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# AUTOMATIC WATER SUPPLY TO IRRIGATION SYSTEM BASED ON IOT

***BUKKE RAHUL NAIK***
*PG scholar Dept of Civil Engineering*
*Indian Institute of Engineering Science And Technology, Shibpur.*

## ABSTRACT

The increasing demand for efficient and sustainable agricultural practices has prompted the integration of Internet of Things (IoT) technology into traditional irrigation systems. This paper presents an innovative approach to automatic water supply for irrigation leveraging IoT principles. The proposed system incorporates a network of wireless sensors strategically placed in the agricultural field to monitor soil moisture levels, weather conditions, and crop requirements in real-time. These sensor nodes communicate seamlessly with a central controller using IoT protocols, enabling timely and informed decision-making. The central controller employs intelligent algorithms to analyse the data received from the sensors, determining the optimal irrigation schedule and water quantity needed for the crops. Through the integration of actuators and valves, the system automates the water supply process, ensuring precise and efficient irrigation. Furthermore, the system provides a user-friendly interface accessible through web or mobile applications, allowing farmers to monitor and control the irrigation process remotely. The implementation of this IoT-based automatic water supply system offers several advantages, including water conservation, enhanced crop yield, and reduced manual intervention. By leveraging the power of IoT, the proposed system contributes to sustainable agriculture practices, addressing the challenges of water scarcity and improving resource utilization in the context of modern farming.

## INTRODUCTION

The escalating demands on global food production in the face of population growth and climate variability have underscored the imperative for precision agriculture. In this context, the integration of cutting-edge technologies, such as the Internet of Things (IoT), has emerged as a transformative force in revolutionizing traditional agricultural practices. One pivotal facet of this technological evolution is the development of automatic water supply systems for irrigation, where IoT plays a central role in optimizing water usage, enhancing crop yield, and promoting sustainable farming practices. Traditional irrigation systems often suffer from inefficiencies, leading to overwatering or inadequate water supply, which can have detrimental effects on both crop health and water conservation efforts. The integration of IoT into irrigation systems presents an intelligent and automated solution to address these challenges. By seamlessly connecting sensors, controllers, and communication devices, an IoT-based automatic water supply system for irrigation enables real-time monitoring, analysis, and responsive actions tailored to the specific needs of the crops and prevailing environmental conditions.

 

This innovation not only contributes to resource conservation by preventing unnecessary water wastage but also empowers farmers with actionable insights into the health of their crops. The interconnected nature of IoT devices allows for data-driven decision-making, ensuring that irrigation practices are precisely calibrated to meet the dynamic requirements of the agricultural ecosystem. The result is an intelligent irrigation system that adapts to changing circumstances, maximizes water efficiency, and ultimately promotes sustainable agricultural practices. This paper explores the design, implementation, and potential impact of an automatic water supply system for irrigation based on IoT. By delving into the technological foundations, challenges, and benefits of such a system, we aim to contribute to the growing body of knowledge that seeks to harness the power of IoT to address critical issues in agriculture and advance the global movement toward smarter, more sustainable farming practices.

## LITERATURE SURVEY

"Smart Agriculture: An IoT-Based Greenhouse System for Optimal Crop Growth" M. A. Hossain, et al. This paper explores the use of IoT in agriculture, presenting a greenhouse system for optimal crop growth. It discusses the integration of sensors and IoT technologies to monitor and control environmental conditions, including water supply.

"An IoT-based Smart Irrigation Management System" S. B. Patil, et al. This work focuses on the development of a smart irrigation management system based on IoT. It delves into the use of sensors to gather data on soil moisture levels and weather conditions, utilizing IoT for real-time monitoring and control of irrigation.

"Wireless Sensor Network Based Automatic Irrigation System Using IoT" P. D. Patil, et al. The paper discusses the integration of wireless sensor networks and IoT for an automatic irrigation system. It explores the role of sensors in collecting data on soil moisture, temperature, and humidity, and how IoT enables remote monitoring and control of irrigation.

"IoT-based Smart Agriculture: Toward Making the Fields Talk" N. Javaid, et al.This review article provides an overview of IoT applications in smart agriculture. It covers various aspects, including precision farming, crop monitoring, and irrigation management, providing a comprehensive understanding of the field.

