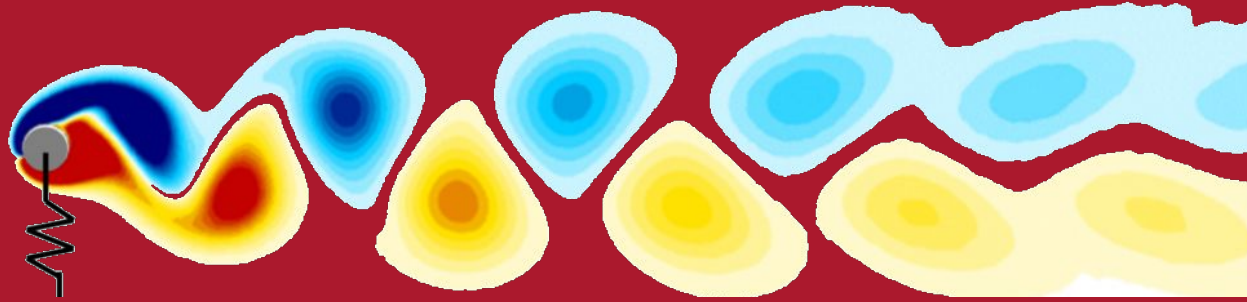




WPI



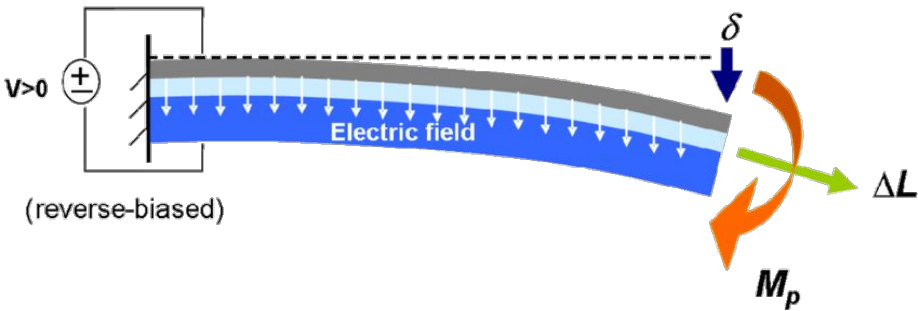
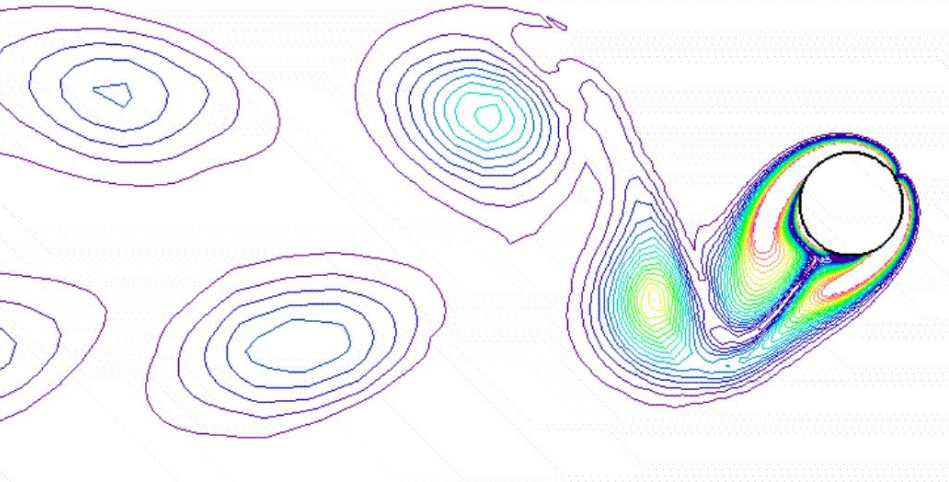
Energy Harvesting from Vortex-Induced Vibrations

Authors: Talya Feldman, Evan McCauley, Brendan Merritt,
Alyssa Tepe, Joseph Gilmartin

