Harvesting Energy from Raindrops Using Piezoelectric Generator

Ho, Huong (School: Rockdale Magnet School for Science and Technology)

Many developing communities do not have enough money to afford electricity for their homes. Nonrenewable Energy is cheap in generating energy, but they can cause detrimental effects on the environment killing plants and animals, and renewable energy has an expensive initial cost. Piezoelectric generators are cheap and can generate enough energy; it contains piezoelectric quartz that converts the compression pressure to electrical energy. The goal of this project is the build a piezoelectric generator-based panel to generate at least 17 volts from the force of the falling rain. Piezoelectric transducers contain piezoelectric quartz that converts the compression pressure to electrical energy. The platform of the panel was first drilled and assembled with the acrylic sheet and plastic steel sheet. The piezoelectric transducers were then attached to the platform and the wires were soldered together; the wires were attached to the solderless breadboard. The panel went through a rain simulation with a low pressure, medium pressure, and high pressure, and the panel went through a real-life rain situation with light rain and heavy rain. The Multimeter was attached to the breadboard to record the voltage. An ANOVA test was performed and resulted in a p-value of 6.008 x 10-7 which rejected the null hypothesis, so the panel does produce a voltage. With 12 piezoelectric transducers, 10.38 volts was the maximum output. If the panel gets expanded on a bigger scale and is created with a hybrid with the solar panels, then people would be able to power their homes.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Intel ISEF Category