**Background**

**Symon** stands for **Symmetry Monitor**

**What is it?**
It is a wrist wearable accelerometer that records data in real time to help analyze a person’s walking pattern - more formally known as a person’s gait.

**Why is it Necessary?**
Asymmetry is extremely common amongst the healthy population, as well as in people with illnesses such as stroke or parkinson's disease. Having a method to continuously measure their gait can be a great tool in monitoring conditions, as well as being used in rehabilitation.

**Project Goal**
To develop a system for continuous monitoring of walking patterns of medical patients for future research and wellness purposes.

**Design Methodology**
Our plan was to create custom hardware and software to measure gait using accelerometer data to meet our needs. There are current similar products on the market, but we wanted ours to have bluetooth capability, as well as better usability and storage of data. Below is our design process.

**First Iteration:** Collecting Accelerometer Data from Smartphones

**Second Iteration:** Collecting Accelerometer Data from Custom Hardware

**Third Iteration:** Graphing with MATLAB

**Fourth Iteration:** Designing Researcher User Interface

**Results & Discussion**
Accuracy and walking tests were conducted with both the first iteration (mobile phone prototype) and second iteration (hardware prototype). By calculating the root mean squared error between the left and right device, the mobile phone accelerometers could be compared against the hardware accelerometers.

Visualizations were created using data from walking tests using hardware and compared against the bilateral magnitude plots from the literature survey. Results were conclusive when compared against the literature results.

**Literature Excerpt:** Low cost accelerometers were used to study the walking patterns of patients (right) using the benchmark device for our project, the AX3. Gait measurements were made by measuring stride length and step time. Results concluded that low cost accelerometers were feasible for study.

**Conclusion**
The data visualizations were created as a starting point for researching the medical usefulness of gait symmetry monitoring. Long-term studies will have to be conducted to determine which methods for visualizing data are useful.