SMART INDIA HACKATHON 2024

- **Problem Statement ID – 1781**
- **Problem Statement Title- Revolutionizing Water Filtration**
- **Theme- Environmental Sustainability**
- **PS Category- Hardware**
- **Team Member names with USN-**

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- **Team Name: PHOENIX**

Compact and Adaptable Water Filtration System

❖Proposed Solution

Our system is a compact, portable water filtration system that installs directly into the aerator of any standard tap. Filtration would be based on an approach using activated carbon and ceramic filters that can remove contaminants such as chlorine, pesticides, bacteria, and particulates. It would be miniaturized with ease of installation and adaptability to taps. The non-electric, user-friendly design makes it suitable for households in urban and rural areas.

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TECHNICAL APPROACH

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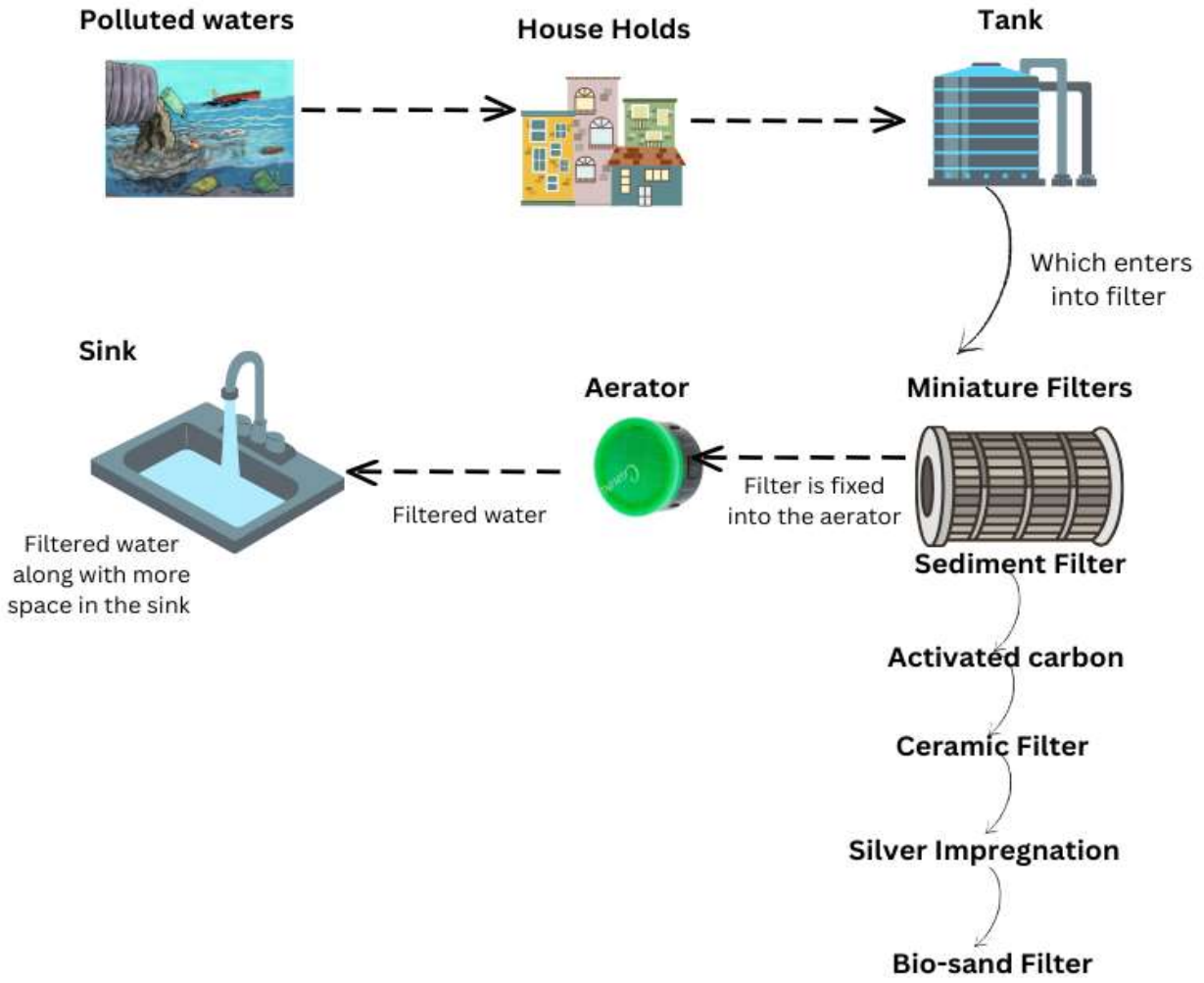
Planned technologies:

