

PICO HYDRO

POWERING DEVELOPING COMMUNITIES WITH RUN-OF-STREAM HYDROELECTRICITY

Created by: Jonathan Rogers

The Problem

The lack of renewable and affordable electric power in small, off-grid communities in the developing world limits both educational and economic opportunities, making it difficult for people to flourish and the communities to prosper.

Mission

We believe that all people deserve an opportunity to pursue financial prosperity for themselves and their families. We believe that small-scale hydro can bring jobs and economic prosperity to underdeveloped communities.

Goals

Construct a final design for an optimized, field-tested prototype (WEDGE 4.0) that meets EMI's design specifications and serves as a battery charging station.

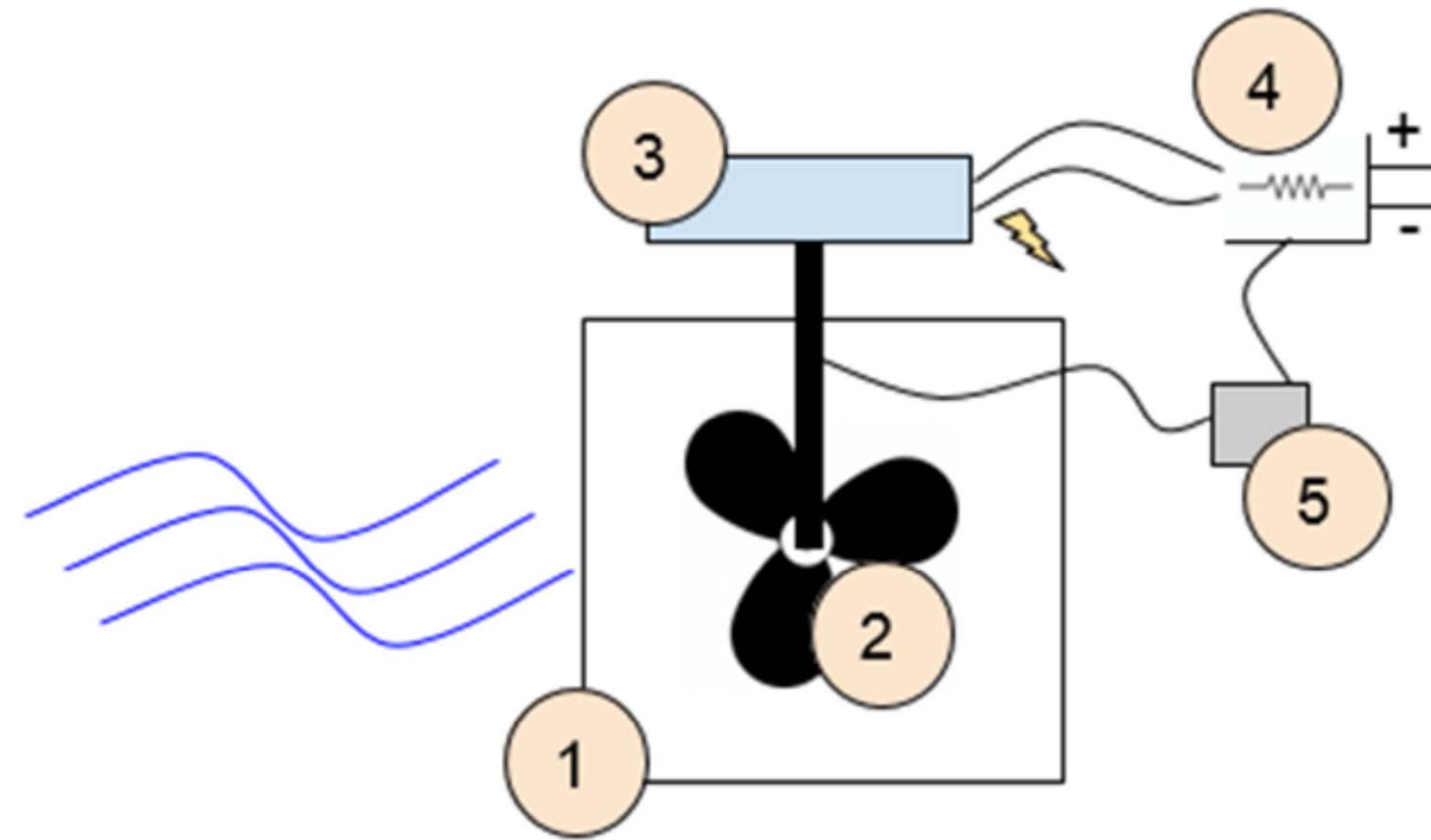
Partner



