

Water Harvesting and Recycling Using Solar Energy and Smart Sensors

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Introduction

01 Problem Statement

Our project aims to develop a sustainable water treatment and recycling system using solar energy system which will contain solar panels and batteries. We will filter the water using innovative techniques and power the system with solar energy. To ensure water quality, we will use smart sensors that connect to a mobile app, allowing real-time monitoring of key water quality parameters, with the aim of meeting the growing need for effective and sustainable water resource management solutions. Demand for advanced water treatment solutions is increasing due to increasing pressure on freshwater sources and increasing awareness of the importance of conserving natural resources.

02 Constraints

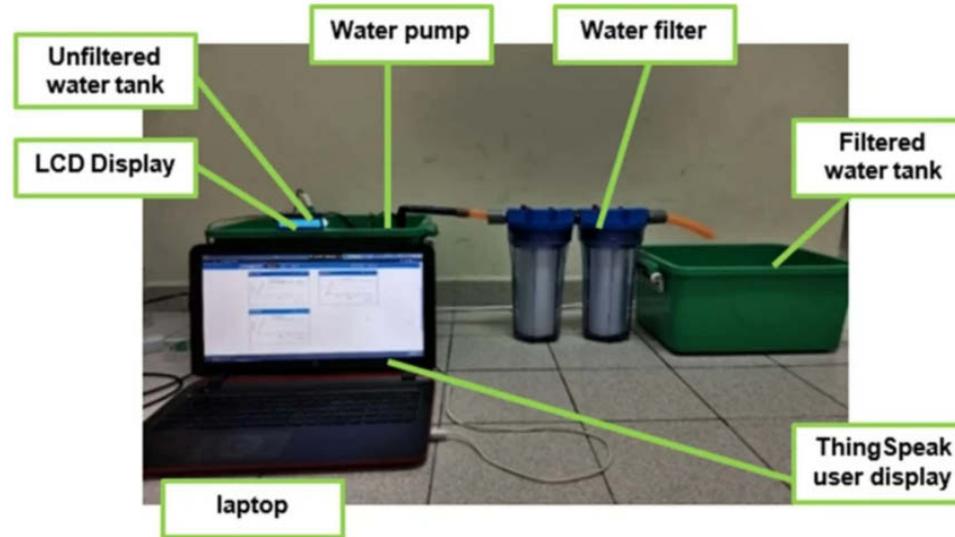
Economic Growth: Cost-effective methanol production boosts development. Environmental Impact: Reduces carbon emissions for a cleaner environment. Societal Benefit: Supports Saudi Arabia's sustainable future vision.

03 Target Specifications

- 1-Processes 1000 liters of water per day.
- 2-Operates efficiently between 5°C and 45°C.
- 3-Primarily operate with a minimum of 80% energy supplied by solar power.
- 4-Sustainable system will use 70% recyclable materials.

Prototype Design

01 Scale Drawing



02 Process Flow Diagram



Conclusion

We will design a square box that acts as a collection point for water, which will then be channeled into the first stage of our filtration system. The water will undergo a series of filtration processes, including sediment filters, activated carbon filters, and potentially UV or membrane filtration depending on the water source, such as rainwater, gray water, or even seawater. These filters are configured to remove particles, contaminants, and microorganisms, ensuring the production of high-quality water suitable for agriculture, irrigation, and potentially drinking.

After filtration, the treated water will be stored in specially designed tanks. These tanks will be sized based on predicted water consumption and will be equipped to preserve surplus water for future use. The design considerations for the tanks include durability, material safety, and insulation to minimize evaporation and contamination. The capacity of the tanks will be determined by analyzing local rainfall data, water demand, and expected consumption patterns.

To power the system sustainably, we are considering the integration of solar cells. These will provide electricity for the filtration process and sensor operations, maximizing efficiency while minimizing reliance on external energy sources. Our focus is on achieving the highest benefit using the least resources, ensuring that the entire system is cost-effective both in terms of initial investment and long-term operational and maintenance costs.

Throughout the project, we will prioritize cost-effective solutions by selecting materials and technologies that offer a balance between performance and affordability. We will also consider the ease of maintenance and the longevity of the components to ensure that the system remains viable and sustainable over time.