- **Miniaturized Design:** The filtration technologies would fit within a compact, round-shaped aerator attached to taps for various uses.

Methodology and process for implementation:

- **Design:** Create a perforated, layered filtration design that maximizes space availability while still effective.
- **Prototyping:** Conduct user tests in urban and rural settings to get feedback on its usability and performance.
- **Manufacturing**: Employ low-cost manufacturing processes



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FEASIBILITY AND VIABILITY

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Feasibility Analysis:

The filtration system will use activated carbon and ceramic filters to remove contaminants like chlorine and bacteria. With a size miniaturized to fit a variety of sources, it will be tested for efficiency and ease of use during prototyping.

Potential Challenges:

- User adaptation - to encourage users to clean and maintain the filter regularly.
- Compatibility - some taps may be of non-standard designs; therefore, the fittings may face compatibility problems.

Strategies for overcoming these challenges:

- This filtration system should have an attachment mechanism that can fit for any type of tap. This will account for minimal spaces around sinks, offering an easy solution to place any vessels as one uses the filter.
- Easy to maintain and clean the filters.

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IMPACT AND BENEFITS

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Potential Impact:

Compact filter design that fits taps to bring clean water.

Clean Water Access

It removes harmful contaminants, which improve health.

Health

Saves electrical energy.

Sustainability

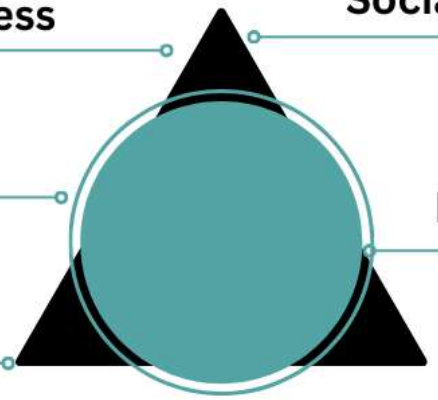
Benefits:

Improves water quality in the houses who cannot afford for expensive filters

Social

low cost-the money saved on costly filters.

Economic



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RESEARCH AND REFERENCES

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Research:

1) Antimicrobial Nanomaterials for Water Disinfection and Microbial Control: Potential Applications and Implications

- Presenting a broad range of available, antimicrobial nanomaterials such as TiO2, nAg, and chitosan, this review presents water disinfection methods while weighing their principles, advantages, disadvantages, and the necessity to carry out further research to enhance their application in water treatment systems.

2)Applications of Nanotechnology in Water and Wastewater Treatment

- This report is concerned with the productive employment of nanotechnology by the water and wastewater treatment industries in relation to water pollution control efforts with special focus on the area of nanomaterials, which are applied to achieve decontamination, elimination of pathogens, and improvement of water filtration systems through advanced methods.

3) Smart and Innovative Nanotechnology Applications for Water Purification

- The present paper examines comparatively recent nanotechnology applications in water purification processes, which are based on nanoparticles and nanofiltration membranes in the aim to

Reference:

1) S. M. D. Y. L. L. B. M. V. L. D. L. P. J. A. Qilin Li, "Antimicrobial nanomaterials for water disinfection and microbial control: Potential applications and implications," *Water Research*, vol. 42, no. 18, pp. 4591-4602, 2008.

2) P. J. A. Q. L. Xiaolei Qu, "Applications of nanotechnology in water and wastewater treatment," *Water Research*, vol. 47, no. 12, pp. 3931-3946, 2013.

3) S. K. Nishu, "Smart and innovative nantechnology applications for water purification," vol. 3.