Energy Harvesting via Pyroelectric Effect

Palanki, Rupa

An energy harvester is developed via the pyroelectric effect that utilizes temperature fluctuations due to the sun and the wind on a lead-zirconate-titanate (PZT) disk to generate energy in the 100 micro Joules range. A laboratory apparatus is designed in SolidWorks and constructed to simulate atmospheric effects. A LabView program is written to acquire voltage data. It is shown that this apparatus can provide reproducible results. The effect of varying bulb power (to simulate sunny and cloudy days) and fan speed (to simulate a gusty and gentle winds) on the voltage produced is studied. It is observed that increasing bulb power and fan speed results in an increase in the peak voltage produced from the PZT disk. This device produces alternating current (AC) supply while most devices operate on direct current (DC) supply. A simple bridge rectifier circuit is fabricated to convert the AC supply to DC supply. It is shown that this device is capable of producing up to 125 mW of power when exposed to the sun and the wind for 10 minutes. This is sufficient to power wireless sensor networks that are embedded in civil structures such as tall buildings, bridges and dams.

Awards Won: