

### DEVELOPMENT OF A PEDAL POWERED WATER FILTRATION SYSTEM IITM Technology Available for Licensing

#### Problem Statement

- Rural areas in Tamil Nadu, India, lack access to good quality drinking water due to high levels of TDS, alkalinity, fluorides, and heavy metals in the water, particularly near industrial zones.
- There is a need for a sustainable and cost-effective water filtration solution that can provide potable water in these rural areas without relying on electricity, while also addressing heavy metal and contamination issues.

#### Technology Category/ Market

**Category** – Water Filtration Technology, Green Technology, Renewable Energy

**Applications** – Water purification, Rural water supply, Environmental sustainability

**Industry** – Water treatment, Rural development, Environmental sustain.

**Market** - The global water purifier market size accounted for USD 26.42 billion in 2022 and it is projected to hit around USD 63.99 billion by 2032, growing at a noteworthy **CAGR of 9.30%** during the forecast period 2023 to 2032.

#### Key Features / Value Proposition

##### Technical Perspective:

- A **pedal-powered peristaltic pump filtration system** efficiently **removes contaminants and heavy metals** from rural Indian water sources, ensuring **sustainability and potable water without electricity.**

##### User Perspective:

- The invention relates to use of a **cheap and sustainable technology** for filtering rawwater in rural India through **manual pedaling action.**
- This **sustainable and cost effective technology** provides potable water by **removing heavy metals, alkalinity and TDS** from raw water.

#### Intellectual Property

- IITM IDF Ref. 1033
- IN 338204 (PATENT GRANTED)

#### Technology

##### Peristaltic Pump Mechanism:

The technology utilizes a **peristaltic pump system** with **spring-loaded rollers**, which are driven by human pedaling action to create pressure and move water through the filtration process.

##### Self-Cleansing Design:

Incorporates a **self-cleaning feature** uses reverse pedaling for filter maintenance.

##### Multi-Stage Filtration:

It incorporates a **multi-stage filtration process** involving **sand, activated carbon, ultrafiltration membrane, reverse osmosis, and chlorine treatment**, sequentially removing contaminants, heavy metals, and pathogens from raw water.

##### Human-Powered and Sustainable:

Operates entirely on **human power**, making it **cost-effective and sustainable for rural areas** with limited electricity.

##### Versatile Mounting Options:

The system can be mounted on **bicycles or tricycles**, providing **mobility for both water purification and transportation**, in rural settings.

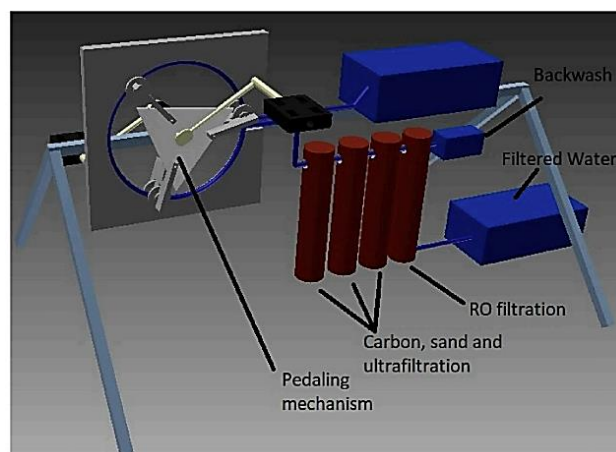


Fig.1 Stand-alone mechanism with the peristaltic unit for pedal – powered water filtration

#### CONTACT US

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## Industrial Consultancy & Sponsored Research (IC&SR)

The benefits resulting from this invention are many. Some of them are listed below.

- **Pedal-Powered Water Transport & Filtration** for Rural Tamil Nadu
- **Human-Powered:** No external energy needed.
- **Source Compatibility:** Works with various water sources (excluding sewage).
- **Thorough Filtration:** Sand, carbon, ultrafiltration, reverse osmosis, chlorine.
- **Affordable Maintenance:** Reverse pedalling cleans filters, reducing costs.
- **High Efficiency:** 5L raw water to 2L potable water.
- **User-Friendly:** Designed for 56 kg individuals, promoting fitness.
- **Mobility:** Attachable to tricycle for mobile water unit.
- **Sustainable:** Emission-free, climate-friendly solution.

