

Sustainable Water Desalination Using Solar Panels and Active Solar Still

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KFUPM Design Expo

Problem Statement

The lack of accessible freshwater poses challenges for remote coastal areas. Our objective is to create an environmentally friendly and sustainable solution to water desalination, empowering these regions to achieve self-sufficiency in their water supply.

Target Specifications

- 1- Total dissolved solids (TDS) less than 400 ppm
- 2- Maximum energy consumption of 0.8 kWh/L
- 3- pH level of 6.5-8.5
- 4- Production capacity of 6-6.5 L/m².day

Constraints

- 1- High initial investment
- 2- Low power output of solar panels
- 3- Large area requirement
- 4- Inadequate sunlight exposure

Prototype Schematic

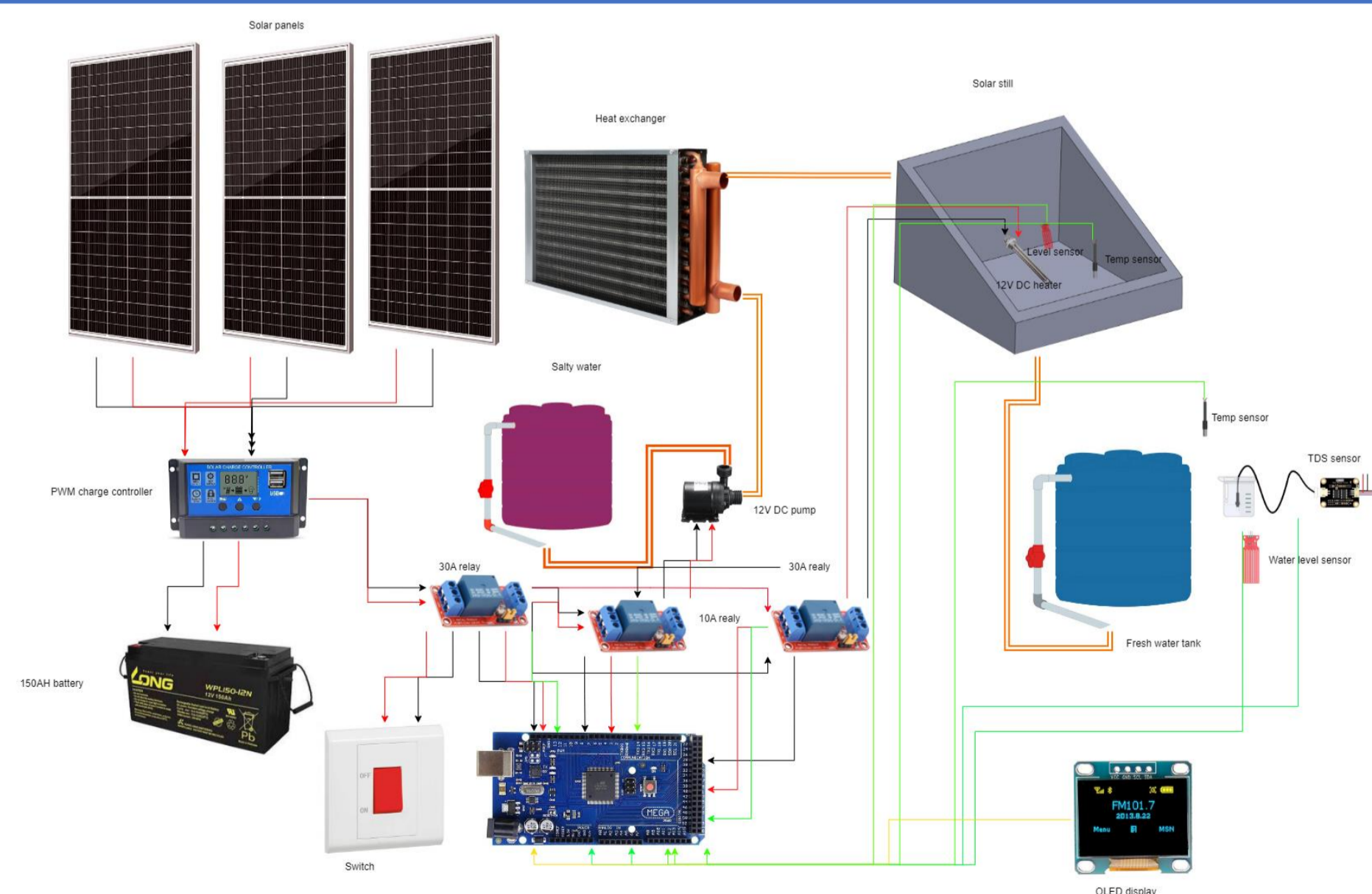


Figure 1 Comprehensive overview of our active solar still prototype

Prototype Operation

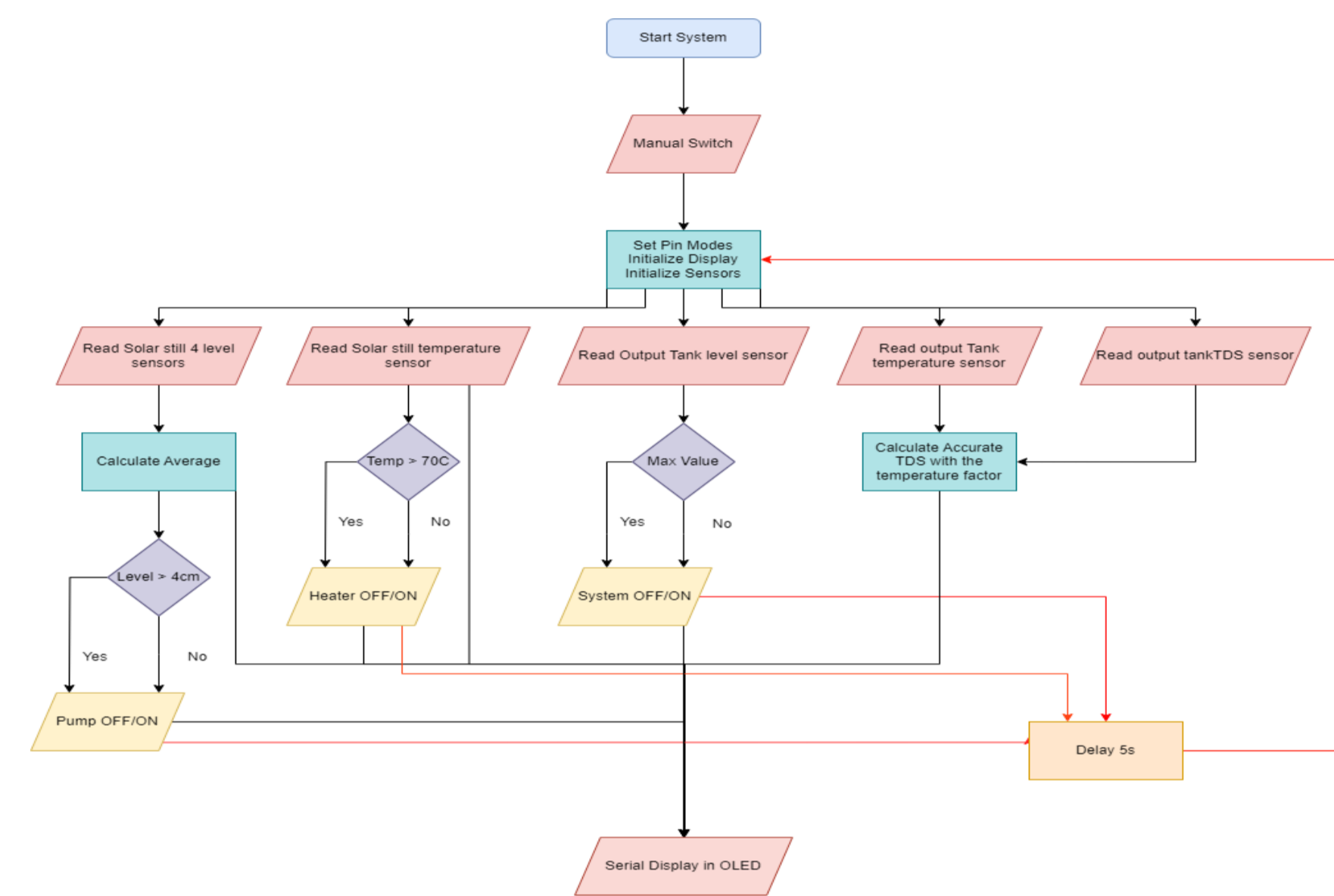


