Piezoelectric Energy Harvesting in Daily Life: Powering the Next Generation of Modern Technology

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To resist detrimental and irreversible climate damage, our dependency must shift from fossil fuel-derived energy to renewable energy sources. Unfortunately, current popular renewable energy sources require the construction of massive structures that distress their environments (ex. wind turbines, nuclear power plants). Electricity production is one of the greatest contributors to CO2 emissions, with its utilizations ranging from the heating of households to the charging of electronic devices. Piezoelectricity is the phenomenon in which electrical charge is accumulated in response to applied mechanical stress. With laptops presenting themselves as one of the most widely-used electronic devices in the world, and mechanical energy constantly being dispersed onto the keys whenever in use, it was hypothesized that piezoelectric material can charge the device by harnessing the mechanical energy from each keystroke to power the device. This novel design was created with 10mA piezoelectric disk elements arranged along the laptop's baseplate. Each element was soldiered in parallel, and the chain became the power source for the laptop. Veneir voltage probe and multimeter were used to measure the average voltage produced for different typing speeds. An average of 0.436V, 1.029V, and 1.643V was generated per keystroke for typing speeds of 23WPM, 49WPM, and 53WPM respectively. Despite their low current, the piezo elements demonstrate proof of concept for the viability of this design as the implementation of materials such as lead-zirconate titanate (PZT) or other piezoelectric material with greater currents will provide greater power for the laptop per keystroke. Thus, eliminating the necessity for a laptop charger, and providing fully renewable energy to charge these devices.

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