Prolonging Battery Life through Application of the Seebeck Effect

Murray, Parker

Johnson, Davis

With the recent upsurge in mobile device use, and with the relative stall in the development of battery technology (in comparison to the development of processors that consume incredible amounts of energy, while producing great amounts of heat), a need has arisen for a way to cheaply extend battery life and provide adequate cooling to maintain optimal operating temperatures in mobile devices. A Raspberry Pi computer, with components similar to modern smartphones, was tested at various operating temperatures using software to tax the CPU or the GPU, and a Peltier module was mounted on the System on a Chip (SoC), with a heat sink to allow for passive cooling. Using the Peltier module in reverse (known as the Seebeck Effect), a thermal gradient was maintained across the module and voltage ranging from 54.9 mV (while the machine running calculations) to 40.1 mV (while the machine was idle) was produced. The machine was run by a 2500 mAh Li-Po battery, and current from the Peltier module was run back into the battery by a voltage regulator. The data from the test demonstrate that in this design, on average, the module added 20.2% more runtime to the device, with the control at 5 hours and 37 minutes, and runtime with the module at 6 hours and 41 minutes. This data shows that using cheap, simple techniques, the Seebeck Effect is a viable source of energy for extending the battery life of mobile devices today.

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