Figure 2 Arduino active Solar still system flowchart

Results & Verifications

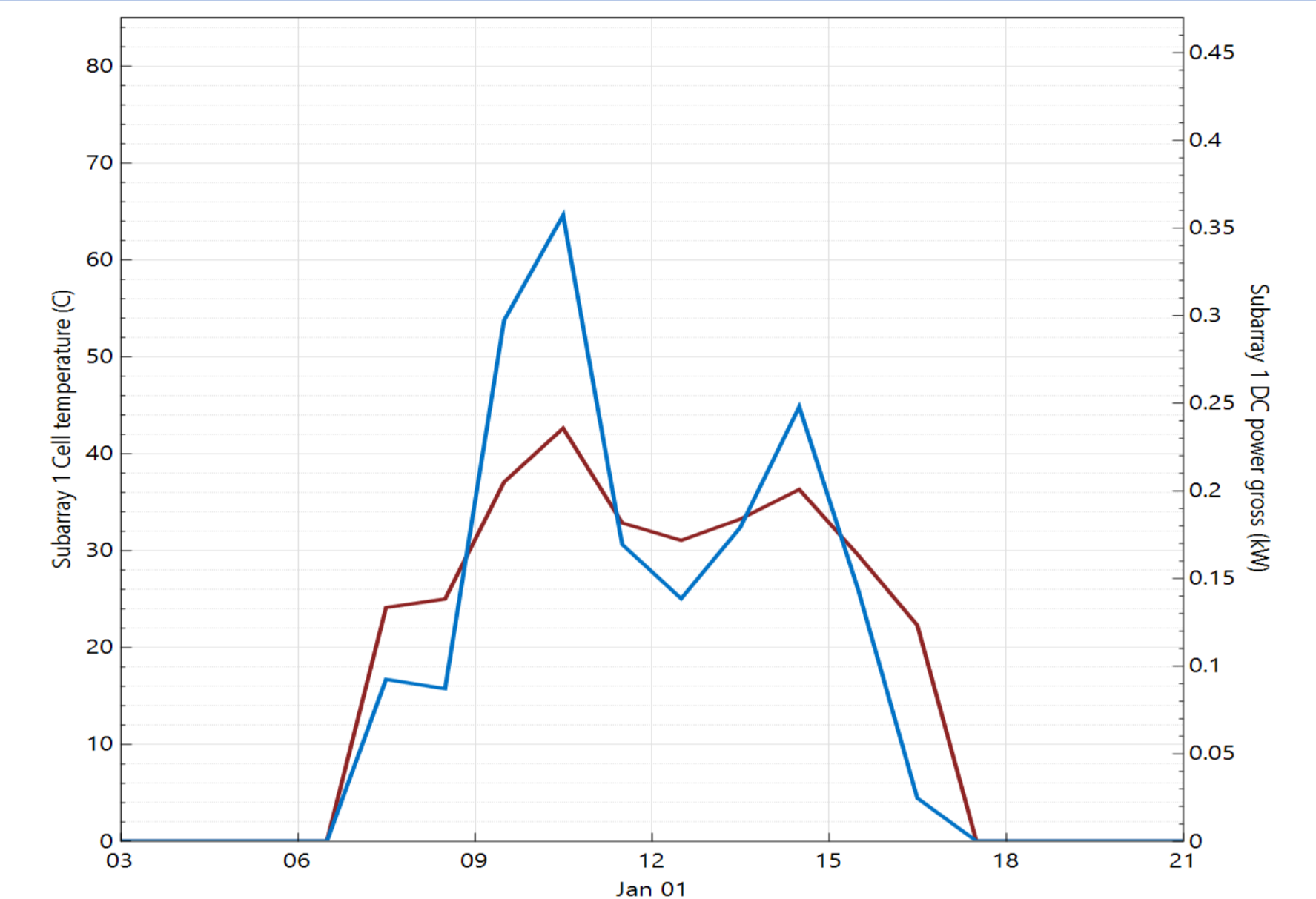


Figure 4 Power and cell temperature of solar panels on a sample day

Results & Verifications

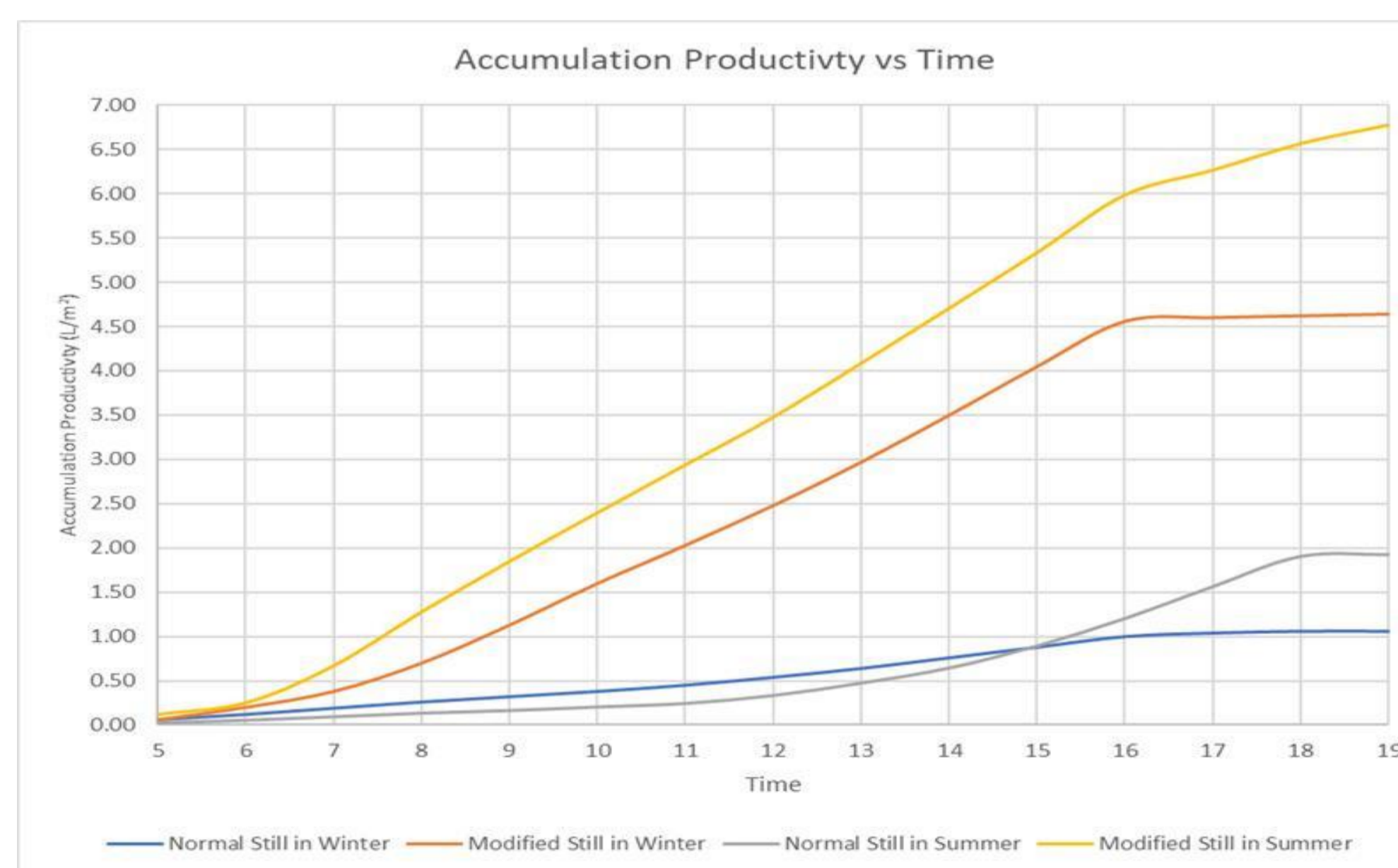


Figure 3 Productivity of project in winter & summer

Conclusion

The results of our testing indoors are indicative of our success in meeting the specifications we set. The results based on our tests and are as follows:

- 1- Total dissolved solids (TDS): 84 ppm
- 2- Maximum energy consumption of 0.79 kWh/L
- 3- pH Level of 6.5
- 4- Production capacity of approximately 5.6 L/m².day

Acknowledgment

We express our heartfelt thanks to Dr. Muhammad Siddiquee, our dedicated coach. In addition, we thank the university for their facilitation of the senior design project. We also thank the mentors and members of the Capstone team for their immense efforts.