



Ministry of
Education
Government of India



SMART INDIA
HACKATHON
2023



Basic Details of the Team & Problem Statement

Ministry/Organization Name/Student Innovation: Ministry of Jal Shakti

Problem Type: Hardware

Problem Statement Code:1328

Problem Statement Title: Call for cost-effective ways of making water sources for piped drinking water supply sustainable in Rural areas

Team Name: Aqua Cloud Innovators

Team Leader Name: Kanjul Verma

Institute Code (AISHE): **U-0923**

Institute Name: VIT Bhopal University

Theme Name: Renewable / Sustainable Energy

Idea/Approach Details

[Learn more about this project.](#)

- The Aqua Cloud Innovator Project is a groundbreaking initiative designed to confront the pressing issue of water scarcity and foster sustainable practices. Our core focus is the development of a revolutionary biomimetic fog-harvesting technology.
- This innovative approach draws inspiration from the remarkable adaptations of the Namib Desert beetle, a creature capable of extracting water from foggy air.
- By emulating the beetle's unique strategies, we've engineered surfaces with a dual nature: hydrophilic regions to attract water molecules and hydrophobic regions to promote water droplet formation while minimizing evaporation.
- What sets our project apart is its comprehensive approach to solving multiple facets of water scarcity. It encompasses water source assessment, resource longevity prediction, and mitigation of the impact of irrigation tube wells on drinking water sources.
- The project is strategically designed to offer both environmental sustainability and substantial business potential. We believe that addressing these critical water-related challenges can pave the way for a cleaner, more secure water future.

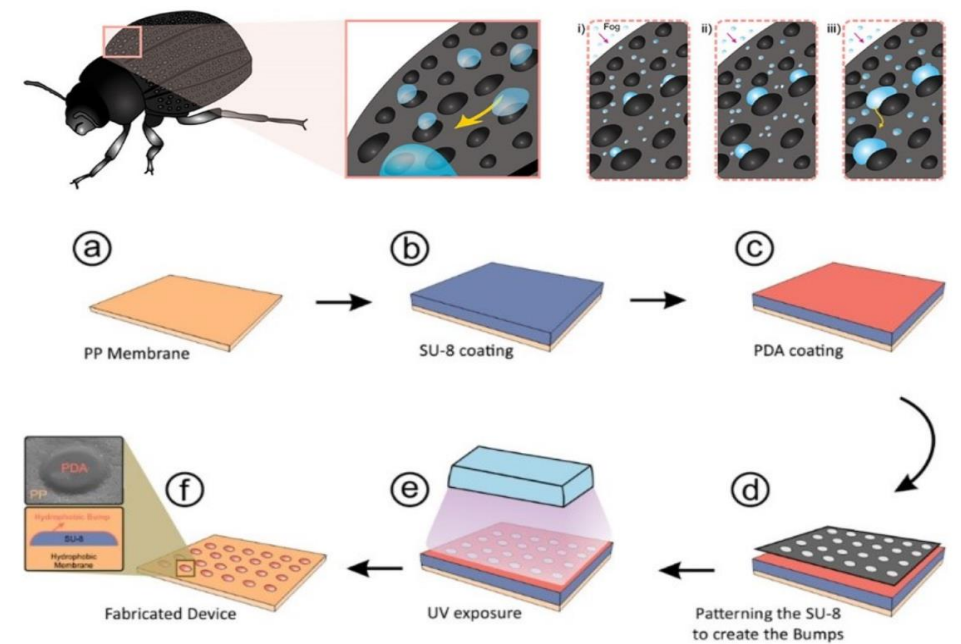
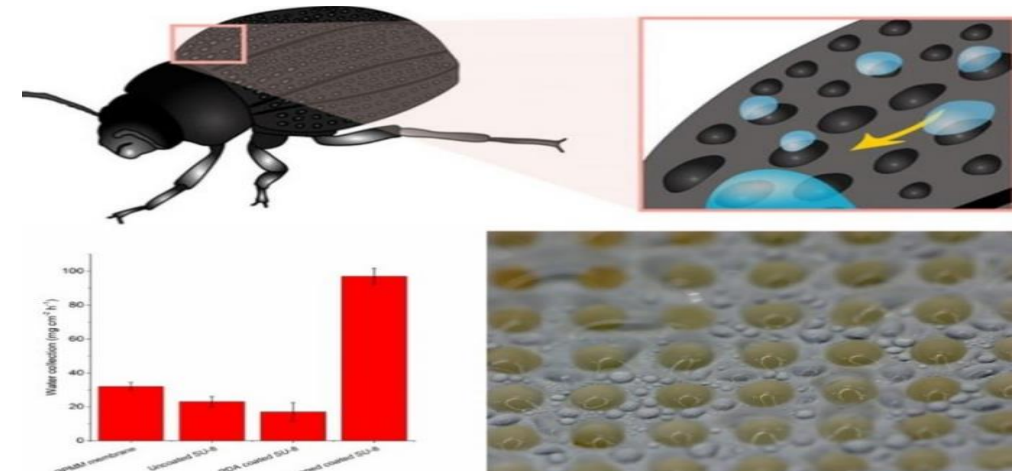


Image Credit -Blogs by UNSW Women in Maths and Science Championship Program.