Specifications

- Power output: 300-800W
- Usage rate: 24hrs/day
- Lifetime: minimum 3 years
- Total Cost: maximum \$500
- Materials: locally sourced

Overview



1	Water Passage	Direct Flow (V_s = Stream Velocity)
2	Turbine	Capture Hydrokinetic Energy (KE -> Torque)
3	Generator	Generate Electricity (Torque -> EE)
4	Transformer	Charge Controller / Shunt Load Regulator (Variable -> Controlled Output)
5	Data Collection	Measuring and Analyzing Variables

Acknowledgements

Andy Breighner—Project Manager: Voith Hydro
Contact: breighner.a@gmail.com

David Vader—Faculty Advisor: Messiah College
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Wil Kirchner—Client: EMI

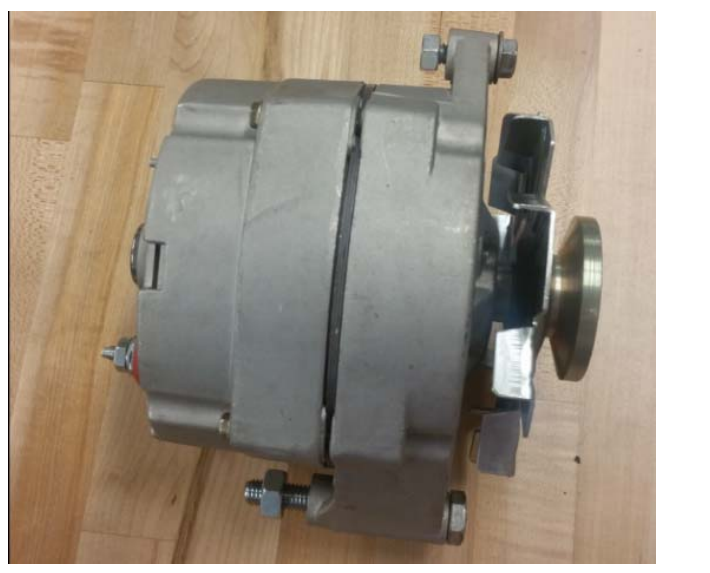
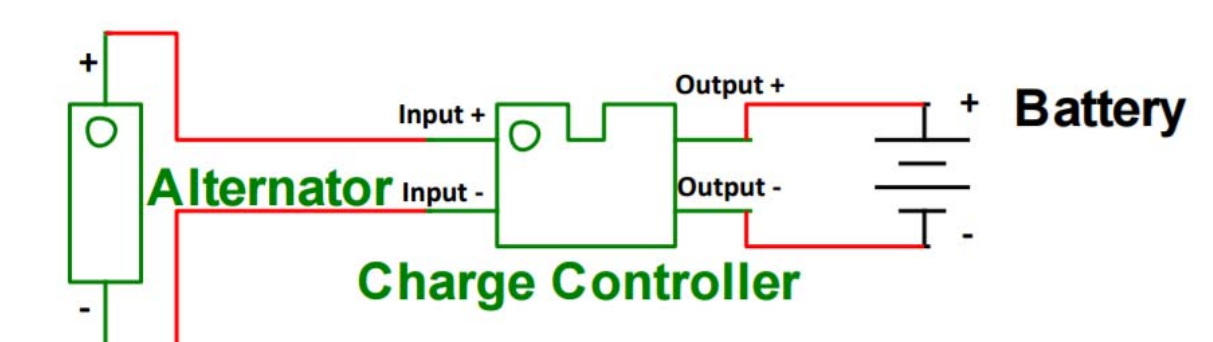
Donald Sternitzke—Professional Consultant: Inventor WEDGE

