

# SMART WATER SYSTEM

## INTRODUCTION:

A smart water system is an advanced and interconnected infrastructure designed to monitor, manage, and optimize various aspects of water supply and distribution, wastewater treatment, and water resource management. These systems leverage modern technology, data analytics, and automation to enhance the efficiency, sustainability, and resilience of water-related processes.

## Benefits of a smart water system:

**Sensors and Data Collection:** Smart water systems use a network of sensors and meters to gather real-time data on various water-related parameters, such as water quality, flow rates, pressure, temperature, and levels in reservoirs and pipelines. These sensors can be deployed throughout the water infrastructure.

**Data Communication:** The collected data is transmitted to a central control system using wireless or wired communication protocols. This enables remote monitoring and real-time analysis, allowing utilities and authorities to make informed decisions.

**Data Analytics:** Advanced data analytics and machine learning algorithms process the data to identify patterns, trends, and anomalies. Predictive analytics can be used to anticipate water quality issues or pipeline leaks, helping prevent problems before they occur.

**Remote Control and Automation:** Smart water systems can remotely control valves, pumps, and other components of the water network. This

automation can help optimize water distribution, reducing energy consumption and minimizing water loss due to leakage.

**Leak Detection:** One of the primary advantages of smart water systems is their ability to quickly detect leaks and other issues in the water distribution network. This can lead to substantial water and cost savings.

**Consumer Engagement:** Some smart water systems offer tools and applications for consumers to monitor and manage their own water usage, encouraging water conservation and efficient use.

**Water Quality Monitoring:** Continuous monitoring of water quality ensures that water supplied to consumers meets regulatory standards. Any deviations can be detected and addressed promptly.

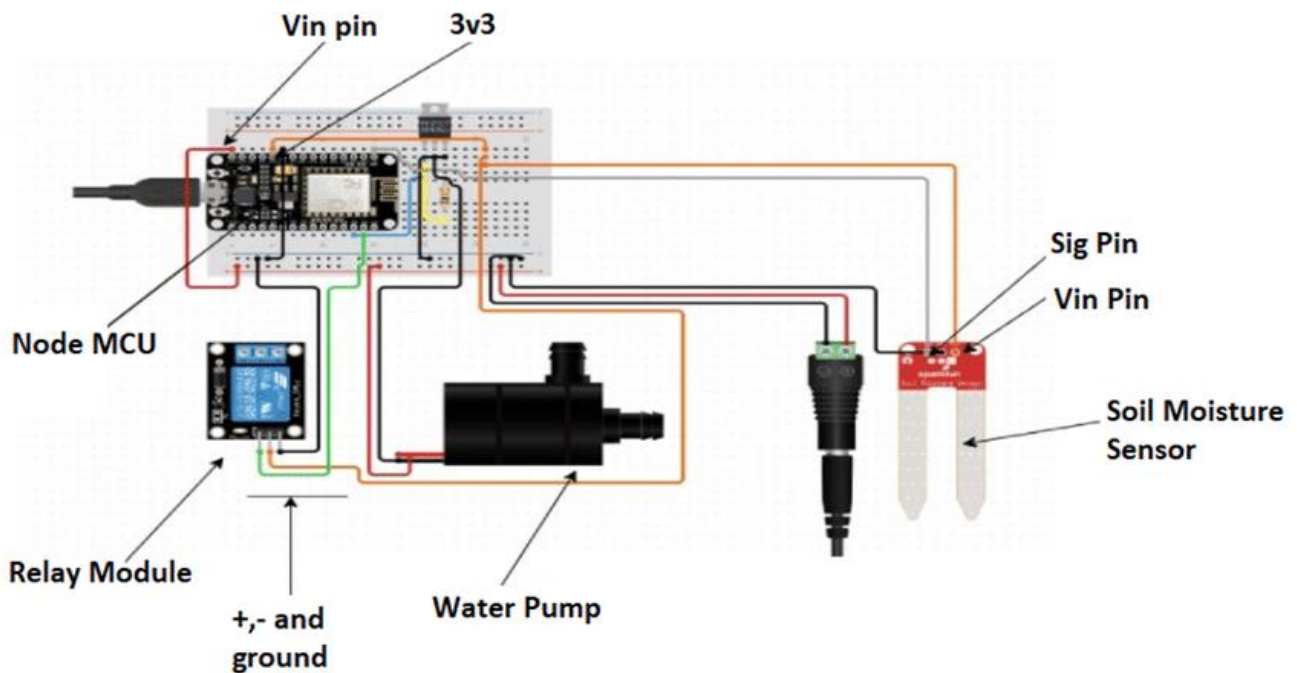
**Energy Efficiency:** Smart water systems also focus on reducing energy consumption, for instance, by optimizing the operation of pumps and treatment facilities, leading to cost savings and a smaller environmental footprint.

**Resilience and Disaster Management:** These systems can help authorities respond to and recover from natural disasters, such as floods and droughts, by providing real-time data and control options to mitigate damage and ensure water availability.

