

**Progress Report for the Assistive Rehabilitation Device Named:**



**Team Members:** Shaquile Nijjer  
Alexandra Talpalaru  
Zachary Nunn  
Ashley Lesperance  
Karsten Harder

**Contact Person:** Alexandra Talpalaru  
atalpala@sfu.ca

**Submitted to:** Dr. Andrew Rawicz  
Steve Whitmore  
School of Engineering Science  
Simon Fraser University

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## 1. Introduction / Background

We decided to develop a device that helps in rehabilitation of gait related pathologies, including, but not limited to, athletic injuries, over pronation, over supination, flat foot and plantar fasciitis. The current techniques used by medical professionals for evaluation include: an assessment of symptoms, localization of the pain, and visually determining gait patterns using treadmills, force plates, and sensor detecting cameras. These methods are lengthy, expensive, and can only be found in a laboratory setting. In order to rival current technologies, we decided to build a device, named Pods, that allows the user to monitor the pressure distribution of their gait through a mobile application. This application would also provide suggestions for improvement of gait patterns. This information, being much more accurate and reliable compared to the human eye, can be used to provide a thorough injury analysis, and a more effective rehabilitation program.

## 2. Schedule

The following figure depicts our teams modified schedule since the proposal. Modifications are highlighted in red.

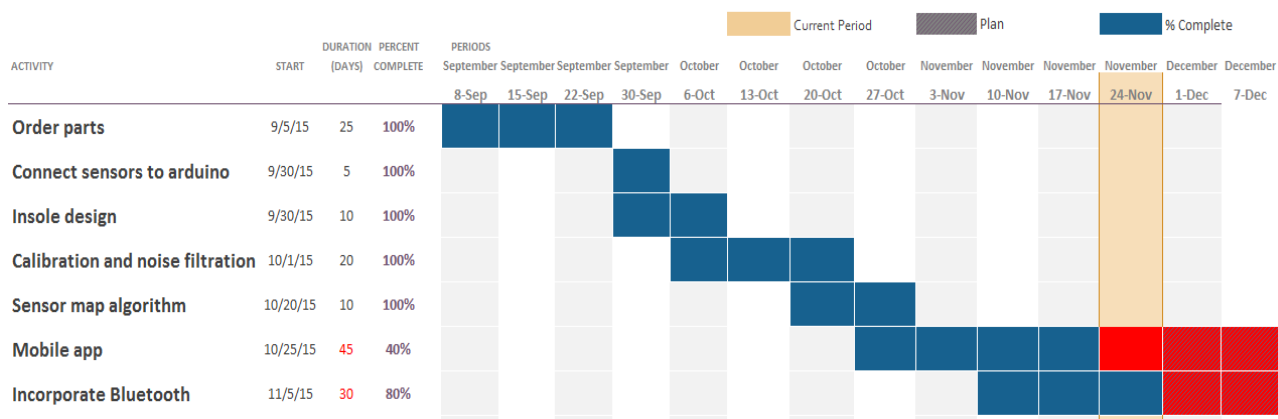


Figure 1: Revised project timeline.

## 3. Financial

The estimated project cost defined in the proposal stage of the project and the actual expenses are summarized in Table 1.

Table 1: Actual Expenses

Item	Estimated Price (\$CAD)	Actual Price (\$CAD)
Bluetooth Breakout	19.95	19.95
Arduino	70.00	43.98
Force Sensitive Resistors	100.00	0
Force Sensitive Resistor Sheet	59.50	35.60
Wire/Conductive Thread	6.95	25.95
Fabric	10.00	N/A*
Shoe Insoles	20.00	7.00
Batteries	20.00	13.99
Additional Items		
Laminate Material	0.00	22.00
Enclosure	0.00	5.13
Prototyping Board	0.00	3.61



Miscellaneous	90.00	79.44
Shipping and import fees	60.00	46.78
<b>Total</b>	456.40	284.43

\*A future purchase for the final stage of the project.

A large amount of money is left over due to the discovery of a cheaper ways to read pressure values across the foot. All estimated expense was funded by ESSS through which we received \$450 for the project.

## 4. Progress

### 4.1 Planning & Design

Pods is comprised of 5 sections: hardware, communication, data processing, mobile application and system component integration. Prior to building the device, we performed extensive research on gait kinetics and methodologies of data collection and processing. For each section we specified deadlines to meet the proof-of-concept, prototype and product stages. Each member of the group focused a majority of their time working on one of the main sections, and some of their time collaborating ideas on the other sections. Continuous research, experimentation, and testing led us to changes implemented between various stages as described in detail in the Design Specs.

### 4.2 User meetings experimentation

We have consulted users with injuries affecting gait. These individuals have expressed interest in utilizing our product for rehabilitation. Physiotherapists can use our device for diagnosis, or as a tool to keep their patients conscious of the patterns that have led them to be in pain. Through various meeting, we have determined that our product has potential market value. We have spent a great deal of time and resources ensuring that our product is also comfortable and the mobile application is user friendly.

### 4.3 Parts and materials acquisition

All of the hardware components are built and functional. All components have been mounted and/or soldered onto the board, and placed into a black box to mount on the user's ankle. Using eagle, the PCB schematic is complete, and the PCB board design is imminent. An insole has been built, however, a cleaner and more comfortable insole will be built by the start of the demo.

### 4.4 Tests and Measurements

We have performed numerous tests and experiments throughout building the product to insure the product is functional and reliable, as well as the user is safe and comfortable. Testing includes having different users try the insole and any feedback and discomfort was taken into consideration and has been revisited in our design. We also tested the extremes, over-pronation/supination. Analyzing the data on the mobile application is still being tested, and will be completed by the end of the week.

### 4.5 Documentation

Our group has submitted all of the required documentation up to this point.

## 5. Summary and Conclusions

Currently, we are working together on developing the mobile app, and designing it so that it will run smoothly. The java code used to run the app is nearing completion, and the next step will be to format the interface within the Android SDK software. Simultaneously, we are collecting data from different subjects using our completed insole, and using this data to test the efficacy of our processing algorithm.