My

**ThermoPower**

AUTHOR:

Nickolaus S. Grant

**Nickolaus Grant**

A black machine with wires and wires

Description automatically generated

**Technical Field**

This project involves the technical fields of Network Security and Robotics as I will be using this as a crypto mining tool and having to construct a device it revolves using these two principles.

**Background Information**

This idea came from the help of my dad’s business. He constructs filters for crypto mining devices for the family business and as I started to learn what crypto miners are and what they do I noticed how hot they get. For years my mother told us how high the electricity bill was so I thought how I could lower the bill and utilize the heat to do that. I did a little bit of research and found out about TEG. Then the idea came to me to use the heat from my dad’s miner to generate electricity to then power some of our other devices to save on the electricity bill.

**Prior Art**

TEG Powered Stove - There is a website called thermoelectric generator where someone made a generator from a wood burning stove. The reason it is mentioned here is because it generates electricity from using the stove which is similar in where I am using crypto miner instead of a stove. There is a video on the website going over his design. [https://thermoelectric-generator.com](https://thermoelectric-generator.com/)

TEG Shirt - Another project that did something like what I am doing is this TEG T-shirt. I read an article about a team of people applying TEG to use body heat to generate power using just the body heat and surrounding air. This is also very similar with the fact that we are using TEGs and generating electricity but this time it is using body heat instead of the miner heat for my project. <https://hdiac.org/articles/wearable-thermoelectric-generators-powered-by-body-heat/>

**Problem Statement**

My project is intended for crypto mining enthusiasts as its tailors to these people who have a lot or many different miners that are running. The reason it is meant for them is to save money and help make more money at the same time. The idea is that you have a miner that mines on the blockchain within the internet that gains you money now all we need to do is generate enough electricity to power on these miners. I tailored this project to this smaller group since it meant for them to buy smaller miners like the Bitaxe and run them totally free with a miner they already have.

**Project Description**

My project revolves around a device I will be making called ThermoPower. This tool has 2 parts at the given moment it tries accomplishing one goal: generate power. It does this by using a thermoelectric generator (TEG) and a crypto mining device. It is meant to transfer the heat from a cryptocurrency mining device (S9 Miner) using TEG to capture the heat that comes off the device and use an AC copper cooling system to cool off the other side of the TEG. With these two different temperatures it will create electricity using the Seeback effect to then a device can be powered.

This project is meant for crypto mining users, as this is meant to be used on those devices. I will also suggest this device to crypto mining companies and database centers. The reasoning behind this is because the principle can work on devices that generate a lot of heat. I know that these two devices and companies spend a lot of money to try to cool them off when you can be harnessing this power.

**Innovation Claim**

My claim is creating a tool that can be applied to crypto mining devices to use the heat that comes off these machines to create electricity. With the electricity given I will be able to power smaller devices such as a small crypto mining device.

**Usage Scenario**

This product is a thermal generator as its main job is to create electricity. This tool can be utilized in many ways effectively. You can power small IoT devices such as working on smaller projects like the pi hole which is using a raspberry pi. If at the end of the day you can use this to charge batteries for free and other equipment. Its main purpose is to power other mining devices, but it is you as the user to determine how you use ThermoPower.

**Evaluation Criteria**

These are the questions that need to be answered to have working version of my device:

Does my device power solely on the electricity made for TEG?

Is my device small enough to be attached to the miner?

Does the surrounding air enough to make a change in temperature?

Is there enough electricity to power any device?

Does 3D printed material be able to stand up to a temperature of 70C for a long period of time?

**Objectives and Tasks Associated with the Project**

The main objectives are as follows:

1. Creating the design to hold all the necessary components
2. Testing the limits of how hot and how cold it can get with damaging any devices
3. Finding out the max output of electricity
4. Final testing of the device

To complete the 1st objective these are the task that follows:

1. Find the parts that I need and find out the dimensions of each part so I can determine how big the tool can be. - Completed
2. Using 3D software to model up testing designs to come up with a final template. - Completed
3. Use a 3D printer with heat resistant PLA to construct the tool. - Completed

To complete the 2nd Objective:

1. Find a TEG to use to then test how hot I can with the temperature given off from a miner. - Completed
2. If more power is needed, then test the AC Unit cooling system to generate more electricity.
3. Test at what temperature the mining device starts to damage to find the max heat available without long term damage.

To complete the 3rd Objective:

1. Using a TEG and the max heat and the max cold I learned from pervious objective to find out the max amount of electricity I can generate.

To complete the 4th Objective:

1. Using all the information from pervious objectives to create a final testing phase where I will run a time test to find any issues with my current build.
2. After testing the main issues that are given in the first test, I will want to time it for an entire day to see if you can run for a full day with no issues.

***Note: This section must be revised prior to SIP405 to describe tasks as they actually occurred.***

**Description of Design Prototype**

As of now the prototype works by attaching the end of the device to the S9 Miner. Once it is clipped on all you need to do is power the S9 Miner. As the miner starts to do its job by mining on the blockchain it would create up to 70-80 C so it will push out that heat with a fan. The hot air will hit the TEG and since the 20 C and 70 C is big temperature change each of the TEGS that are attached to the device will start to generate small amount of electricity. As of now this is what the prototype does. With future updates and versions, I will make it so all the electricity will combine into one output so instead of getting 4 small outputs you can one big output of electricity.

***Note: This section will be revised prior to SIP405 to describe the design prototype in its final form.***

**Evaluation Plan**

The plan that I will follow is to test the TEG capabilities to find out how I will need to design the case for the overall tool. I need to know what the TEG is capability of so I can get as much power from it. I will then start to plan my design so I can run multiple different ideas and see which one is more durability and small enough to work. I also want to test if more TEGS are better for the plan. After more testing is done with the case, I want to start by powering a small 5-volt microcontroller to see if it works. I want to get into testing what it can and can’t power so I know the limits of my device. I will then start testing with a crypto mining device to see if it’s possible to run small crypto mining devices with nothing but heat of a bigger mining device.

***Note: This section must be revised prior to SIP405 to describe the full evaluation plan as it was actually implemented.***

**Project Completion Assessment**

***Note: This section must be completed prior to SIP405***

Provide an in-depth description of the completion assessment of your project. Describe how well the completed components function and highlight the innovative facets of your design. This is sometimes known as a “Post-Mortem” or “Lessons-Learned Report”. A good approach for this section is to answer the following 4 questions: “What went right? What went wrong? What was learned throughout the process? What would be done differently if you had to do it again?

**Appendices**

***Note: This section must be completed prior to SIP405.***

Appendix A: 3D model for the prototype – Version0.1.stl

Appendix B: Document for information on project info – SIPResearch.docx

Appendix C: Presentation for the project – SIP Prototype Presentation.ppt