Dan Elliot—Professional Consultant: Retired

Dereck Plante—Collaboratory Consultant: Messiah College

Work in Progress

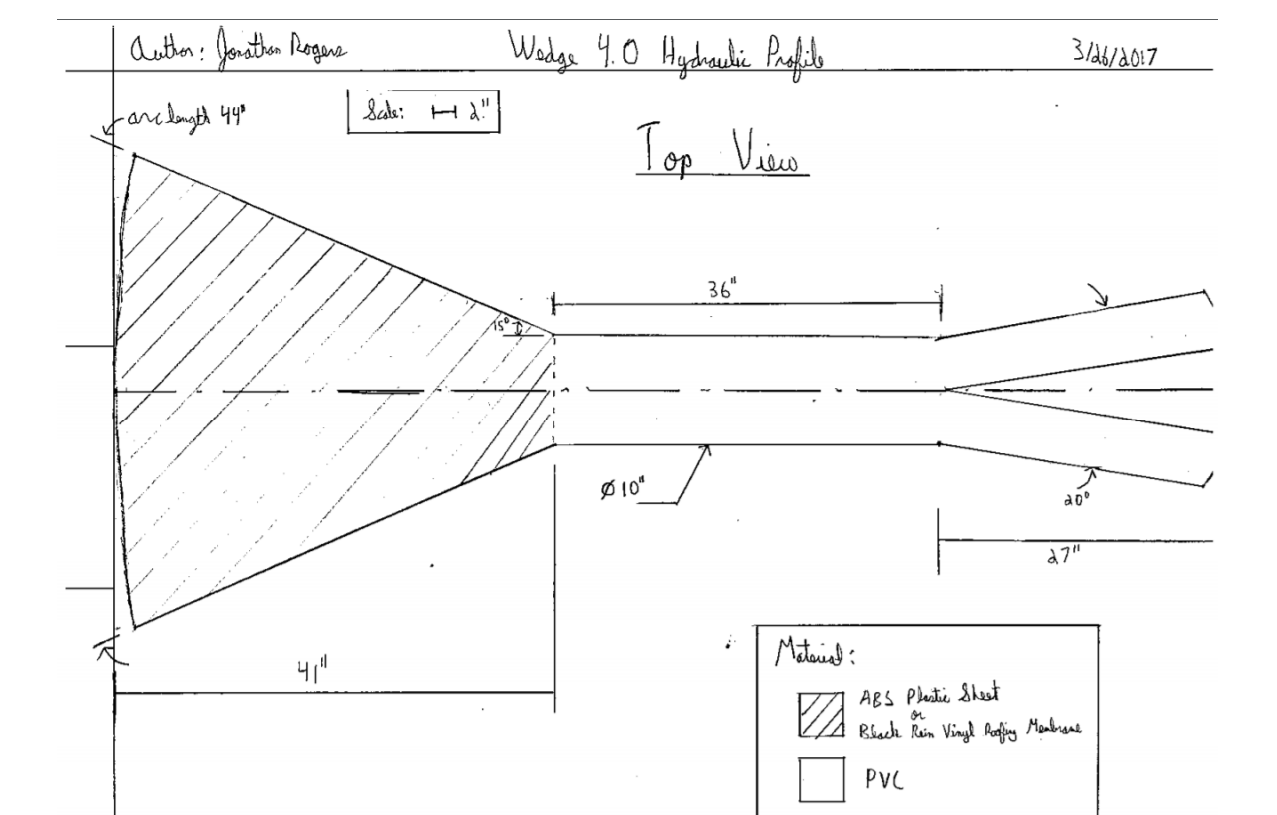
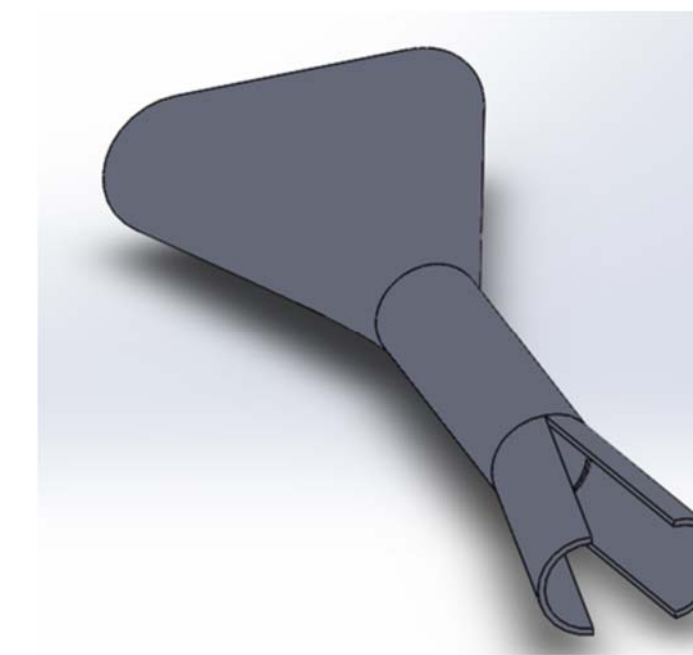
Electrical – Analyzing battery charge and discharge cycles, charge controllers, and alternator performance