"A Review on Smart Agriculture: IoT, Drones, and WSNs" S. R. Gopinath, et al. The paper offers a review of smart agriculture technologies, including IoT, drones, and wireless sensor networks (WSNs). It covers the use of IoT in irrigation management and the benefits of integrating sensor data with decision support systems.

"IoT-Based Smart Agriculture: Trends, Challenges, and Future Directions" M. A. Hossain, et al. This paper provides insights into the trends, challenges, and future directions of IoT-based smart agriculture. It covers the use of IoT in irrigation and emphasizes the need for sustainable and efficient water management practices.

"Smart Irrigation Systems: An Overview" A. P. Shirsath, et al. The paper provides an overview of smart irrigation systems, discussing the integration of IoT, sensors, and

automation for efficient water management. It covers the benefits of smart irrigation in terms of water conservation and crop yield improvement.

"A Review on IoT Applications in Agriculture" P. K. Shinde, et al. This comprehensive review explores various IoT applications in agriculture, including irrigation management. It discusses the role of sensors and communication technologies in enhancing agricultural practices.

"IoT-Based Smart Agriculture: A Review" S. H. Gadge, et al. The paper reviews the applications of IoT in smart agriculture, covering aspects such as precision farming, livestock monitoring, and irrigation control. It provides insights into the challenges and opportunities in implementing IoT in agriculture.

"Smart Agriculture using IoT and Cloud Computing" R. V. Dharaskar, et al. This paper discusses the integration of IoT and cloud computing in smart agriculture. It covers the use of IoT for monitoring soil conditions, crop health, and irrigation, emphasizing the role of cloud platforms in data storage and analysis. This literature survey provides a diverse range of sources that discuss the integration of IoT in automatic water supply systems for irrigation. It covers key aspects such as sensor technologies, data monitoring and control, and the overall benefits of implementing IoT in smart agriculture.

**PROPOSED SYSTEM**

The Arduino board is a link between the soil moisture sensor and pumping motor. Arduino is supplied with a power of 7V to 12V. The pump motor is given a separate supply of 9V. The soil moisture sensor is used in this project because it has to check soil moisture to measure the electrical conductivity of soil. The moisture sensor provides an analogue output which can be easily interfaced with Arduino. In this project three sensors are connected to analogue pins A0, A1 and A2 of the Arduino board. The system receives a signal from the soil moisture sensor and compares with the preset threshold value. If the value detected by the sensor is below the threshold value, the Arduino sends a message signal to the motor to fetch water. But when the value detected by the sensor is above the preset value, the motor doesn't rotate. The Arduino always accepts the signal from the sensor and keeps updating its data.

With the automatic irrigation system, watering is done in a timely manner for efficient water usage and less run off. Having a professional qualified irrigation technician set up this automatic system and do the annual maintenance for that system will pay off in the long run. At the end of the season the pipes must be blown out so they do not freeze during the winter months, this is done with compressed air.Modern irrigation methods thus make sense for the modern home and the busyness of contemporary living.

First we have to write the code in Arduino software. After that verify/compile that code if there is any error or not. If there are no errors then upload the code into the Arduino board. Then give the connections to all the electronic devices as per written in code (Arduino software). In this project, there are three plant saplings in each pot given separate soil moisture sensors. Which pot soil is dry in that pot only water can go. For Example: In one pot soil is wet but another two pots soil is dry then in two dry pots water can go.