A diagrammatic representation of how the outer layer of the beetle's body is designed to absorb the maximum water using hydrophilic and hydrophobic techniques.

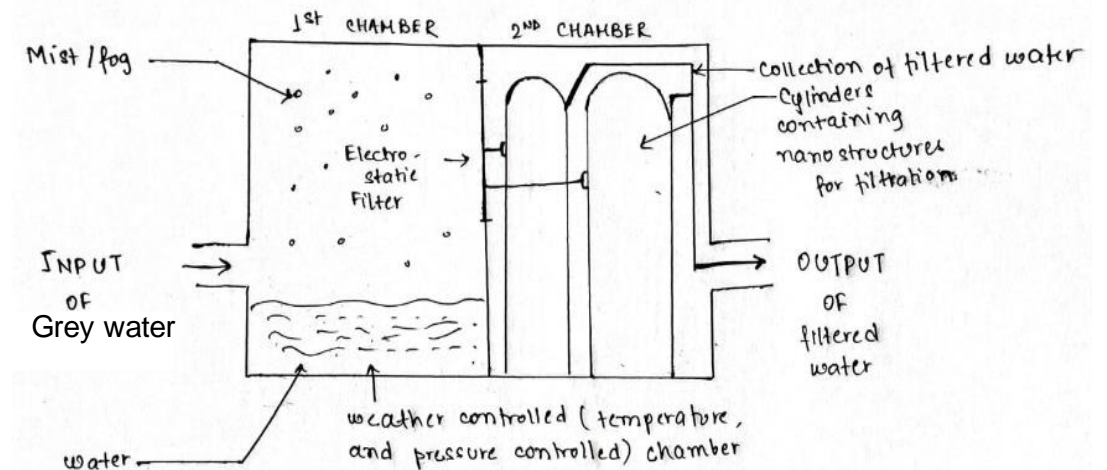
Idea/Approach Details

Use Cases

- 1. Water Scarce Regions:** Deploy in arid or water-scarce regions where traditional water sources are limited, providing a sustainable source of clean water for communities.
- 2. Remote Areas:** Install in remote locations with limited access to infrastructure, reducing the need for long-distance water transportation.
- 3. Agriculture:** Support agriculture by supplying water for irrigation in regions with unpredictable rainfall patterns.
- 4. Environmental Restoration:** Contribute to environmental restoration efforts by providing water for reforestation and ecosystem revitalization projects.
- 5. Disaster Relief:** Use in disaster-stricken areas to quickly establish temporary water supply systems.
- 6. Industrial Processes:** Supply process water for industries in water-stressed regions, reducing the environmental impact.
- 7. Humanitarian Aid:** Deploy in refugee camps and humanitarian missions to ensure access to clean water.

Our Novelty

- 1. Biomimetic Precision:** Inspired by the Namib Desert beetle, our system optimizes hydrophilic-hydrophobic patterns for efficient fog water collection.
- 2. Wastewater Recycling:** We recycle wastewater from industries and rural areas, reducing water wastage and pollution.
- 3. Nanotech Ingenuity:** Nanotechnology enhances surface properties for maximum water condensation and droplet formation.
- 4. Reliable Fog Generation:** Artificial fog production ensures consistent water supply across diverse climates.
- 5. Energy Efficiency:** Minimized energy consumption and potential use of renewable sources reduce environmental impact.
- 6. Holistic Approach:** Comprehensive blend of biomimicry, nanotech, data analytics, and environmental monitoring for a multifaceted solution.
- 7. Eco-Friendly Design:** Unlike traditional systems, our approach eliminates wastewater by-products (brine), aligning with sustainability goals and reducing environmental impact.



Prototype of the model: Designed by Sharanya Basak

Team Member Details

Team Leader Name: Kanjul Verma(22BHI10209)

Branch: Btech.

Stream: CSE(Health Informatics)

Year: II

Role in the Team: Responsibility for correlating with biomimetics and integrating the concept of desalination of sea and ocean water for water source.

Team Member 1 Name: Sharanya Basak (22BOE10079)

Branch: Btech

Stream: Bioengineering

Year: II

Role in the Team: Responsible for in-depth research and designing the prototype of the model.

Team Member 2 Name: Anushka Bora(22BOE10001)

Branch: Btech

Stream: Bioengineering

Year: II

Role in the Team: Responsible for problem-solving and modifications

Team Member 3 Name: Kopal Verma(23BCE10222)

Branch: Btech

Stream: CSE

Year: I

Role in the Team: Responsible for the filtration unit and desalination mechanism.

Team Member 4 Name: Aayush Sharma(22BOE10057)

Branch: Btech

Stream: Bioengineering

Year: II

Role in the Team: Responsible for Research on Nanotechnology

Team Member 5 Name: Ankush Sil(22BSA10062)

Branch: Btech

Stream: Cloud Computing and Automation

Year: II

Role in the Team: Responsible for Research on Nanotechnology