Developing a Preliminary Ultrasonic Continuous Glucose Monitoring (CGM) Implant System

Gandhi, Gauri (School: Hathaway Brown School)

Spinal cord injuries (SCIs) are a common cause of paralysis, rendering patients unable to utilize motor functions. In particular, cervical SCIs cause tetraplegia, one of the most severe forms of paralysis, while also affecting internal organs such as the pancreas. Functional electrical stimulation (FES) provides an alternative to aid patients in regaining function throughout their motor systems. In combination with the net neuroprosthesis system (NNP) which provides FES, the Lifeline module can help monitor patients for various encoded health parameters. One major health parameter is glucose monitoring, which is important for individuals living with SCI, diabetes, and other disorders affecting glucose levels. Using humidity sensors for preliminary testing and Arrhenius' equation, as well as prior implants, this device will be long lasting in the body and have capability for bluetooth communication and rechargeable batteries within the body. After encoding and developing Arduino ultrasound sensors for a large-scale prototype, a theoretical system has been designed for an implantable continuous glucose monitoring (CGM) device that measures blood glucose levels via ultrasound.

Awards Won: