<p align="center"><u>Meeting with Dr. Lerner</u></p>

Purpose: To clarify the project goals and deliverables, to establish expectations, and to create timeline of work.

Attendees: Dr. Lerner, Ethan Michel, Azalea Grant, Robert Libby, Brandon Begay.

Meeting Time: 09/12/17 3:00-3:45

Minutes Recorder: Hannah

We want to create a device that will increase gate economy. The calf muscles are tight which limits ankle motion.

Create propulsive force on the bottom of the foot to compensate for the loss of function

Robert will be in charge of all electronics

Bowden cable system should be used to transmit force because it is light weight.

Motor will be mounted at the waist

We are only focusing on the ankle for this project

Connect the device to a shoe or make a shoe built into the exoskeleton.

This device is a cross between an exoskeleton and a prosthetic.

Deliverables

- Structural analysis of device
- Working prototype
- CAD package at professional quality
- Working electrical and mechanical system and interface
- Use Bowden cable system
- Orthotic/ connection to the leg
- Scalable for foot size and severity
- Easy on/off
- Use torque sensor to measure the torque of the joint
- Force sensor
- Robert implement finite state machine between stance and swing phase
  - This requires a force sensor to tell if the foot is on the ground or not
  - This is in addition to the torque sensor
- Light weight system 0.5kg for the total system.
- Soft interaction between the foot and floor
  - Possibly spring on the Bowden cable

- Large base that takes up whole base on the bottom of the foot.

If get far enough could possibly test on patents and write a paper for publishing.

Planter flex muscles provide propulsive force. We want to make forward propulsive force.

Be able to adjust starting position then have space for propulsion.

By end of this semester we should have

- Finalized design
- FEA analysis
- Come up with 2-3 designs
    - Prototype
    - Test
    - Get ready for manufacturing
- Ready to order parts over winter break or early January

Want to build in January or February, March-April we should finalize the electronics, and April - May test on patient.

Deliverables for Robert:

- Functioning control box
    - Control using Bluetooth and matlab
    - Stream torque data to matlab
    - PCB is already designed
    - Electric system should look professional
    - safe

Get fanny pack motor assembly for Michael Beir.

We may need cable on each side of device for drossy flexion of the ankle.

Meet with Dr. Lerner as little as possible

- come for help if off track or need direction
- no weekly meetings
- do not send documents

Focus design on children 5-12 years old

Provide 10-15N of propulsion force from the device

- this will be effected by the torque to arm ratio

Focus on CP patients and their condition types.

Want 25-30 degrees of actuated ankle rotation

Want 0-30 degrees of static adjustable angle

Focus on mild cases of equines gate

Device takes precedence over in-depth medical research but do know what the condition is.

Orthotics are for holding and securing the device to the body

Robert:

- o Create wireless device connected to matlab
- o Find optimal torque for a given individual. Program that uses sensors to determine this.

Robert may also need to create the following bio feedback but does not need to be incorporated into the design.

Measuring biomechanics -> optimizing control-> New control law -> sending to exo-> (back to measuring biomechanics)