

# Piezoelectric Self-Charging Hearing Aid

## Introduction

Piezoelectricity is energy that can be generated from mechanical stress. In Laymen's terms, it is free energy. The goal of this project was to harvest the energy used by moving one's mandible to charge their personal hearing aid.

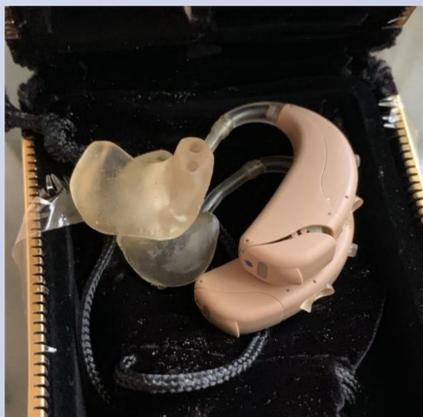


Figure 1. The donated hearing aid to be self-charging.

## Background

This was a project that started with five engineers who loved renewable energy. The team initially wanted to power a scooter with piezoelectricity, After extensive research, the team decided to downscale to a hearing aid. This gives more purpose as well as makes the scope of the project more feasible.

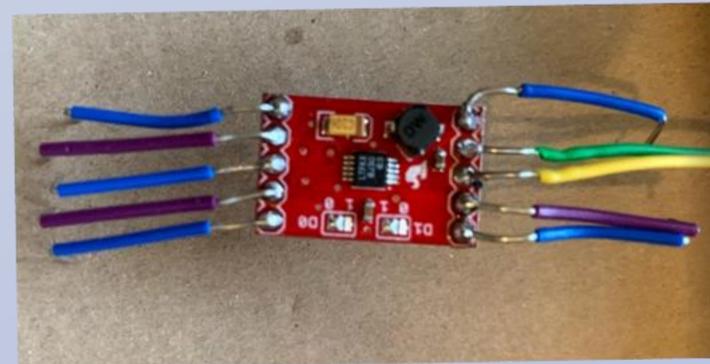


Figure 4. Energy harvesting chip that will allow maximum energy harvesting capabilities.

## Two Designs

This project had two major designs; mechanical and electrical. The mechanical design was a simulation of mandible movement. This design utilized a motorized tapping device to gently stress the piezoelectric generator. The electrical design had to control the motor, store any usable energy and compile power data.

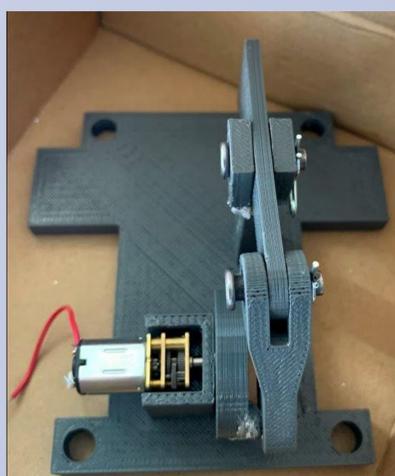


Figure 2. Mechanical tapping device.



Figure 3. Electrical wiring of the project.

## Results

The team worked as diligently as possible while all working remotely. This remote work lasted two months. The team would need more time as well as a new revision of the tapping device to provide more concrete results. These changes are easily possible as long as the Campus remains opened.

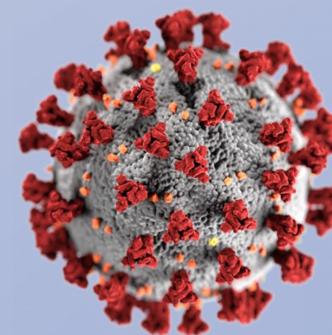


Figure 5. General depiction of the COVID-19 virus which caused a great delay in the development process.

## Conclusion

COVID-19 pandemic played a large role in the last leg of this project. Future plans would consist of a larger redesign of the tapping device and full access to LabVIEW at Penn State. With these changes it is possible to see more success.

## Acknowledgments

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## References

Bhatia, D., Bairagi, S., & Jangra, M. (2010, January). Pacemakers charging using body energy. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3146093/>.