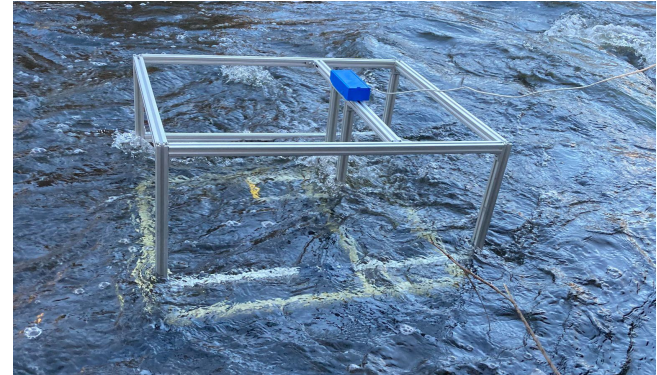
Advisor: Prof. Brian Savelonis



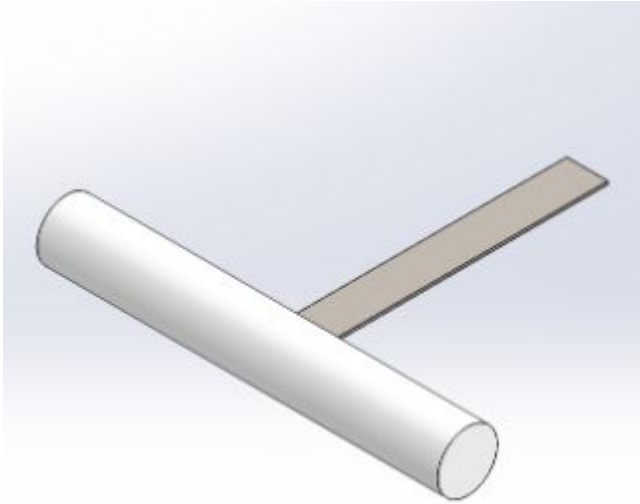
Vortex-Induced Vibrations



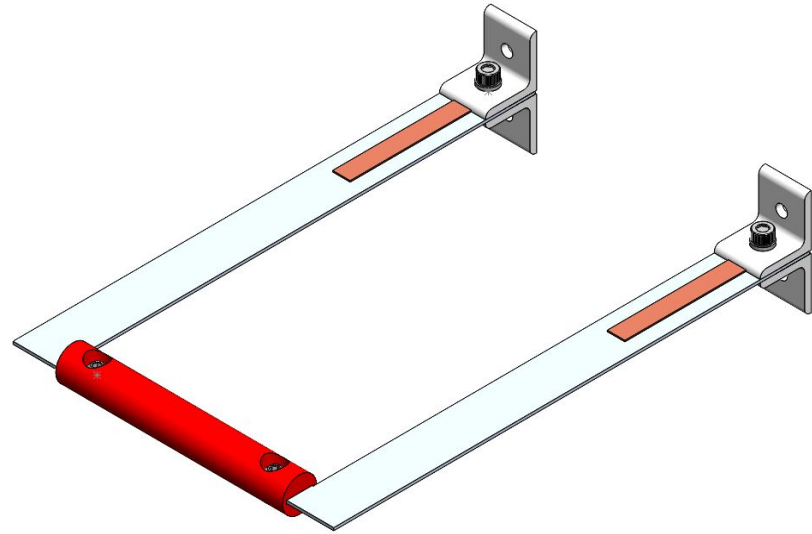
- Built a system with a cantilever to induce vortices
- This cantilever was connected to a bending generator to create small electrical outputs



