DEVELOPMENT AND FABRICATION OF BICYCLE POWERED WATER PURIFYING SYSTEM

Project Reference No.: *47S_BE_4730*

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Keywords:
Clean water, Eco-friendly, Bicycle Power-operated

Introduction:

- Water purification is the process of removing undesirable chemicals, biological contaminants from the water.
- Traditional water purification system required electricity to run the purification system.
- During floods, natural disasters there is no availability of pure water for drinking purpose, and also to purify
- Hence to provide pure and safe drinking water for the flood affected regions and also for the rural areas where there is no supply of electricity.
- Due to peddling the system exercise also done which is very good for our health.

In this project we used mechanical energy as a power source of the system. In that system without use of external electricity we run the pump with the help of chain drive which is driven a bicycle

Objectives of the project:

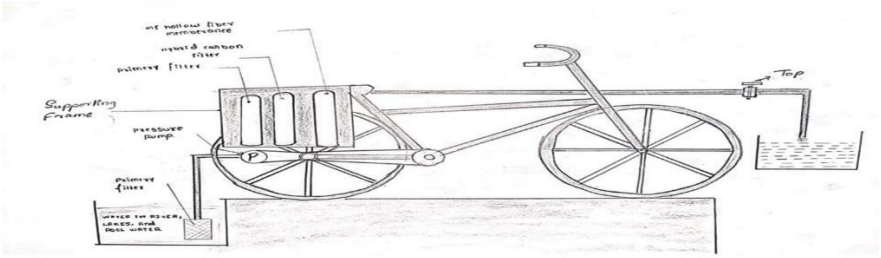
To design and develop a pedal operated water purification system.

1. To provide purified water with minimum cost
2. To make the system portable
3. To provide good quality of purified water with less maintenance

Methodology:

1. Conceptual Design

- **Preliminary Sketches:** Create initial design sketches outlining the proposed system, focusing on the integration of the bicycle mechanism with the filtration unit.



2.Prototyping

- **Prototype Fabrication:** Assemble a working prototype using selected materials. This involves welding the bicycle frame, installing the gear mechanism, and attaching the filtration system.

3. Filtration System Development

- **Filter Media Selection:** Choose suitable filter media based on the target contaminants, which are dirt, suspended particles. The series of filters are used to remove the targeted contaminants are cotton filter, sedimentation and active carbon cartridge.

❖ **Cotton filter**: - it is the primary water filter. It will work as a when dirty water passes through the filter; the cotton ball layers trap the largest particles of dirt. It will reduce the bacteria content about 50%.

❖ **Carbon filer**: - It is the secondary filter which can effectively remove chemicals from water including chlorine as well as iron, manganese and hydrogen sulphide. They can also remove objectionable tastes and Odors.

❖ **Sediment filter: -** sediment filter traps and removes debris from stormwater runoff, rust flecks, suspended solids, and other particulates that contaminate water.

Series 0f filters

- **Flow Rate Optimization**: Design the filtration system to achieve an optimal flow rate that balances purification effectiveness with ease of pedaling.
- **Contaminant Removal Testing:** Test the filtration system with various water samples to evaluate its effectiveness in removing contaminants. Adjust the filter configuration as needed.

4. Mechanical Testing

- **Pedaling Efficiency**: Measure the energy required to operate the system through pedaling. Ensure that the effort needed is sustainable for an average user.

5. Analysis and Iteration

- **Performance Analysis**: Analyze the data collected during field testing to assess the system's performance against set benchmarks.
- **Design Iteration**: Make necessary design modifications based on the analysis. This may include changes to the filtration system, mechanical components.
- **Repeat Testing**: Conduct additional rounds of testing with the updated design to ensure improvements are effective and no new issues have arisen.

6. Finalization and Documentation

- **Final Prototype**: Build the final version of the prototype incorporating all improvements and optimizations identified during testing.
  Comprehensive Documentation: Document the entire development process, including design specifications, test results

Working: -

The system uses pedal fixed sprocket with chain attached to supply circular force to the pump. The power generated by human effort by pedaling to pump the water from source. The pressurized water is passed through series of filter to remove the particle and basic filtering. The container on other end is used to store the filtered water. Thus we achieve pedal powered water purification system.

Final model of project

Results and Conclusion:

WATER QUALITY ANALYSIS REPORT

Sl No	Characteristics	Sample Values		Limits for drinking water as per IS 10500-2012	
		Before treatment	After treatment	Acceptable	Permissible
1	Turbidity, NTU	53	4.4	1	5
2	Settleable solids (ml/l)	5.5	1.3	--	--
Remarks: For the characteristics checked, Turbidity parameter for the treated sample is within the acceptable limits.					

Conclusion:

The development and fabrication of a bicycle-powered water purifying system represent a significant advancement in providing sustainable and accessible clean water solutions, particularly for rural and remote areas. Based on the results the purified water is suitable for drinking purpose

Innovation in the project:

Traditional water purification system are stationary or fixed and required electricity to run the purification system. But the pedal powered water system is portable because it is mounted on bicycle. we used mechanical energy as a power source of the system hence it does not required electircity to run the system.

Future scope:

This project is further integrated with solar panels as a power source, the generated energy is stored in batteries. Which is used to run the pump, RO and UV. Using RO and UV the purification is improved.