

Light Up Your World with Body Heat

Who has the time for batteries these days?

Ann Makosinski, a 15-year-old high school student from Victoria, British Columbia, designed a flashlight that's powered entirely by body heat — specifically, heat produced from the palms of your hands.

The device, which she calls "hollow flashlight," uses Peltier tiles to transform hand warmth into usable — and battery-free — energy. A typical light beam can last up to 20 minutes once it's produced.

Makosinski was selected to bring her flashlight to the [Google Science Fair](#) ^[1] on Sept. 21, where she'll compete with 14 other students, all hand-picked from across the world. The winner will receive a \$50,000 scholarship and a free trip to the Galapagos Islands.

Q&A With Hollow Flashlight Designer Ann Makosinski

This is such a unique idea. How did you think of it?

A few years ago, in grade seven, I did an energy harvesting project for this local science fair. I used [Peltier tiles](#) ^[2], which I also use in my hollow flashlight. Basically, they're these flat tiles, and if your body heat runs on one side, and you cool the other side, it will produce electricity.

For this first project, I heated one side with a candle and cooled the other side, so there was a very large temperature differential. I noticed that the greater the temperature differential, between the hot and the cold sides, the more power was produced. I think I had powered enough to run an [mp3](#) ^[3] player or something. In the following years, I did all these projects that related to harvesting energy — the same basic concept.

This year's project — the hollow flashlight — kind of combined previous ideas. I knew I wanted to harvest human energy, specifically heat — as humans, we radiate enough heat that's close to 100 watts' worth of lightbulbs. So I thought, 'Why not take advantage of that?' The flashlight just seemed like the best application.

When did you begin working on the flashlight?

The summer before grade 10. Our local science fair is around April, but I got caught up with class, plays and things like that, so I could only work on it from time to time. It eventually got done, though.

So — how does it *work*?

Like I mentioned, [the flashlight] is made up of Peltier tiles. Basically, there are lots of different pairs of these two similar metals sandwiched in between two ceramic plates, and I use four of them. The warmest part of the hand is the palm area, which is where I decided to focus.

How long does each beam of light stay glowing?

I did a 20-minute test with it, which turned out well. It had a good temperature differential between the two plates, but I got cold after a bit. It will always last as long as there's a difference in temperature between the environment and your hand.

How much does the outside temperature affect the flashlight's brightness?

It definitely plays a role. If you're in a warmer climate, the temperature differential won't be as great. In the tropics, for example, this would be especially useful because you don't normally use your phone during the day, so temperatures will have cooled off by night. But it will work as long as there's about a five degree differential; a 10 degree difference would work, too, but wouldn't be quite as bright.

You've certainly caught the attention of a lot of people with this project. Do you have any plans to distribute this on a national level?

I believe so — at least, at some point. A few companies are corresponding with my parents. But there are still quite a lot of improvements to be made before I put this to commercial use. I'm also working on getting a patent right now — so we'll take it slowly, I guess.

What are you most looking forward to about the Google Science Fair?

I think it's going to be a great experience! Just meeting all these people who are interested in science, like me, and hearing about their ideas and just talking — seriously — about the science field in general. At school, there are less people interested in this area. I've been reading about the other projects in this fair, and they all sound incredible, so I can't wait to meet the people behind them.

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