Thermoelectric Generation: Preventing Diabetic Foot Ulcers with the Seebeck Effect

French, Drew

The purpose of this experiment is to create a device that measures the temperature of diabetic patients' feet so that it can alert and record when the temperature difference of each foot is within 4° Fahrenheit. Before testing, I had to insert the base code into Arduino's program and then add more code to the base program to allow all four of the thermocouples to be read by adding more variables and function calls. The thermocouples were then attached about an inch above and below of the middle of the mannequin feet and the socks were placed over them carefully not to disturb the position of the thermocouples but yet hold them in place. For testing the foot was placed upon a heating pad until a steady increase was present. The data showed the thermocouples keeping a steady temperature until the left foot was placed onto the heating pad, when the temperature would spike from about 95? to about 102?, which is when the program properly showed an alert that there had been a temperature difference of 4° F. In conclusion the device was successful in meeting the engineering goals. The most valuable conclusion to be taken from the data is that the device is able to distinguish a four degree temperature difference and alert the patient about their change in foot temperature. This success means that this device has the potential to actually be put into use for preventing diabetic ulcers from forming.

Awards Won: