

# SMART WATER MANAGNMENT

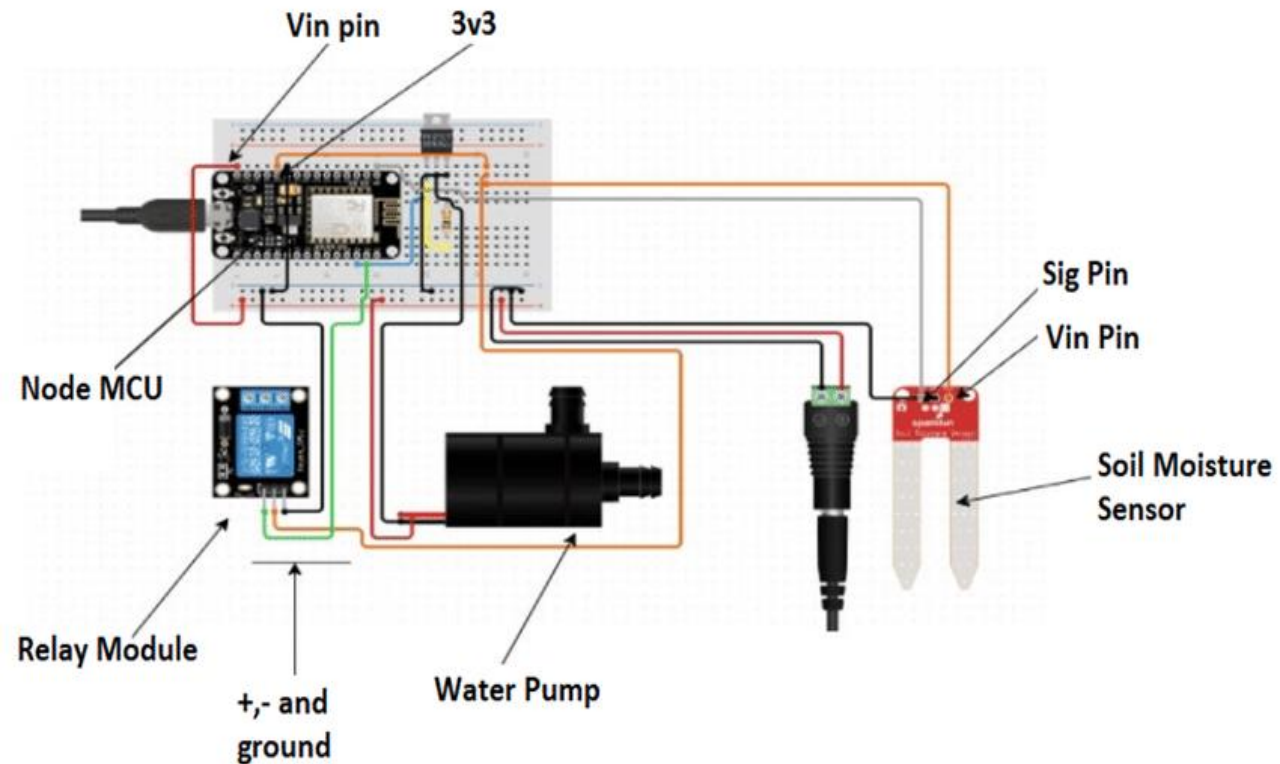
# Smart water documentation and Objectives

- Smart water management is a holistic approach to efficiently and sustainably manage water resources. Its objectives include:
    1. Conservation: Minimizing water wastage through smart technology and practices.
    2. Monitoring: Using sensors and data analytics to track water usage and quality.
    3. Efficiency: Optimizing water distribution and reducing losses.
    4. Sustainability: Ensuring long-term availability of clean water.
    5. Resilience: Adapting to changing environmental conditions and extreme events.
    6. Accessibility: Providing clean water to all communities.
    7. Cost Reduction: Lowering operational and maintenance expenses.
    8. Environmental Protection: Preserving ecosystems and reducing pollution.
- Documentation for smart water management should cover these objectives, technologies used, data analysis, and impact assessments. It's crucial to integrate technology, data, and community engagement to make smart water management effective.

