Smart Prosthetic Leg

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Introduction

- Typical prosthetic limbs can be limiting
- Injuries to hips/back due to unnatural gait
- Goal to implement a moving ankle foot joint that automatically adjusts to match natural heel to toe motion of walking.

Mechanical Specs

- Ball screw driven by P60 Brushless motor
- Printed using PLA
- Final Design in stainless steel

Solid Works Modeling

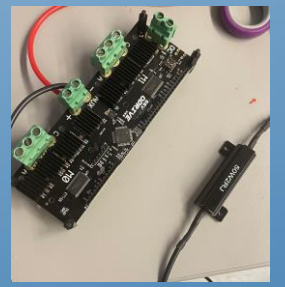
- Used to determine compatibility of parts prior to print.
- Design of foot and motor case
- 9 versions of stator case
- 2 versions of motor case

Problems/Difficulties

- PLA plastic would overheat and warp if run with the motor too long
- Getting the correct dimensions for Hall effect sensor spacing from magnetic ring
- Difficulties with motion capture system
- Solid Works model of anatomical foot

Future Plans

- Adding encoder to stator case
- Controlling motor using basic algorithm
- Creating more advanced algorithm to control the motor using sensor input data
- Adding sensors to metal foot



Testing

- Using IMUs, motion capture cameras, and smart insoles with pressure sensors.
- Data fed into MATLAB program for use motor control algorithm
- Treadmill used to take data at different walking paces