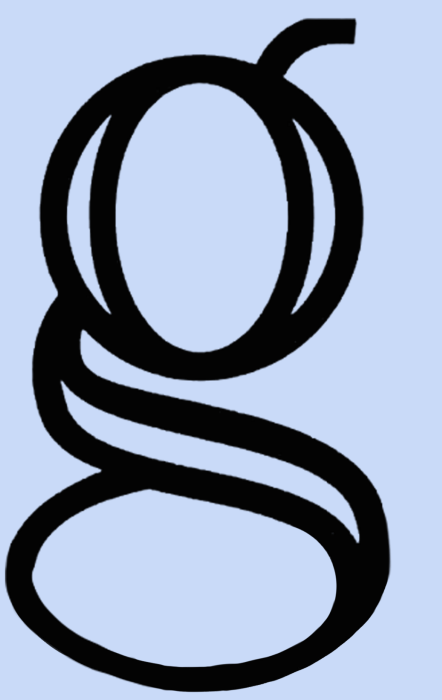




UNIVERSITY OF MARYLAND
HONORS COLLEGE

Team PISO: Turning Pressure into Power

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Problem Statement

Climate change and the urgent need for sustainable energy present a serious challenge to future development.

Meeting this energy demand requires new alternative energy sources, which must have consistent output and be easily accessible.

Research Questions

1. How can piezoelectric energy harvesting be improved?
2. Can a piezoelectric floor tile be optimized for cost-effective power generation?

Acknowledgements



Data Collection

Our custom test rig (bottom right) allows us to customize the frequency and intensity of an impulse we put onto a piezoelectric transducer with a high degree of accuracy.

This allows us to read the transducer's behavior in a controlled environment and create a model using our observations.

