

NSERC USRA 2024 (Summer, Fall 2024 or Spring 2025)
Design and development of wearable biomedical sensors
with Dr. Bonnie Gray (bgray@sfu.ca)

Project Description

The Microinstrumentation Lab has developed a number of technologies supporting the development of wearable sensors. We combine our technologies to result in various biomedical sensors and other devices (see Fig. 1), including measurements of heart signals (see Fig. 2), sweat pH (Fig. 3), and others for applications in health monitoring. We also have need for a student to investigate and optimize the electronics and sensor placement for more conventional biomedical devices (e.g, heart signals, pulse oximetry) for detection of cardiac and respiratory events.

Student Contribution

The proposed project will develop technologies to support new wearable biomedical sensors and devices. Technology development may involve flexible PCBs, printing or micromolding of polymers, optimization of electrode and sensor placement, electronic sensor read-out and data analysis, or some combination of these techniques. These technologies will form the foundation for various biomedical sensors and other devices, including sensors and electronics for applications in health monitoring. The exact nature of the project will depend on the successful candidate's interests and skill sets.

Skills Needed:

The successful applicant may perform some combination of design and modelling, circuit and drive/read-out development, fabrication and component soldering/adhesion, sensor placement optimization, sensor data analysis, and/or testing of devices.

The applicant should be in their third year or above with some combination of the following skills:

1. Good grades, especially in sensors, circuits, materials, BPK/biology, and/or physics.
2. Enthusiasm to learn new things and combine knowledge from disparate areas. We are looking for “hands on” people who like to tinker and play in the lab as well as perform design work.



Fig. 1. Dr. Gray modelling safety vest with screen-printed flexible electronic wiring at 2017 BC Tech Summit.

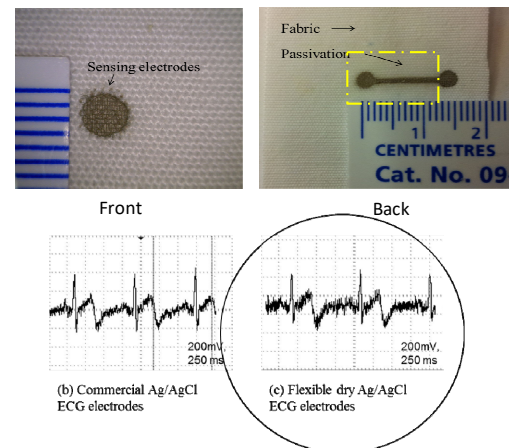


Fig. 2. Heart monitoring electrodes on clothing with resulting measurement compared to commercial electrodes.

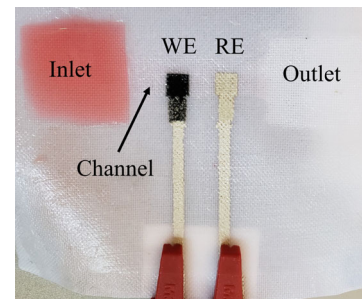


Fig. 3. Sweat sensor integrated with flexible microfluidics on clothing.