### Images

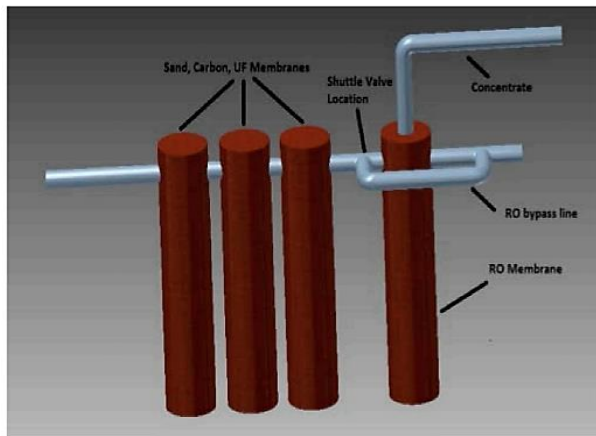


Fig.2 Sequence of filters for optimal filtration

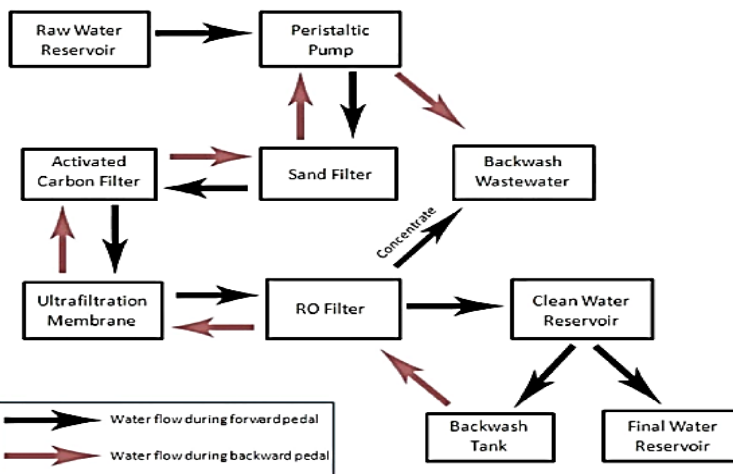


Fig.4 Water flow in forward- and reverse pedalling action

| ITEM | QTY | PARTS LIST PART NUMBER | DESCRIPTION            |
|------|-----|------------------------|------------------------|
| 1    | 1   |                        | Frame Assembly         |
| 2    | 1   |                        | Triangular Assembly    |
| 3    | 1   |                        | Cover                  |
| 4    | 1   |                        | tube                   |
| 5    | 3   |                        | RO tank                |
| 6    | 4   |                        | ro mf carbon membranes |
| 7    | 1   |                        | outlet                 |

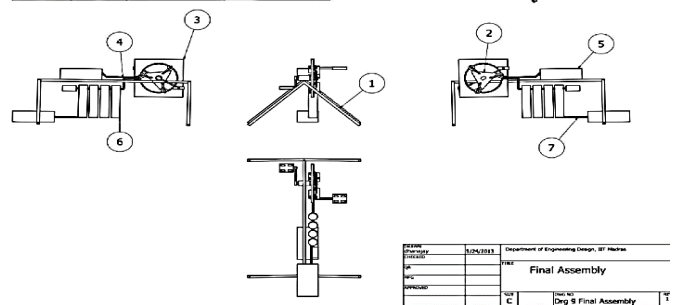


Fig.3 Stand-alone mechanism with the peristaltic unit for pedal-powered water filtration.

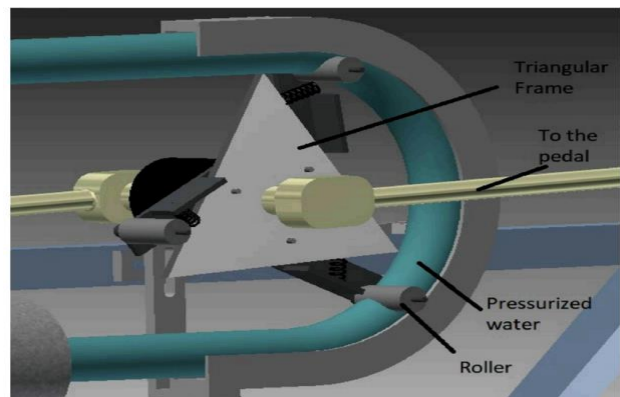


Fig.5 Peristaltic mechanism for pumping water in mobile filtration

### TRL (Technology Readiness Level)

TRL- 4/5 Technology validated in lab and relevant environment.

### Research Lab

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