# “IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN FLOATING SOLAR WICK TYPE DESALINATION SYSTEM FOR CROP GROWING.”

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**Keywords:**

Artificial Intelligence, Desalination, Floating Solar Still, Wick System, Crop Irrigation.


**Introduction:**

Water scarcity poses a significant challenge in agriculture, especially in arid and semi-arid regions. Desalination of saline water into freshwater presents a sustainable alternative. Among various desalination technologies, floating solar wick-type systems offer a cost-effective, energy-efficient solution. However, their performance often suffers due to unpredictable environmental conditions.

To address this, Artificial Intelligence (AI) technologies such as Artificial Neural Networks (ANN) can be integrated to predict performance metrics, optimize output, and adjust parameters dynamically. This project aims to incorporate AI into a floating solar desalination system to enhance freshwater generation for agricultural purposes. The end goal is a smart, sustainable system capable of autonomous operation and predictive crop irrigation.

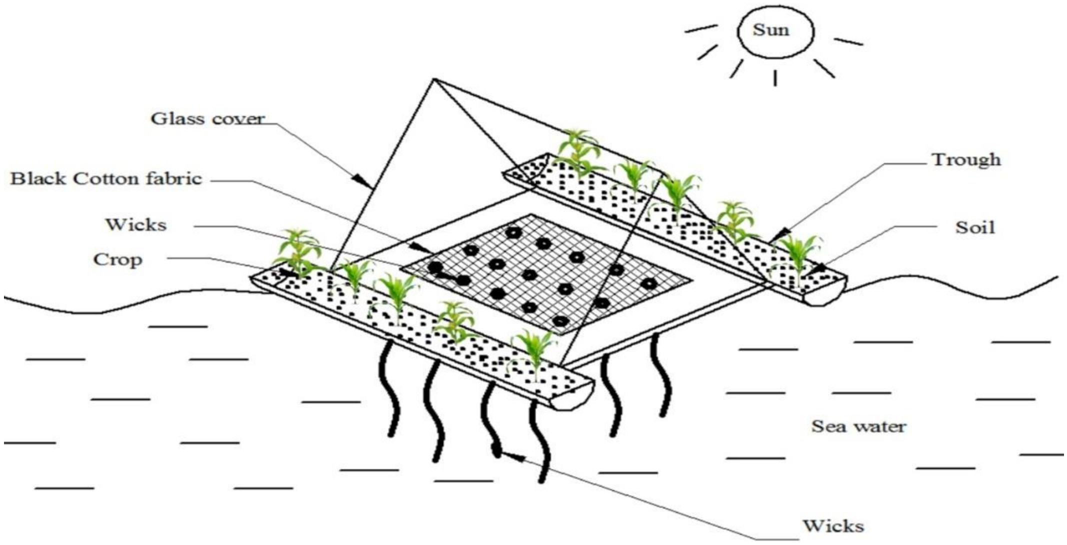


*Figure 1*: *schematic diagram of the experimental setup*

**Objectives:**

- Design and fabricate a floating solar wick-type desalination system for crop irrigation.
- Integrate an AI regression model to predict water output based on environmental conditions.
- Analyze system efficiency using different wick geometries and configurations.
- Evaluate clean water output and crop growth performance.
- Explore double-slope and heat-exchanger integrated wick designs.
- Study the practicality of using AI-enhanced desalination systems for agricultural productivity.

**Methodology:**

- A prototype floating solar desalination system is constructed using wick materials, cotton fabrication, and glass casing for solar absorption.
- A pyranometer and thermocouples are used to monitor solar radiation and temperature at multiple points.
- Water with 35gm salt per liter is used to replicate saline conditions.
- The system is tested with varying wick counts (14, 30, and 40) to study the impact on freshwater output.

- A simple crop irrigation channel is incorporated to demonstrate agricultural application.
- Freshwater output is measured and compared across different setups.
- ANN is trained using inputs such as temperature, radiation, and wick number, to predict water production.
- K-fold cross-validation ensures robustness of the AI model.
- Results from AI predictions and experimental outputs are analyzed.

**Result and Conclusion**:

- The system produced up to 21 ml of freshwater under optimal conditions using 40 wicks.
- Freshwater was effectively used to grow coriander crops, demonstrating real-world utility.
- The AI-powered ANN model provided accurate predictions of water production based on environmental data.
- The system shows high potential for automated and optimized irrigation, particularly in water-scarce agricultural zones.
- The integration of AI enhances system reliability, adaptability, and overall performance in varying conditions.

**Future Scope:**

1. Scale up the prototype to serve larger agricultural fields.
2. Incorporate real-time IOT sensors for live data feeding into the AI model.
3. Experiment with different wick materials and hybrid desalination methods (e.g., membrane distillation).
4. Develop a mobile application for monitoring and controlling the system remotely.
5. Expand the AI model to predict long-term agricultural yields based on weather and water availability forecasts.
6. Collaborate with industry partners to pilot the system in rural regions with critical water issues.