

ABSTRACT

Thermoelectric Generator is a power plant which is based on the Seebeck effect, a phenomenon of electric current generation when two sides of conductor or semiconductor have two different temperatures. In application, thermoelectric generators are generally used in a system which produces heat. Computer processor is one of the device that generates heat up to 79.1°C and up to now the heat has not been used properly. In order to convert heat on the processor into electricity using thermoelectric generator, one side of thermoelectric module should be cooled. This cooling process is quite challenging and requiring extra power. In this study, the thermoelectric generator type of TEG241-1.0-1.2 is placed between the processor and PC Cooler Hybrid W120. The cooling system consists of aluminum heat sink, fan and water cooling system. Brushless DC Pump EKWB with maximum flow rate of 5 liters/min was used to pump water on the water cooling system. By using this cooling system, the cold side temperature of thermoelectric module can be maintained at room temperature ($\pm 26^\circ\text{C}$). The maximum voltage of 2.4 V DC and electric current of 0.19 A ($P \approx 0.5\text{ W}$) can be produced at temperature difference of 53 °C. The generated electricity was stored in NiMH rechargeable battery with a capacity of 750 mAh. In the battery charging process, the processor temperature was maintained at $\pm 40^\circ\text{C}$ to avoid overheating, and to keep the battery safe. This is done by supplying battery with a constant voltage of 1.3 V and an electric current of $\pm 110\text{ mA}$. The energy conversion efficiency of the system was calculated to be about 4.25%.

Keywords : thermoelectrics, CPU processor, hybrid cooling.