DEPARTMENT OF BIOMEDICAL ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2023

PROJECT TITLE: NeoWarm: Kangaroo Mother Care with Integrated Thermal Management and Vital Signs Monitoring

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Project Description

Neonatal hypothermia is one of the most common and dangerous complications of premature birth. In resource-rich settings, incubators are typically used to prevent hypothermia; however, incubators are scarce in low/middle-income countries (LMICs). Kangaroo Mother Care (KMC) is a technique that effectively combats the lack of incubators in LMICs. In KMC, a caregiver holds the newborn to their bare chest, augmenting the newborn’s compromised thermoregulation system. While KMC is highly effective, it requires the participation of the caregiver at all times and poses challenges for vitals monitoring used to assess the newborn’s health during their early stages of life. As a response to this need, we have developed NeoWarm, a device that will augment KMC. NeoWarm is an insulated newborn carrier with integrated sensors for monitoring temperature, heart rate (HR), respiratory rate (RR), and particularly, blood-oxygen (SpO2) to detect apnea, another common complication of premature birth. Additionally, when the caregiver needs a break to care for themselves, NeoWarm can function as a stand-alone unit, monitoring and maintaining the newborn’s temperature without the caregiver.

The UPRISE student will work with a senior member of the lab to integrate each sensor into a single device. The student will help develop a professional-grade printed circuit board as well as firmware that will simultaneously track each physiological signal of interest using a microcontroller and send the resulting data to a previously developed smartphone application using Bluetooth Low-Energy.