Name(s)	Project Number
Shruti Sridhar	**J0924**

Project Title

A Novel Sensor-Based Device to Detect Heatstroke and Dehydration

Abstract

Objectives/Goals

The purpose of this engineering project was to create a prototype that would detect heatstroke and dehydration. The portable device aims to detect heatstroke based on body temperature and heart rate. Skin resistance is measured to detect dehydration.

Methods/Materials

Firstly, a pulse sensor and an infrared thermometer were paired with the Arduino Uno, an SD logging shield, a 5V battery shield, and an LCD to display the heart rate and body temperature. The accuracy of the prototype was also confirmed. Secondly, to test the pH of sweat, a 0.2 micron membrane used to mimic the sweating human skin was taped to a pH strip and a water-filled jar. The water#s pH was continually manipulated through the addition of baking soda and vinegar. Also, human testing was performed to prove the efficiency of the prototype. Tests of ten-minute jogging periods were performed on two participants.

Results

The pH strip had a faint color change after the addition baking soda and vinegar consecutively four times, proving this method of detecting dehydration to be ineffective. Therefore, I researched more and found out that skin resistance, a more quantitative and accurate measurement, could be measured instead to detect dehydration in the human participants.

The human testing data showed that as body temperature rose, skin resistance fell, which is a healthy trend.

Conclusions/Discussion

After testing on human participants, which served as a proof-of-concept of my prototype, the efficiency and accuracy of the device were affirmed. Regarding human testing, a dangerous trend would be a rising skin resistance and rising body temperature, which would indicate low sweat levels and no heat regulation. In the future, the wireless transmission of Arduino data to a smart phone could be explored. In addition, the risks of heatstroke and dehydration in animals could be investigated. Lastly, algorithms to automatically convert Arduino output for skin resistance into the actual resistance could be developed to quickly find trends and detect dangerous or fatal situations early.

Summary Statement

I constructed an efficient and accurate device to detect heatstroke through body temperature and heart rate, and dehydration through skin resistance.