**Background Information**

**Plantarflexion/Dorsiflexion**
- Plantarflexion occurs during heel strike. The foot makes a greater than 90° angle with the lower leg.
- Dorsiflexion occurs during midstance. The foot makes a less than 90° angle with the lower leg.

**Inversion/Eversion**
- Twisting of the ankle from side to side
- This twisting of the ankle is usually from 0 to 5 degrees
- During inversion the foot and ankle rotate inwards or towards the center of the body

**Project Background**
- Post stroke patients lose functionality in their foot and ankle
- Ankle foot orthosis (AFO) are used to assist clinicians in rehabilitation process
- Current AFO limits patient gait recovery
- Only allows motion in one plane
- Limits calf extension
- Patient must use calf muscles to recover strength.

**Objectives**
- Help patients recover their natural gait through neural plasticity
- Allow patients to use and retrain their calf muscles
- Make AFO easy to use for both patients and clinicians
- Have an AFO that patients will trust

**Design Requirements**
- 0-5° inversion & eversion
- 0-15° plantarflexion & dorsiflexion
- Provide resistance through dorsiflexion
- Hard stop at 15°
- Adjustable soft stop increases load without deflection
- Sustains body forces of a 300lb person
- Keep cost similar or below current design

**Design Overview**

**Design Solution**

**Plantarflexion/Dorsiflexion**
- Our design guides the patient through the gait cycle with the usage of springs inside the joint.
- The two front springs create a soft stop to help the patient trust the orthotic.

**Inversion/Eversion**
- A spring suspension system along with a hinge and sliding parts allow for the patient to invert/evert their ankles.
- Springs push ankle back to correct position after movement

**Conclusion**

While keeping all of the functions of the DAAJ ankle orthotic, we were able to add:
- Additional range of motion to ankle dorsiflexion and plantarflexion.
- A soft and hard stop during plantar flexion to allow the patient to trust the orthotic and guide them through the gait cycle.
- Five degrees of eversion and inversion to allow the patient to rotate their ankle while walking.
- High strength aluminum to the some of the components of the joint, keeping the weight similar to the current AFO as well as the cost of production

**Ethics**

It has always been the highest priority in our work to ensure the safety and well being of those who will be using this AFO.

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