ZPower Undergraduate Bowl Summary

Product: Fabric Touch Sensor Glove as a Medical Diagnostics Tool

Our team is developing a fabric touch sensor glove as a medical diagnostics tool for doctors and patients in the treatment and diagnostics of muscular dystrophy and other related muscle deficiency diseases and illnesses. It consists of a force sensor based on capacitive technology able to detect the force acting on the user's hand, the surface subjected to a load, and the pressure distribution over the entire hand equipped with the sensor. In addition to the sensors, the glove will be equipped with the necessary electronics and hardware to capture, store, analyze, and transmit data from the glove to a phone, tablet, or computer. The sensor consists of 24 independent sensing areas positioned on the palm and fingers of the user's hand. By using fabric based capacitive touch sensors, made from an organic, dielectric elastomer such as PDMS or Ecoflex foam, the product can seamlessly be integrated into the glove not interrupting the doctors analysis and diagnostics of the patients medical condition.

One example of the application of our product would be the diagnostic and administration of medicine for muscular diseases. Currently, the amount of medicine given to the patient to treat the illness correlates to the force applied by the patient to the doctor's hand. Today this assessment isn't quantified and is given on a 1-5 scale by the relative forced felt by the doctor. This analysis is inaccurate and inconsistent requiring an alternative accurate approach. The incorrect dosage of measurement, from the innacurate measurement techniques, can cause seizures or pain to the patient.

ZPower rechargeable batteries, specifically the model XR48, would improve and enhance our current prototype due to its small form factor and high energy density since can be recharged over 400 times with 22% more energy density than lithium ion cells. This battery meets our engineering requirements as we are using low power BLE communication, capacitive sensors, and low power micro-controllers. Using two XR48 batteries in series would provide the power for our digital and analog circuits as well as ensuring the user has the maximum ease of movement and doesn't affect the simulated working task, whose pressure and force parameters are under analysis. Additionally, the glove needs to be lightweight, portable and rechargeable.

Carl Demolder and Quyen Hoang are the participants involved in the contest and are part of the Flexible Printed Electronics Lab guided by Tina Ng at the University Of California, San Diego.

Development Kit Mailing Address:

Carl Demolder, c/o Tina Ng
Room 3605, EBU1
Dept of ECE, UC San Diego
9500 Gilman Dr.
La Jolla, CA 92093-0407 USA