Wastewater Treatment and Energy Generation
TEAM: 11

Abdullah Aldokhi EE   Nasser Albraik EE
Abdulaziz Almutairi CHE   Yahya Zarban CHE
Mahmoud Alhassan CE

Introduction and Background: This project proposes a solar-powered wastewater treatment system that uses advanced filtration technologies and real-time monitoring through IoT (Internet of Things) to address the urban water challenges. It is designed to be scalable, efficient, and adaptable to urban settings where space and resources are often limited.

Problem statement: With the goal of improving energy efficiency and water quality, our project intends to create an innovative wastewater treatment and energy recovery system for urban settings. It will accomplish this by combining solar power, real-time IoT monitoring, and sophisticated filtration technologies.
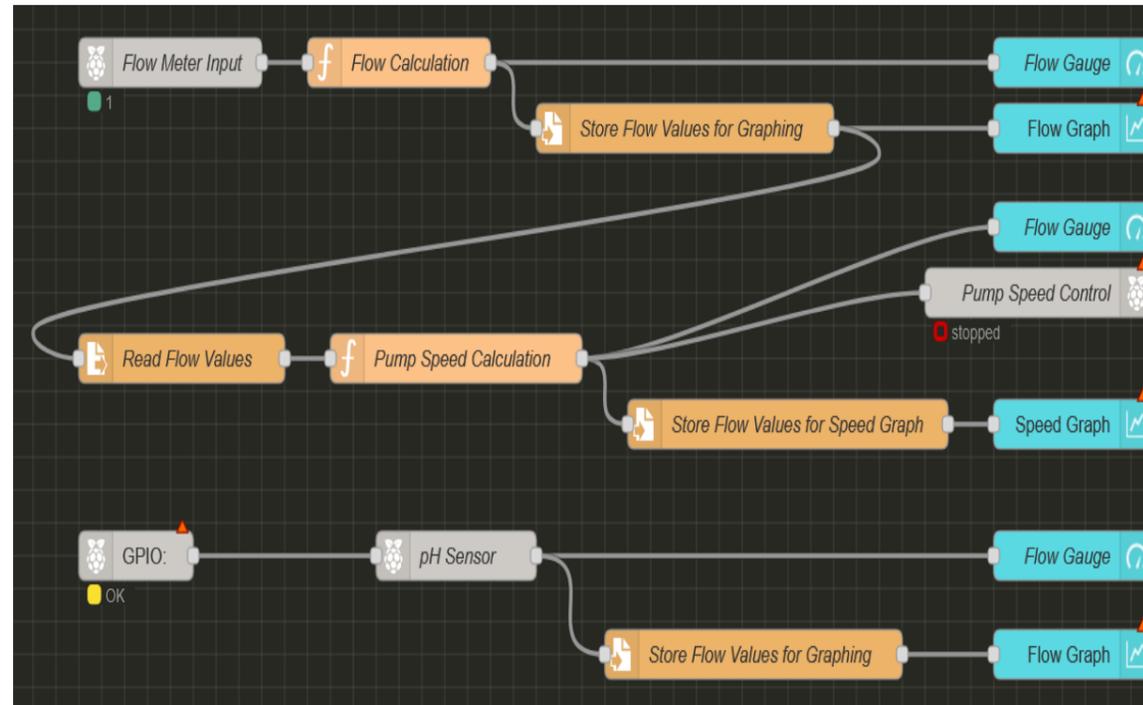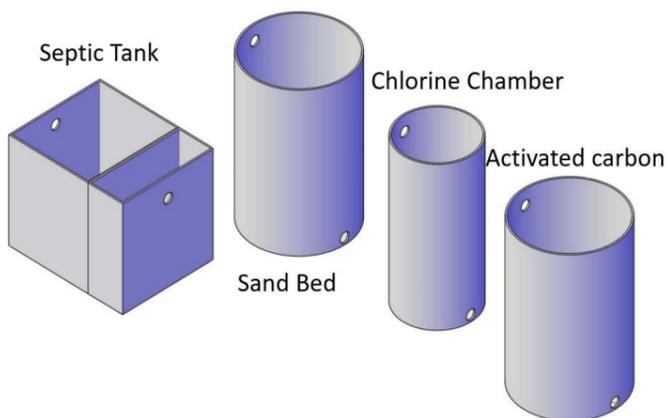
Constraints:
- Space limitation
- Budget constraints
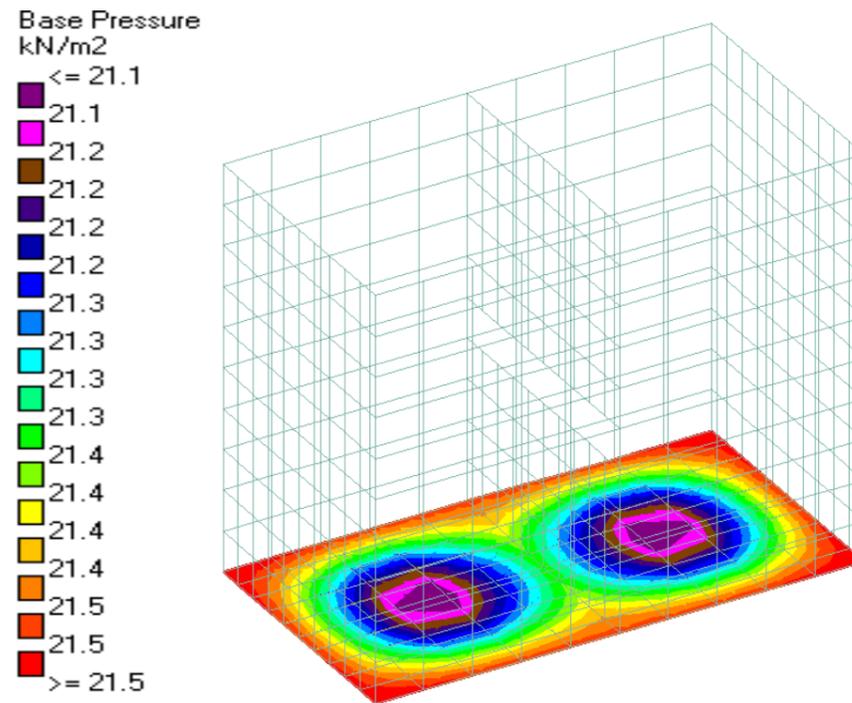- Social constraints
- Regulatory compliance

Target Specifications:
- Water quality > 75% purity
- Maintenance interval >6 months period
- Energy self-reliance > 60% energy
- Efficient treating time:45 minutes of treating time

Prototype design:

Structural analysis:

Validation:

- Water quality: The pH sensor worked as expected, keeping the treated water within the safe range of 6.5 to 8.5 making it suitable to reuse it.
- Maintenance interval: Activated carbon absorbs chlorine and organic chemicals quite effectively and can last for around 6 months.
- Energy self-reliance: The 100W solar panel provided enough power to keep the pumps and monitoring system running without any external electricity
- Efficient treating time: The treatment time was calculated using the volume and flowrate of each tank using the following formula: Time = Volume/Flowrate.

Project Impact:

- Economic
- Environmental
- Social

Conclusion:

The project introduces a new way to treat wastewater where it employs renewable technology like solar energy and advanced filtration and also, it's designed to be scalable so it can fit anywhere needed and ensure more than 60% energy self-reliance and more than 75% purity for the water quality , and it also use real-time monitoring to see how the process going and gives notification for the filters change time and others thigs.