

Goal

- To demonstrate the ability of heat generation/recycling to improve the battery life (Reduce load on the battery) for electric cars. We do this by the use of a Thermoelectric RC Car.

Motivations and Objectives

- Motivations
 - Future improvements in battery life for electric cars.
 - A fun project combining heat and electricity.
- Objectives
 - Create a functional thermoelectric generator for the RC car
 - Using the recycled heat as a source to reduce the load on the battery.
 - Use an Arduino to control the RC Car with an Infrared Remote Control.

Research Challenges

- Producing a heat gradient for the thermoelectric generator.
- Learning how to write code to program our Arduino to do what we desire
- Making the semiconductors in the shape of a tube.
- Building the stand for the candles and the generator.

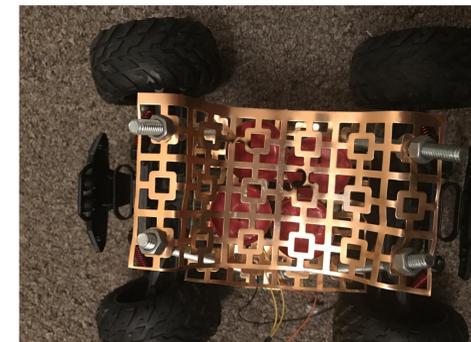
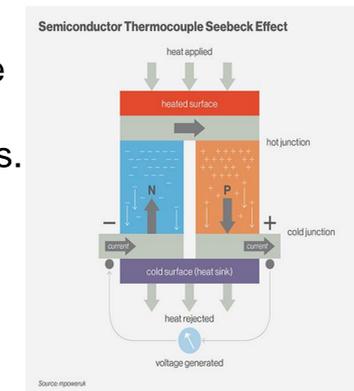
References

- Programming Arduino: Getting Started with Sketches, Second Edition** by [Simon Monk](#)
- Rouse, Margaret. "Seebeck Effect." *TechTarget*. N.p., Dec. 2008. Web. 17 Apr. 2017. <http://cdn.ttgtmedia.com/rms/onlineImages/networking_seebek_2015_desktop.jpg>.

Methodology

- The main theory that was used in this project was Seebeck effect.
 - It is an effect when temperature differences between two semiconductors started to produce a voltage drop.
 - The idea for electric car is to create a tube with semiconductors that's able to transfer heat into different areas of the electric car, while creating electricity in the process and reducing the load on the battery to prolong the battery's life.
 - As for the tube (generator), it is assumed to be on the electric motor. Our way of representing this is to put candles under the semiconductors.
 - Since we were having difficulties finding materials for the tube shaped semiconductors, we started using an alternative shape of it for representation.

- Starting off with first programming the Arduino to create high voltages and low voltages at specific pin outputs.
- Then making the Arduino's infrared remote control allow user to make decisions for high or low voltages at the Arduino's pin outputs.
- Connect Arduino to RC Car to make high and low voltages to make RC Car move forward, backwards, turn left, and turn right



Results

The result of the project added about 9% extra capacity for the RC car. Before adding the generator, the RC car was about to last about 12 minutes and after adding it, it was able to last about 13 minutes.

- Here is a graph that is made from the data that was collected. The voltage was stable around 4.5 V and after measuring the resistance is 26 Ω , we were able to calculate the current that was generated, which was around 170 mA.
- From there, we calculated the power, which was 0.765 W.
- The battery itself have a power of 7.68 W and adding them together, the total power produced would be 8.445 W.

- The ratio between the total power and the power generated would be 9.1%.

