Water Turbine Project Report

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1. Introduction

This project demonstrates the principle of energy conversion using a water turbine. The objective is to convert the kinetic energy of flowing water into mechanical energy and subsequently into electrical energy, using a homemade water turbine model. The turbine design incorporates basic fluid dynamics and Bernoulli's principle.

2. Materials Required

1. Plastic Bottle Caps - 11
2. Ice Cream Sticks (10 cm each) - 10
3. Water Source (Tap/Bottle) - 1
4. Bucket or Small Tub - 1
5. Manometer / U-shaped Tube - 1
6. DC Motor - 1
7. Small LED Bulb - 1
8. Hot Glue - As required
9. Thin Rod (10 cm) - 1

3. Working Principle

The model works on the principles of fluid dynamics and conservation of energy, especially Bernoulli's Principle. The flowing water strikes the turbine blades, causing them to rotate. This rotational mechanical energy is transferred to a DC motor, which converts it into electrical energy, lighting up the LED bulb.

4. Construction Manual (Step-by-Step)

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Step 1: Turbine Blade Assembly

- Take ice cream sticks and cut them if needed to equal length. Attach them to plastic bottle caps using hot glue to form blades.

Step 2: Rotor Mounting

- Insert the assembled blades into a thin rod (10 cm) at the center and fix it.

Step 3: Stand Setup

- Fix the rod with turbine on a stable stand so it can rotate freely.

Step 4: Water Setup

- Place a bucket or tub below the turbine. Direct a water stream onto the blades.

Step 5: Pressure Measurement

- Attach a manometer or transparent U-shaped tube to measure flow pressure.

Step 6: Energy Demonstration

- Connect the rotating rod to a DC motor. Attach an LED bulb to show energy generation.

5. Applications in Real Life

- Hydroelectric Power Generation: Water turbines are central to hydro plants, converting flow into electricity.
- Renewable Energy: Used in dams and rivers, they harness clean, sustainable energy.
- Efficiency Focus: Requires optimized blade design and flow control for best performance.

6. Conclusion

In this project, we aimed to convert the energy of flowing fluid into mechanical work. Using basic materials, we demonstrated the conversion of kinetic and potential energy of water into rotational motion and further into electrical energy using a DC motor. The glowing LED bulb confirms the principle of energy conservation through turbine technology.