# Specification

- Smart water specifications typically include the following components:
  1. Sensors and Data Collection:
    - Type of sensors (e.g., flow, pressure, quality).
    - Data collection frequency and methods.
    - Communication protocols (e.g., IoT, wireless).
  2. Data Management:
    - Storage and processing of collected data.
    - Data security and encryption measures.
    - Integration with existing systems (e.g., SCADA).
  3. Analytics and Control:
    - Algorithms for data analysis.
    - Automation and control mechanisms.
    - Decision-making processes based on data insights.
  4. Remote Monitoring and Control:
    - Ability to monitor and control water systems remotely.
    - User interface and dashboards for real-time insights.
  5. Infrastructure:
    - Hardware requirements (e.g., servers, gateways).
    - Compatibility with existing infrastructure.
  6. Standards and Compliance:

# Circuit and diagram explanation

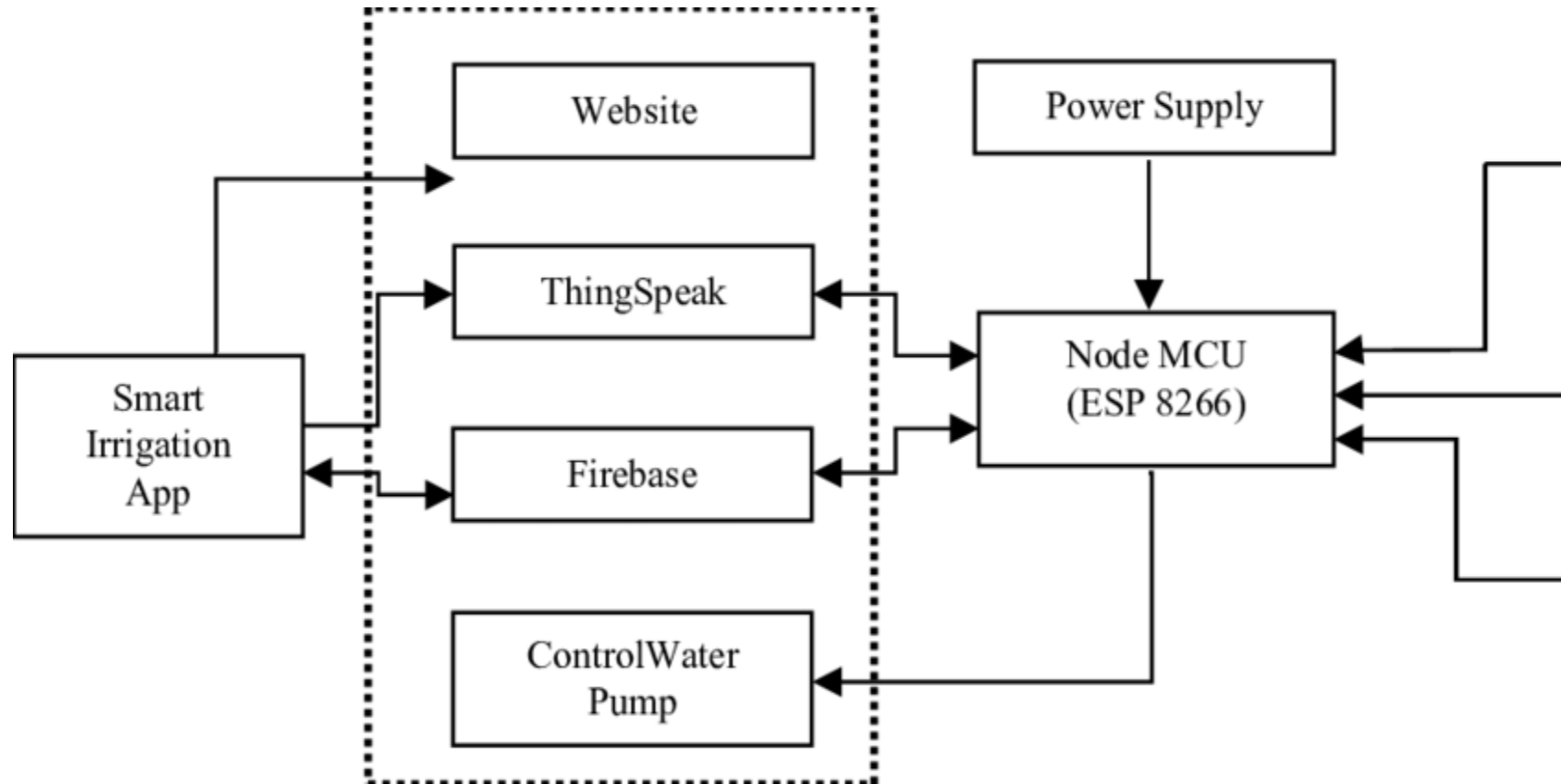


- Smart irrigation involves several key steps:
- 1. Sensor Installation: Install soil moisture sensors, weather stations, or other relevant sensors in the irrigation area
- .2. Data Collection: Collect real-time data from these sensors, including soil moisture levels, weather conditions, and temperature
- .3. Data Analysis: Analyze the collected data to determine when and how much water is needed for the plants or crops
- .4. Automation: Implement an automated irrigation system that adjusts water delivery based on the real-time data and predefined parameters.
- 5. Weather Integration: Integrate weather forecasts into the system to adapt irrigation schedules based on upcoming weather conditions
- .6. Remote Control: Enable remote control and monitoring of the irrigation system through a mobile app or computer.
- 7. Water Conservation: Use the data-driven approach to minimize water usage while ensuring that plants receive the necessary hydration.
- 8. Alerts and Notifications: Set up alerts and notifications to inform users of system status, issues, or maintenance requirements.
- 9. Fine-Tuning: Continually refine the irrigation system settings and schedules based on performance and plant-specific needs. By following these steps, smart irrigation systems can optimize water usage, promote plant health, and reduce water wastage in agriculture, landscaping, and gardening.

# Working and explanation

- Smart irrigation systems work by using technology and data to efficiently water plants, lawns, or crops. Here's an explanation of how they work:
- 1. Sensors: Smart irrigation systems use various sensors, such as soil moisture sensors, weather stations, and temperature sensors. These sensors continuously collect data from the environment.
- 2. Data Collection: The sensors provide real-time data on factors like soil moisture levels, current weather conditions, and temperature.