Design Process

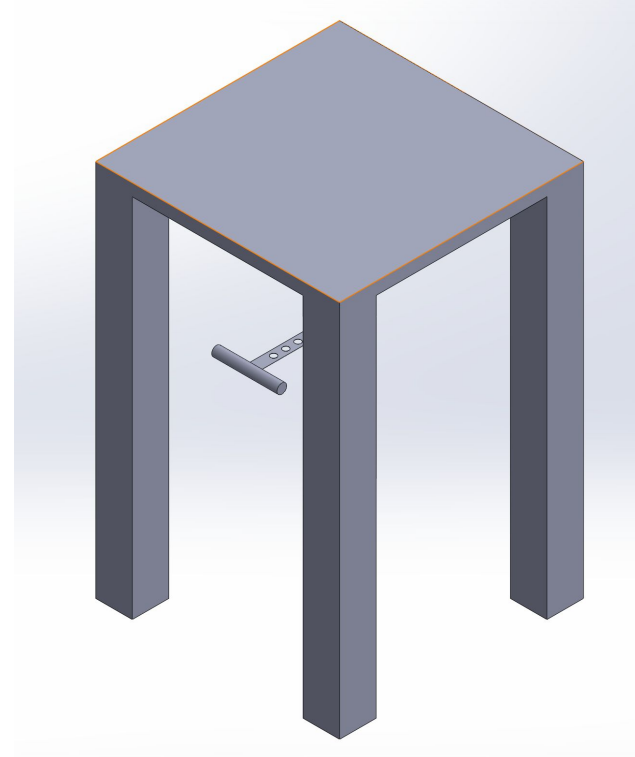
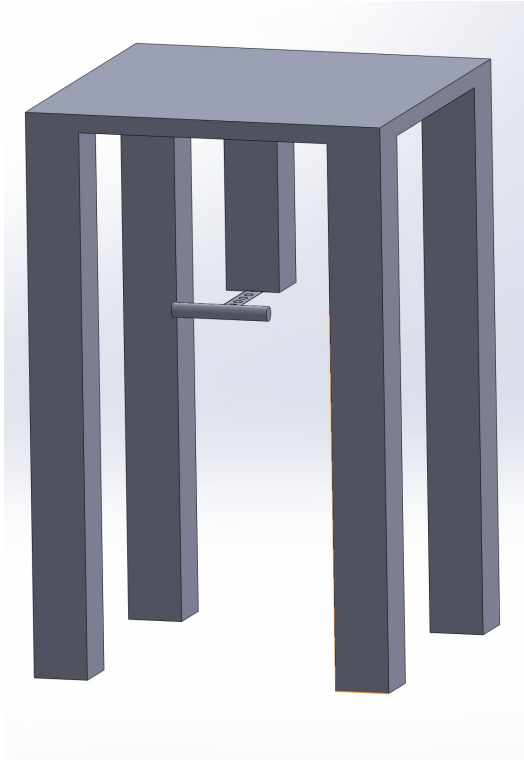


Preliminary Cantilever Design

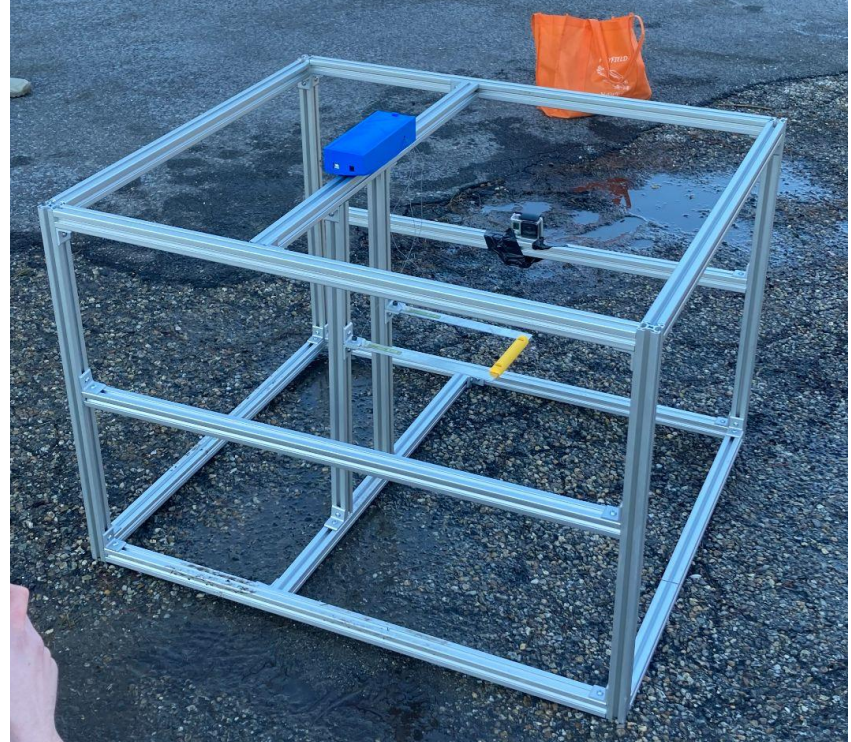
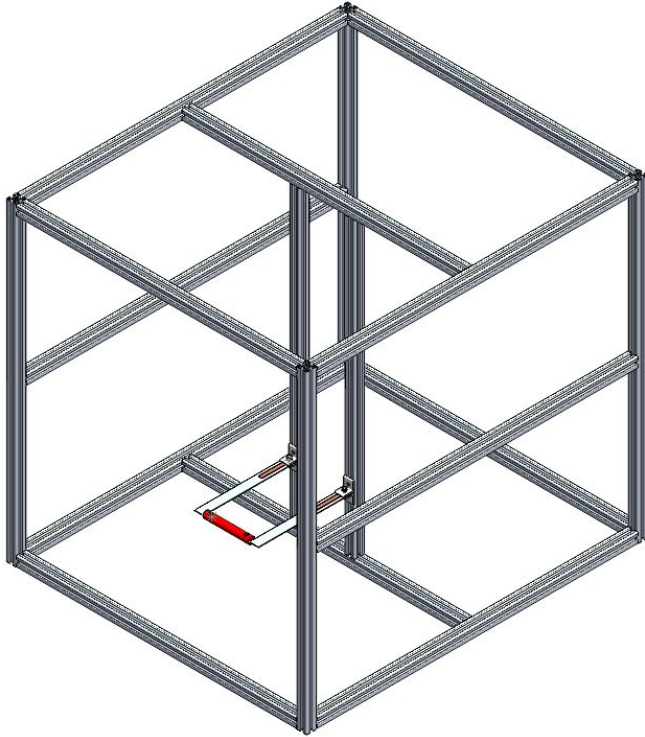


