Charging Electronics in Remote Areas

Overview:
The HydroGEN is a portable hydroelectric generator designed for backpackers and river runners. It uses the kinetic energy of a stream or river to charge 10,000 mAh of electric energy for charging personal electronic devices and batteries. The compact, collapsible design makes it perfect for backpacking or river rafting. Once setup in the river the HydroGEN operates without any intervention.

How it Works:
- River current spins the propeller that is coupled to a 34:1 DC motor
- The motor produces an electrical output voltage
- A voltage regulator steps the motor voltage up to 4.2 Volts to charge internal batteries
- Battery overcharge is prevented by a Li charging chip
- A second voltage regulator steps the battery voltage up to 5 V, allowing personal electronics to be charged through the external USB port

Additional Information:
- Step up / step down voltage regulators capable of providing 1 Amp of current require a minimum input voltage of 2.7 Volts
- 1 Amp of current will charge the 10,000 mAh capacity batteries in 10 hour, or at a rate of 0.1C
- All manufacturing was done with 3D Printing on a Stratasys Fortus 400 printer

Power Generation:
- Torque gathered from the flow simulation, no load RPM and stall torque of the generator were used to create a system power output model
- River flow rates, voltage, and current readings in the system were then recorded to determine the actual power output of the system
- The model over predicted power generation, but the system still generates enough electricity to charge the internal batteries at flows above 4 ft/s

Internal Wiring Diagram

Flow Simulation: 3.71 in*lbs torque at 3.0 ft/s flow rate

Collapsible Design

HydroGEN

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