Mechanical – Housing design

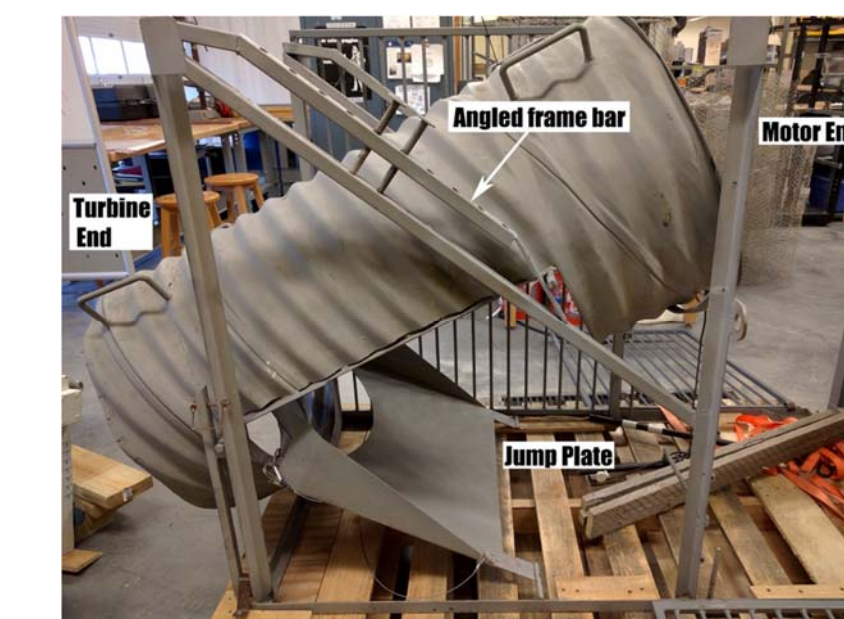
Design considerations:

- Cost
- Material availability
- Optimized efficiency
- Durability
- Transportability



Project History

EMI testing, Colorado mountains: WEDGE 2.0



Pico-Hydro testing, Yellow Breaches PA: WEDGE 3.0