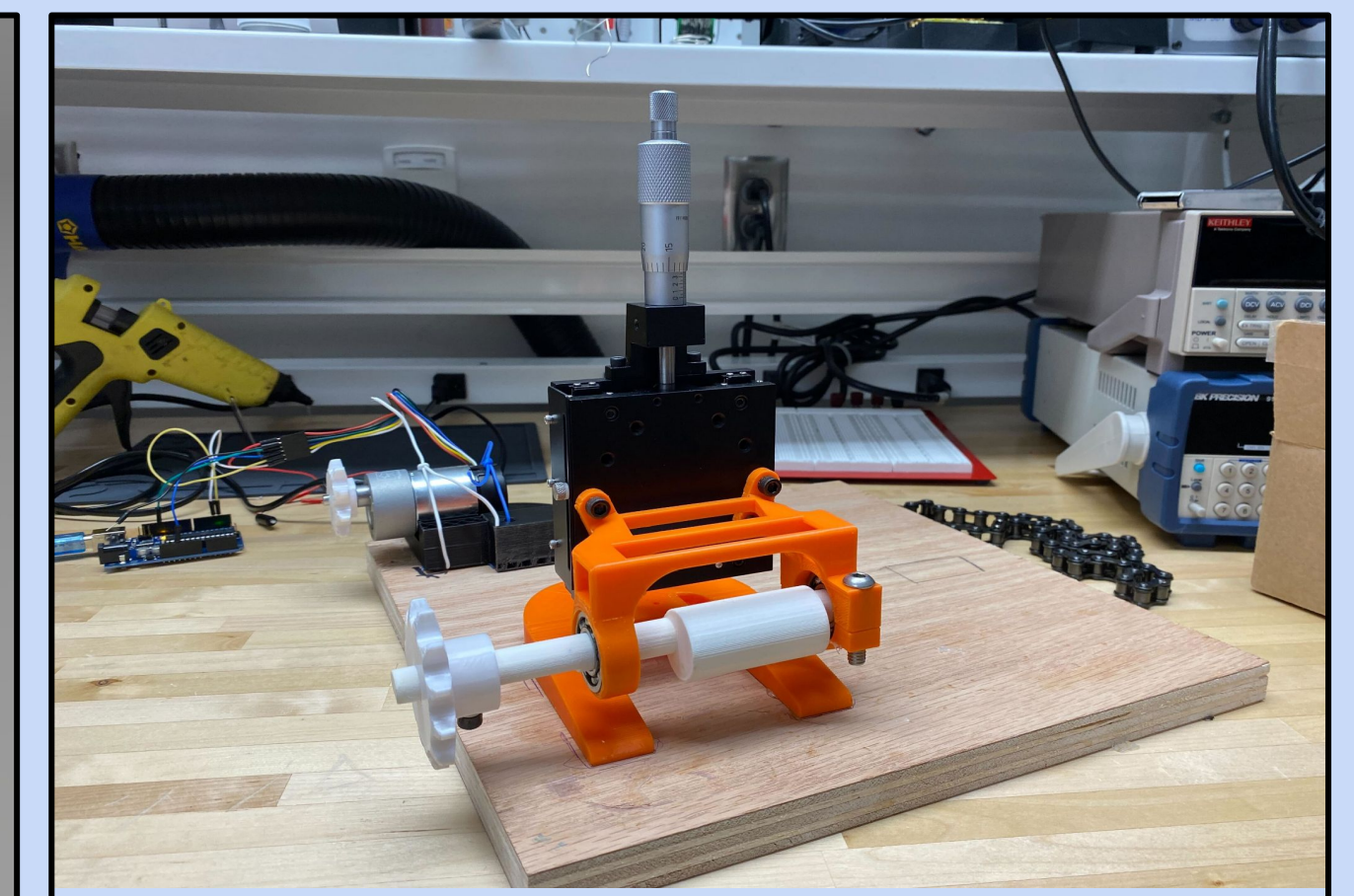
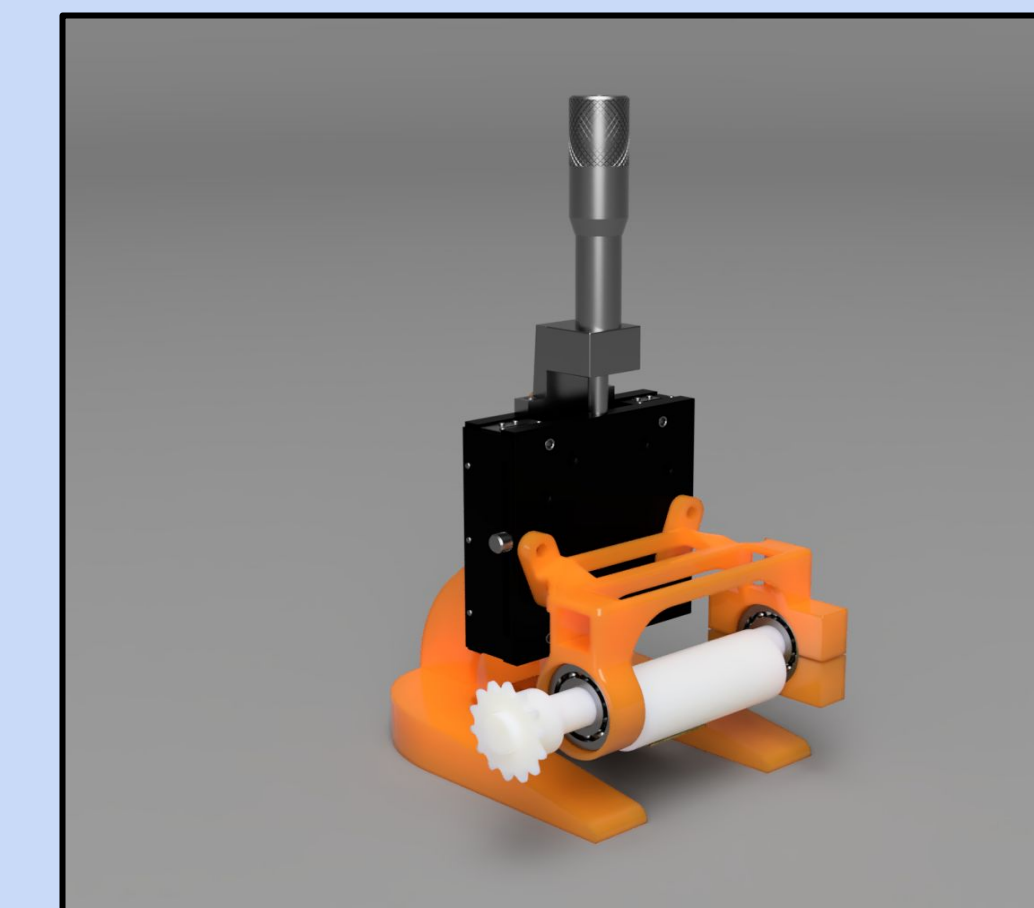
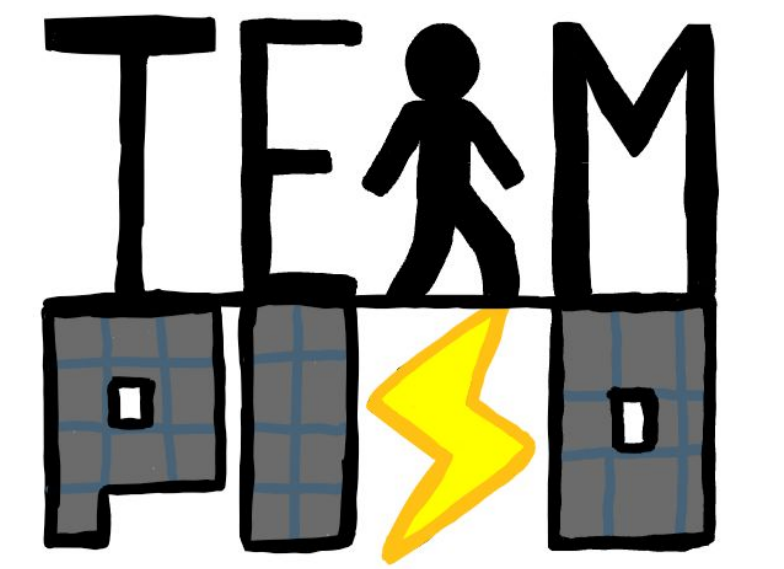
Analysis

Due to COVID-related supply chain issues, some components required to complete the test rig were severely delayed. At time of writing, the test rig above has only just been completed, and has not been used to collect data.

However, data collected from a less precise rig made as a proof of concept has allowed us to refine our analysis and prepare to collect more precisely acquired data.

Future and Application

Data from this experiment could inform the viability of a widely-produced piezoelectric harvesting mechanism. If the energy output per step is high enough, it could lead to the adoption of a new energy source, implemented cheaply in population centers around the world.



Top: Proof of concept test rig and cantilever, used to generate preliminary data during shipment of parts.
Bottom: Final test rig, render (left) and assembled (right).

Below: Sample of data collected from proof of concept.

