**Project Title**: *Smart Irrigation System for Rain Gardens Using Soil Moisture Data – archive 1*

**Objective**: The aim of this project is to develop a smart irrigation system that optimizes water usage for rain gardens by analyzing soil moisture data. The project will leverage year-round data collected from sensors placed in different soil mixes and plant species to model efficient irrigation strategies that improve plant health and reduce water waste.

**Dataset Description**: The dataset contains soil moisture data collected from rain gardens in Portland, Oregon. Each garden features multiple soil mixes and a variety of plant species. Key details of the dataset include:

* **Soil Moisture Sensors**: Four sensors per garden, placed at a depth of 8 inches.
* **Logging Frequency**: Data was logged every 15 minutes throughout the year.
* **Soil Depth**: Total depth of the soil in each garden is approximately 50 inches. This rich dataset allows for the comparison of soil moisture levels across different garden setups and environmental conditions, providing valuable insights for irrigation optimization.

**Potential Applications**:

1. **Smart Irrigation Systems**: Build an intelligent irrigation model that uses real-time soil moisture data to determine when and how much to water plants, ensuring optimal growth and reducing water waste.
2. **Sustainable Landscaping**: The model can be applied to urban landscaping and green infrastructure projects, ensuring sustainable water use in rain gardens and similar setups.
3. **Agriculture and Gardening**: Extend the application of the model to agricultural fields, gardens, and urban green spaces where moisture levels must be closely monitored to avoid over- or under-watering.
4. **Soil and Plant Research**: The dataset can help researchers understand the relationship between different soil mixes, plant species, and water retention, contributing to best practices in garden and landscape design.

**Methodology**: The project will involve preprocessing the soil moisture data, including time-series analysis to identify patterns and trends in moisture levels over time. Machine learning models such as regression analysis or neural networks can be used to predict optimal irrigation times based on soil moisture, weather conditions, and plant requirements. The model will be evaluated based on its ability to maintain soil moisture within ideal ranges while minimizing water use.

**Expected Outcomes**:

* A smart irrigation system capable of adjusting water supply based on real-time soil moisture data.
* Insights into the most efficient soil mixes and irrigation strategies for rain gardens.
* Reduction in water waste, contributing to more sustainable and eco-friendly gardening practices.