Project Name – AbDisc: Core Fitness Tracker

Overview
AbDisc is an exercise device intended to counteract the adverse effects caused by a sedentary lifestyle. When the project was presented, AbDisc was a semi-working prototype. It incorporated a sensor module from MbientLab with custom firmware and a companion app which displayed information intermittently.

Objectives
The objective of the team was to investigate the connectivity issues from the device and companion app, and convert AbDisc from a semi-working prototype into a minimum viable product.

Approach
- Learned Android app development to understand AbDisc previous code base.
- Analyzed MbientLab code-base and attempted to deploy the application.
- Due to lack of documentation from previous code-base and missing dependencies, the team restructured the project into 3 subtasks: a new app using MbientLab modules, a new device with custom hardware and a companion app, and a paper on AbDisc and its future.

Custom Hardware and Companion App
- Used an Adafruit nRF52 Feather micro-controller with built in BLE component.
- New companion app built with MIT App Inventor 2

New MbientLab Modules Companion App
- Studied previous source code, and reused parts which worked.
- Implemented a simplified user interface, a step counter using built-in Android phone sensors, and an interface where users select daily goals for steps and crunch sessions.
- Wrote pseudo code and test code for bluetooth connectivity and crunch sessions.

Paper on AbDisc and Its Future
- Gathered information regarding the proper use of the AbDisc Fitness Tracker.
- Conducted research into the physiological benefits of improved posture while sitting and increased physical activity, as well as the future of fitness trackers.

Outcomes

Custom Hardware and Companion App
- Sending data to the app works well with manual control.
- Calculates crunch sessions with force sensor, thresholds might have to be changed for other models.
- Using the phone’s accelerometer did not work as we have issues sending data to the micro-controller, but wrote placeholders for a dedicated piece of hardware.
- Implemented functionality to receive data from app, but it needs to be improved

New MbientLab Modules Companion App
- Step calculation is very accurate, the accuracy depends on the phone that the app is running on. In addition, step calculation is performed daily while the phone is ON.
- Daily goal calculation works as expected.
- User interface is easy to use, and it looks pleasing to the eye.
- The new app architecture allows future developers to scale the application.

Paper on AbDisc and Its Future
- Compiled a concise paper detailing our findings.