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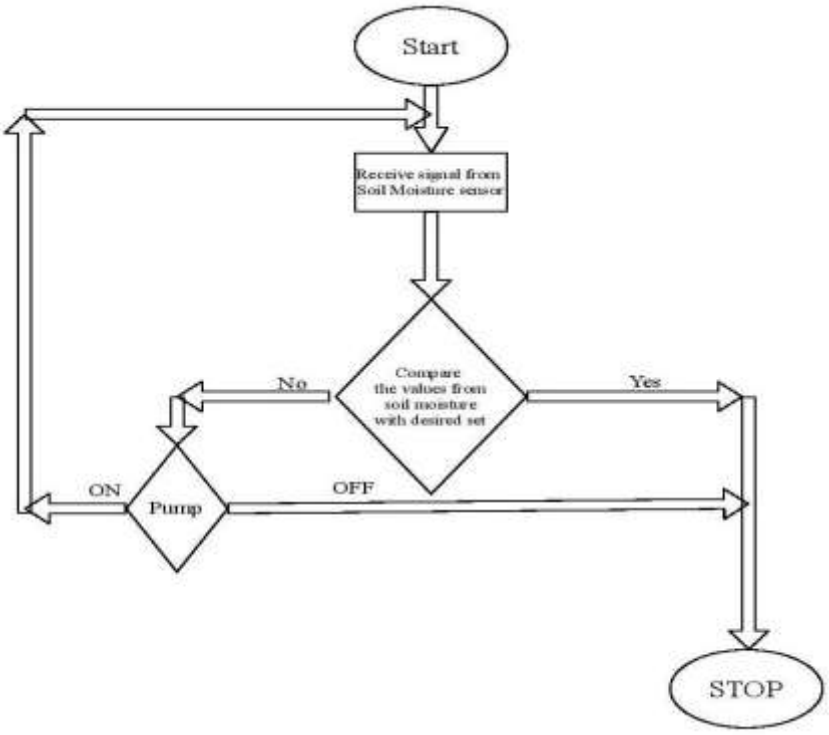


**Fig 1:** Flow Chart

The soil moisture sensor is kept in soil then the sensor gives information regarding the soil to the Arduino board. After this process, depending on whether the soil is dry or moist, the relay coil will supply the power to the water pump motor and then pumps water to the irrigation field if it's dry. When soil gets moist the relay coil will switch off the power supply so that the water pump gets off. In code, we give a certain rage of soil moisture. For example: The range is 400 to 850 (analog values) when the soil moisture sensor read 850 i.e., maximum water holding capacity of that soil then pump will be off. Again when the soil moisture sensor read 400 i.e., minimum water holding capacity of that soil then pump will be start. Using a single sensor may cause a problem of switching off the power supply if the area near the sensor becomes moist. In order to overcome this problem, multiple sensors are used so that area gets evenly watered. Multiple sensors will work with a single motor. Thus this is very useful to get the entire field to moist conditions.

**Advantages of this system:**.

Maximum absorption of the water by the plant is ensured by spreading the water uniformly using a servo motor. So there is minimal wastage of water.

This system also allows controlling the amount of water delivered to the plants when it is needed based on types of plants by monitoring soil moisture.

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This project can be used in large agricultural areas where human effort needs to be minimized. Many aspects of the system can be customized and fine tuned through software for a plant requirement.

As the irrigator is not required to constantly monitor the progress of an irrigation.

