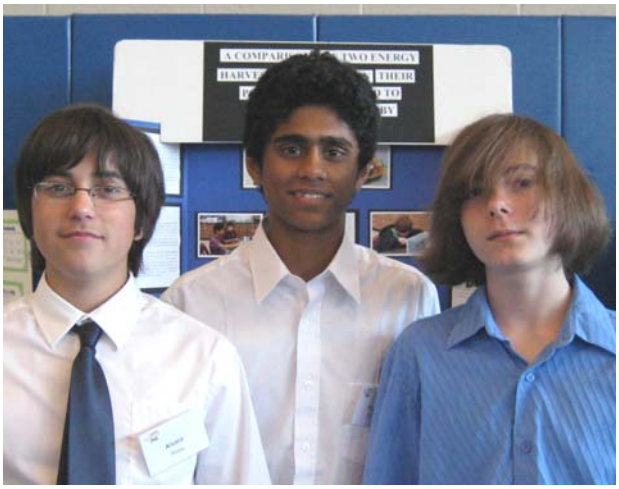

Middle School Clean Tech Awards:

Region I: Western MA

Conor Power, Sourav Podder, Alvaro Rotea; Amherst Regional MS

"A Comparison of Two Energy Harvesting Devices on Their Potential to Charge a Battery by Walking"

Sourav: I am 14 years old and I am going into the ninth grade at the Amherst Regional High School. My parents are from Bangladesh but I was born in Tokyo, Japan on March 3, 1994. I came to America when I was five years old. I experienced a totally new change, but I changed into the American culture very easily and quickly. My hobbies are soccer and violin. I feel that soccer is another life for me because I can express my skills in a different way; I play at I high level called Massachusetts Premiers League (MAPLE). I also play the violin for almost 6 years, and played in the Western District Orchestra. After joining the science fair, I would love to pursue my life as an electrical engineer.

OUR PROJECT:

The purpose of this experiment was to test two different energy harvesting methods on their potential to be used to charge batteries by walking. There are many ways of harvesting energy when walking such as vibration, strain, temperature gradients, energy of gas and liquid flows.

We compared an electromagnetic flashlight and a piezoelectric switch. In the electromagnetic flashlight a movement of coils surrounded by magnets creates electricity. In the piezoelectric switch the vibration of the piezoelectric material creates electricity. The two energy harvesting devices were had been equipped with a 1000ohms resistor. The two devices were attached to an oscilloscope to measure the amount of voltage in duration of time.

The data from three trials showed that the piezoelectric switch created more voltage than the electromagnetic flashlight. On average the piezoelectric switch created 166 volts and took 436 milliseconds to go down to 10 volts. The electromagnetic flashlight created an average of 31 volts and took about 500 milliseconds to go down to 1 volt. The piezoelectric switch was 6 times better than the electromagnetic flashlight.

That data from this experiment didn't support our original hypothesis, which was if the same amount of force is applied to the piezoelectric energy harvesting devices and the electromagnet energy harvesting device, then the electromagnet energy harvesting device will have a better electrical output than the piezoelectric device. Instead, if two energy harvesting devices, Piezoelectric-Switch and Electromagnetic Flashlight, have the same force applied then the Piezoelectric-Switch will have a

greater electrical output (voltage). If this is applied to a shoe, then the shoe can generate a voltage and charge a battery. The piezoelectric switch is also much more convenient because the switch is much smaller and lighter than the electromagnetic flashlight.