- 3. Data Analysis: The collected data is analyzed to determine the specific water needs of the plants or crops in the irrigation area. This analysis takes into account factors like the type of vegetation, soil type, and weather conditions.
- 4. Automation: The irrigation system is automated, allowing it to adjust the water delivery based on the real-time data and predefined parameters. For example, if the soil moisture levels are low, the system will activate the irrigation to provide the necessary water.
- 5. Weather Integration: Smart irrigation systems often integrate weather forecasts. This enables them to adapt irrigation schedules based on upcoming weather conditions, such as rain in the forecast, which may reduce the need for irrigation.
- 6. Remote Control: Users can control and monitor the irrigation system remotely through a mobile app or computer. They can make real-time adjustments, check the system's status, and receive notifications.
- 7. Water Conservation: The primary goal of smart irrigation is water conservation. By using data-driven insights, the system optimizes water usage, ensuring that plants receive the right amount of water and minimizing water wastage.
- 8. Alerts and Notifications: Smart irrigation systems can send alerts and notifications to users in case of system issues, maintenance requirements, or other relevant information. Overall, smart irrigation systems improve water efficiency, promote healthier plant growth, and reduce water consumption by tailoring irrigation to specific needs and environmental conditions.

# Block diagram



# Coding

- ```
#include <Servo.h> // servo
library Servo myservo; int m=0;
int n=0; int pos = 0; void setup() {
// put your setup code here, to
run once: pinMode(A0,
INPUT_PULLUP); // Soil Moisture
Sensor 1 PIN A0 pinMode(A1,
INPUT_PULLUP); // Soil Moisture
Sensor 1 PIN A1
pinMode(8,OUTPUT); // Relay
Module PIN D8
Serial.begin(9600); // Sensor
Buart Rate myservo.attach(9); //
Servo PIN D9 digitalWrite(8,
HIGH); // Relay Normally Hight
for OFF condition }
```



# Output

- Automated Watering Schedules: Smart irrigation systems can create and adjust watering schedules based on factors like weather forecasts, soil moisture levels, and plant type.
- Watering Alerts: Users receive alerts or notifications when the system is about to water or when there are issues like leaks or malfunctions.
- Water Usage Data: Data on water consumption, usage patterns, and savings are often provided, allowing users to monitor and manage their water resources efficiently.
- Remote Control: Many systems offer remote control through a mobile app or web interface, enabling users to adjust settings and monitor their irrigation system from anywhere.

# Conculsion

- Smart water management is essential for conserving resources, reducing costs, and adapting to changing environmental conditions, making it a vital strategy for a sustainable and resilient future.