficiency to meet the increasing global food demand. Innovations are expected in sensor technology, providing precise data for tailored irrigation, and in the integration of robotics and autonomous systems for comprehensive farm management. AI and machine learning will enhance decision-making, using diverse data sources to optimize irrigation schedules and predict water needs accurately. The Internet of Things (IoT) will improve system connectivity, allowing for real-time management across extensive agricultural areas.

Additionally, advancements in water recycling and rainwater harvesting will support sustainable water use. Customizable and scalable solutions will cater to various agricultural needs, from small gardens to large-scale farms. Supportive policy initiatives and educational programs will likely encourage the adoption of these technologies, emphasizing water conservation. Global collaboration will be crucial in addressing water scarcity, food security, and climate change challenges. Ultimately, these technological integrations and advancements will transform agriculture into a more efficient, sustainable, and resilient industry, ensuring better water management and higher crop yields.

6. CONCLUSION

The development of an automatic irrigation system utilizing a microcontroller, moisture sensors, and additional electronic tools marks a significant advancement in agricultural technology. This system intelligently manages the irrigation process by continuously monitoring the soil's moisture levels, ensuring that water is only dispensed when necessary. This methodology significantly optimizes water usage, a critical factor given the increasing concerns over water scarcity globally. The system's ability to automatically activate a motor to pump water when the soil is dry, and subsequently turn it off once the desired moisture level is achieved, showcases a highly efficient approach to irrigation. This not only conserves water but also promotes the healthier growth of crops by maintaining optimal soil conditions.

Furthermore, the implementation of such technology reduces the need for manual labor in monitoring and managing irrigation, thereby reducing operational costs and allowing for resources to be allocated elsewhere.This automation in water management is a step towards more sustainable farming practices, potentially leading to higher yields and improved crop quality. By precisely addressing the water needs of plants, the system supports the cultivation of healthier crops, which is vital for food security. Overall, this automatic irrigation system represents a forward-thinking approach to agriculture, blending technology with traditional farming practices to achieve greater efficiency, sustainability, and productivity.

7. REFRENCES

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