CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

J1023

Project Title

Friction Flashlight: Using Body Heat Energy to Power a Portable Flashlight

Abstract

Objectives/Goals

A flashlight is essential tool that is critical whenever a natural disaster occurs. However, what happens if the flashlight runs out of battery or there is no battery charger? The goal of this invention uses body heat that is generated from the heat of your hand instead of batteries to generate enough thermoelectric energy to power a flashlight.

Methods/Materials

When there is a temperature difference between two sides of a thermoelectric module, a current is created, and can be amplified through a series of transformers in an oscillator circuit. To create this temperature difference, a water cooling system is used, since water has a high heat capacity and is very thermally conductive. For my first prototype I reused the shell of an existing flashlight, cut in half, connected two Peltier tiles in series and attached them with epoxy on a copper plate which was mounted on the flashlight shell. The end wires of the peltier series was attached to the ground and input of the LTC3108 which was then connected to LED bulb. The hollow tube could be filled with water. For the second prototype I created a custom shell with a aluminum tube, aluminum plates with larger hole to fill water, attached peltier tiles on 2 sides of the tube to maximize the capture of heat from hand and powered 2 LED bulbs.

Results

My second prototype produced an average light intensity of 56 lux and stayed on for 35 seconds. It also weighed 350 grams and took average 6 seconds to light up.

Conclusions/Discussion

After testing my second prototype numerous times, I consider my invention an overall success because it had met all of the design criteria. My first prototype, on the other hand, works better with air since it is small, compact and more portable and is useful where dim lighting will serve the purpose.

Summary Statement

My invention will solve the battery-dependency problem by using easily found natural resources - air and water, and body heat to power the flashlight.

Help Received

Bill Zabor (understanding principles), Neighbor (cutting components), Mrs. Shalini D#Souza - science teacher (overall guidance), Mom (supplies)