

# Thermoelectric Charging (TEC) Case

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## Introduction

The goal of this project was to create a cellular phone case that can charge the device using body heat. The desired effect is to reduce time wasted hovering around a phone charger or needing to carry another portable device just to charge the phone. Eliminating those things will grant the user some flexibility during their day.

## Design

The case's major components included a PLA 3D-printed case, Peltier tiles, step up/step down voltage converter, and a lithium ion battery. The idea was to have the Peltier tile's heat absorbing side facing out and exposed. The voltage that the four tiles produce will go to a step up/step down converter to produce a 5V output that trickle charges the lithium ion battery. From there the battery will be able to charge the phone.

## Performance Testing

Each Peltier tile's output was tested with a temperature difference of 15°F. The palm of a hand was applied to one side while the other remained at room temperature. The results are as follows:

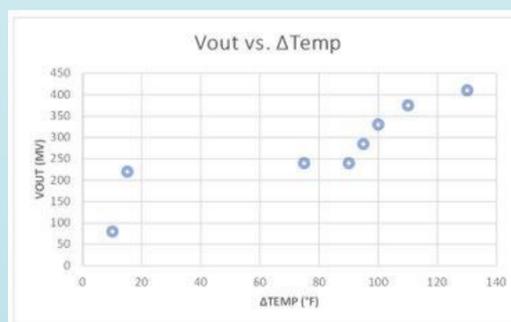
- Standard Peltier Tile:  
150-200 mV
- High-Performance Tile:  
200-250 mV



Figure 1. Testing a Peltier tile



Figure 2. Testing multiple tiles



A Peltier tile was also tested with various  $\Delta$ Temp values. The output voltage is shown to the left.

## Results

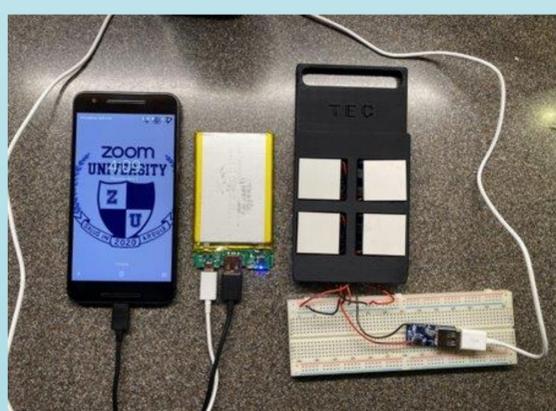


Figure 3. Case Assembly w/ Components

After assembling each of the components of the system, the tiles were able to begin charging the battery. This battery was then able to supplement the phone's internal battery.



Figure 4. Back view of 3D-printed case



Figure 5. 3D-printed case in hand



Figure 6. Case with four Peltier tiles

## Acknowledgments

The authors would like to thank...

- Prof. Terry Speicher
- Berks Learning Factory
- Dr. Marietta Scanlon



## References

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## Discussion

- If this project was to continue forward, different configurations of the tiles and layout should be tested.
- Testing these configurations would allow for more insight into how the overall performance of the case could be improved.