E2.02 - Vortex One

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Sponsored by: Dr. Rich Compeau

TEXAS STATE
INGRAM SCHOOL OF ENGINEERING

VORTEX ONE

Requirements

- Produce electricity when oscillating in at least two directions.
- Output power to user that meets the USB 3.0 power delivery standard.
- Accumulate power to be output while the product isn't producing any power.
- Have no rotating parts.
- Store and display data relating to power generated, DC purity, and accumulation capacity.

Importance

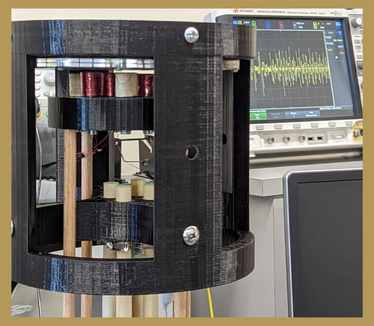
- Cheaper entry into green power
- Much lower maintenance than traditional turbines
- Smaller impact on wildlife than traditional turbines
- Less space needed than traditional turbines

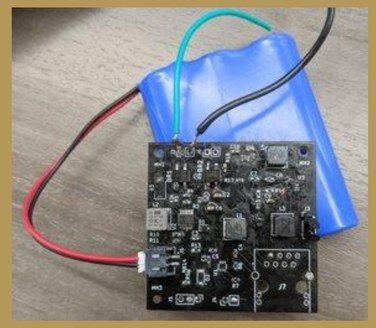
Team Members

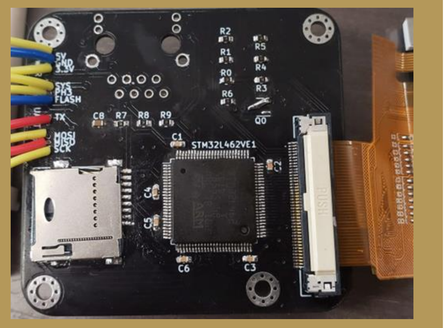
Zachary Trascher | Ryan Middleton | Matthew Crain | Grant Page

Final Design

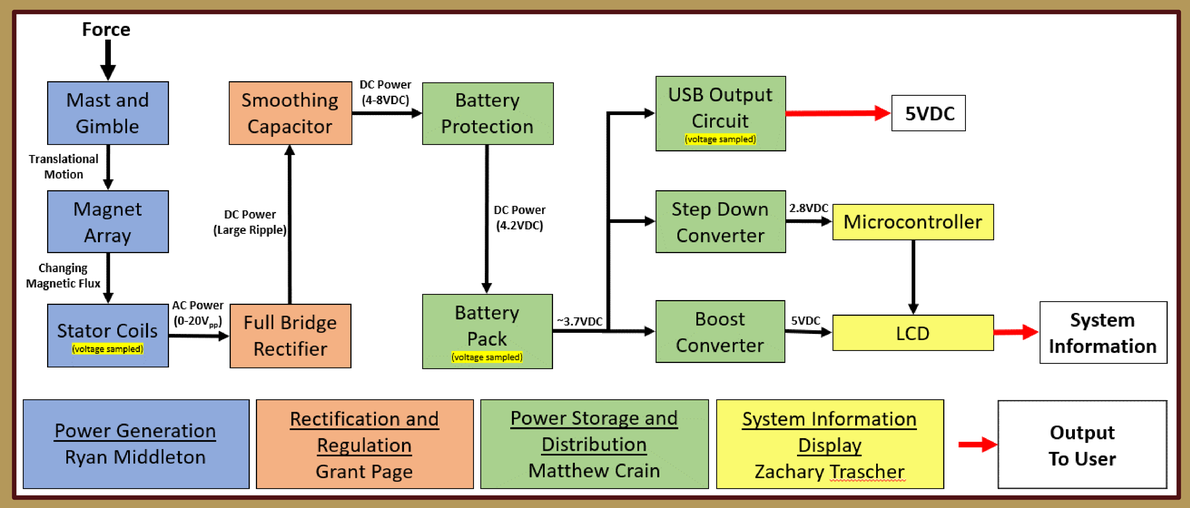
The Vortex One is a generator that uses the phenomenon of vortex shedding to produce electricity by oscillating in the wind.







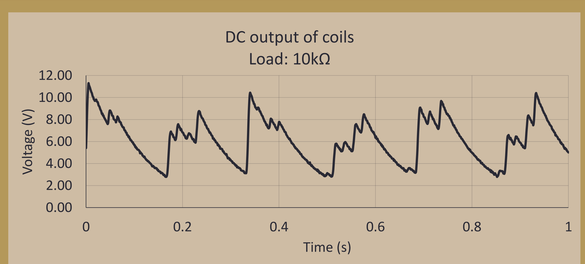
Overall Block Diagram



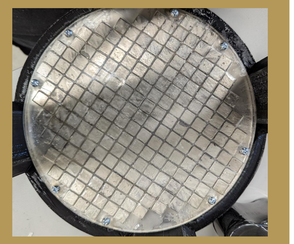
Final Design Results

System Power Consumption

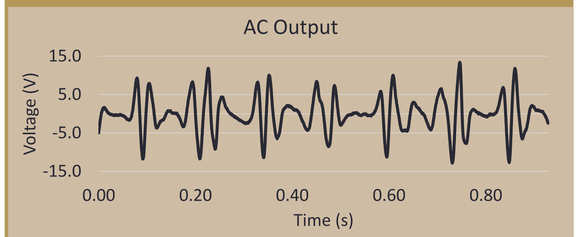
System Being Powered	Operating Voltage	Max Current Draw From Battery
LCD	5.0 V	894mA
Microcontroller	2.8 V	11.9mA
5V USB Output	5.0 V	1528mA
Total	~	2433.9mA



Power Generation



- The magnets are in an array with alternating poles in a checkerboard pattern.
- Each coil is lined up with a magnet, so all generated power is in-phase
- The magnet array is connected to the moving mast, while the coil array is connected to a stationary shaft.



- Final Design produces 10 VAC at 4Hz

Stretch Goals

- Generates power omni-directionally.

Acknowledgements

- Sponsor: Dr. Rich Compeau
- Faculty Advisor: Fawzi Behmann