StepSense
Restoring mobility and independence

The Need:
Sensory ataxia is peripheral nerve damage that leads to gait issues and associated decreased mobility, decreased independence, and falls. Patients suffering from sensory ataxia cannot feel the ground beneath their feet due to peripheral nerve degeneration, and this leads to gait issues.

A wearable system that restores sensation lost to sensory ataxia and allows patients to regain mobility.

The Solution:
The system consists of an array of pressure sensors beneath each of the patient’s feet and a hub at the patient’s hip attached to two vibration motors. When the patient takes a step, the system translates the increase in pressure on the sensor array into a vibration elsewhere on the patient’s body. With some practice, the patient learns to recognize the vibration as indication of a step, and the sensory feedback of walking is restored.

Design Evolution:
The StepSense began as a wired system and already as demonstrated success in pilot studies with patients. Over the course of the semester, we have made several vast design improvements based on patient feedback and requests.

Wireless Communication:
StepSense uses several wireless protocols to establish communication between its various components. The foot-mounted components communicate step data to the hub at the hip via Xbee radio. The Xbee in the hub then communicates with a Bluetooth chip which triggers the vibration motors and transmits the data to the cloud to be visualized on our online app.