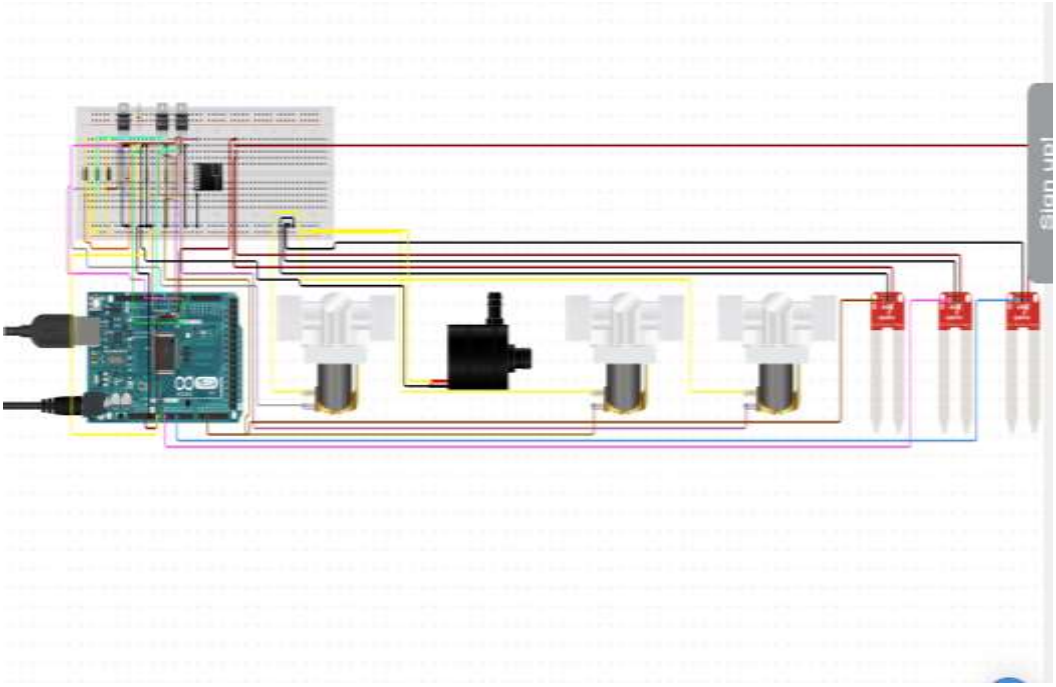

**Fig 2:** Automatic Water Supply to Irrigation System Circuit Diagram

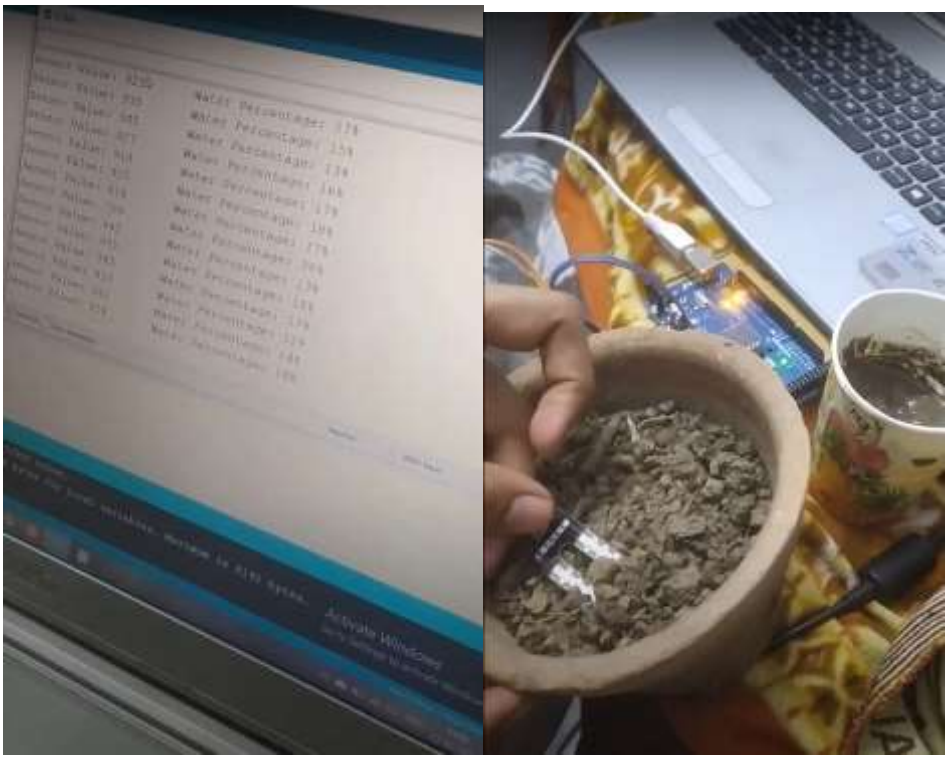

**Fig 3:** Soil Moisture Sensor Mointerning

 

**Fig 4:** Automatic water supply to Irrigation system setup

## CONCLUSION

Smart Irrigation System is feasible and cost effective for optimizing water resources for agriculture production. This irrigation system allows cultivation in places with water scarcity thereby providing sustainability. It improves that use of more water can be decreased. In the present era, the farmers use irrigation techniques through manual control, in which the farmers irrigate the land at regular intervals. This process seems to consume more water and results in water wastage. Moreover in dry areas where there is inadequate rainfall, irrigation becomes difficult. Hence we require an automatic system that will precisely monitor and control the water requirements in the field. Installing a Smart irrigation system saves time and

 

ensures judicious usage of water. Moreover this architecture uses a microcontroller which promises an increase in system life by reducing power consumption. This type of irrigation plants will grow healthy.

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