Final Cantilever Design

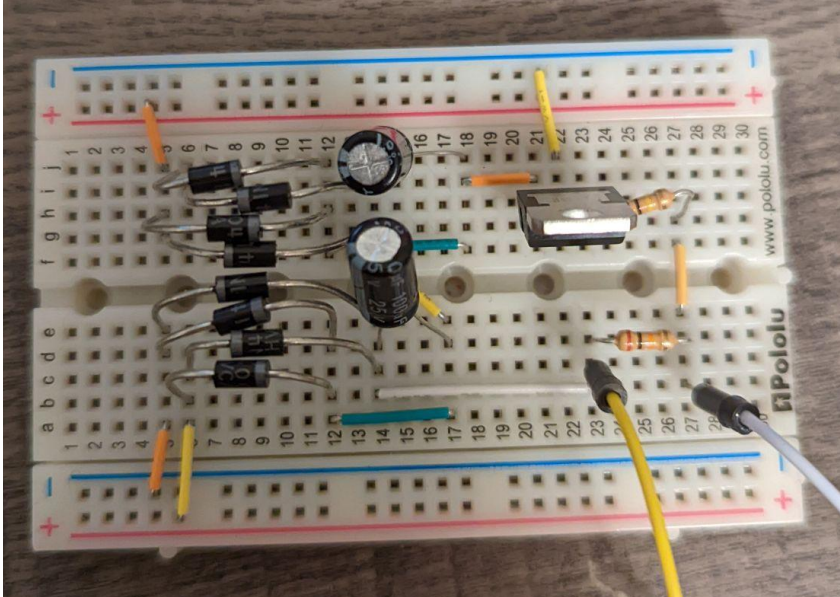
Preliminary Design



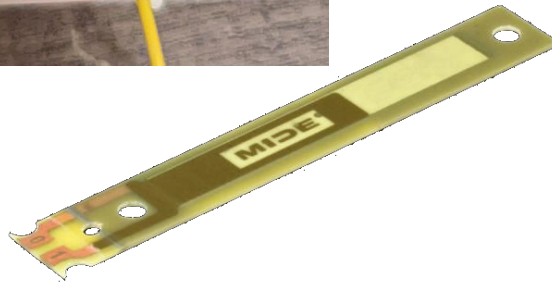
Final Design



Circuit Design



- The circuit shown on the left was used to convert the AC output from the piezoelectric strips into a nearly DC output.
- This circuit consisted of a full bridge rectifier for each strip, both leading into a filter capacitor.
- The piezoelectric strips were connected in series after their respective capacitors, and then connected to a voltage regulator.



Action Shots



Underwater GoPro Image



Results and Impact

Date	Average Velocity (m/s)	Highest Velocity (m/s)	Observed Frequency (Hz)	Observed Max Deflection (m)	Average Voltage (V)	Calculated Power over Resistance (μW)
2/21	0.5	0.9	5.9	0.0140	0.45	1.68
2/23	0.9	1.3	6.4	0.0137	0.54	2.92
3/2	0.7	1.3	6.6	0.00853	0.48	2.30
3/8	0.9	1.6	N/A	N/A	0.56	3.14

The power generated can potentially power small electronics including temperature sensors.





Thank you!