**Environmental Sustainability:** Smart water systems can support responsible water management practices and promote environmental sustainability by minimizing waste, pollution, and resource consumption.

**Asset Management:** The ability to monitor the condition of infrastructure components allows for proactive maintenance, extending the lifespan of assets and reducing long-term costs.

## DIAGRAM



## COMPONENTS:

**Soil Moisture Sensors:** Soil moisture sensors are buried in the ground to measure the moisture content of the soil. They provide real-time data on soil conditions.

**Weather Stations:** Weather stations collect data on temperature, humidity, wind speed, and precipitation. This information is used to adjust watering schedules based on current weather conditions.

**Control Unit or Controller:** The control unit serves as the brain of the irrigation system. It receives data from sensors and weather stations and makes decisions about when and how much to water.

**Valves and Sprinklers:** Automated valves and sprinklers deliver water to the designated areas. They can be controlled by the central unit to ensure precise and efficient watering.

**Drip Irrigation Systems:** Drip irrigation systems deliver water directly to the base of plants, reducing water waste. They are often used in agriculture and landscaping.

**Mobile Apps and User Interfaces:** Smart irrigation systems often come with user-friendly apps and interfaces that allow users to monitor and control the system remotely. Users can adjust settings and schedules through their smartphones or computers.

**Flow Sensors:** Flow sensors monitor the flow rate of water through the irrigation system. They can detect leaks or abnormalities in water delivery.

**Remote Connectivity:** Many smart irrigation systems offer connectivity via Wi-Fi or other communication methods, allowing users to access and control the system from anywhere with an internet connection.

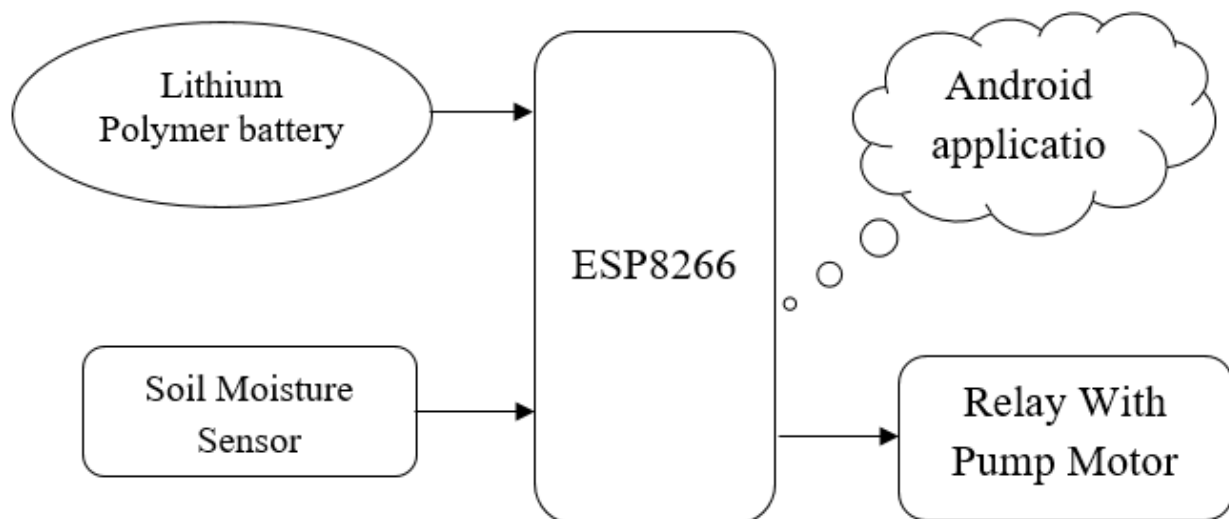
**Data Analytics and Algorithms:** Advanced algorithms analyze data from sensors and weather stations to determine optimal watering schedules. They take into account factors like soil moisture, weather forecasts, and plant type.

**Fertilizer and Nutrient Injection Systems:** Some systems can automatically inject fertilizers or nutrients into the irrigation water, ensuring that plants receive the necessary nutrients.

## WORKING:

In this project, we are building an IOT based smart irrigation System using Node MCU, Moisture sensor, and LDR. It will automatically sprinkle the water to plants when the moisture value goes below a particular value. It will also send the moisture data to Ada fruit IO Server to keep track of the land condition. Ada fruit IO dashboard will also have some buttons to manually turn on/off the solenoid valve and lights. This project uses a solenoid valve to supply the water to the plants. You can change the moisture value at which the solenoid valve should turn on according to your plant's requirement. Here we are using Node MCU ESP8666 which is a very popular Wi-Fi module for IOT -based Projects.

## FLOW CHART



## **CONCLUSION:**

In conclusion, smart water systems offer a promising approach to addressing water-related challenges in an increasingly urbanized and environmentally conscious world. By harnessing the power of technology, these systems have the potential to create more sustainable, efficient, and resilient water management practices for the benefit of individuals, communities, and the planet. However, their successful implementation depends on careful planning, investment, and addressing potential issues to ensure long-term success.