

# Retrofitting a Standard Walker for Parkinson's Patients Experiencing Retropulsion

Team: Morgan Jerin<sup>1</sup>, Dak Ragupathi<sup>1</sup>, Anusha Kureekattil<sup>1</sup>, Manisha Mathew<sup>1</sup> Advisors: Jaimie Dougherty, PhD<sup>1</sup>, Ahn-Thu Vu, MD<sup>2</sup>, Joseph Sarver, PhD<sup>1</sup>  
<sup>1</sup>Drexel University School of Biomedical Engineering, <sup>2</sup>Drexel University College of Medicine

## PROBLEM

### Medical Need

- 1M Parkinson's Disease (PD) patients in the US
- 25% of PD patients report retropulsion
- Retropulsion is a leading predictor of falls

### Objective

- Retrofit a standard walker
- Reduce likelihood of falls
- Accessibility & affordability



## SOLUTION

- Handle Grip
- Top Connector
- Forearm Support
- Connection Rod
- Clamp
- Screw and Nut



**Swivel wheels** - Maintain safe gait speed & limit disturbances



**Glides** - Promote smooth gait & limit disturbances

**Handlebar Design** - Maintains stability & normal pelvic tilt of the patient

## INPUTS



**R3. Applied Weight Capacity** – Withstand  $\geq 106.5$ lbs applied force



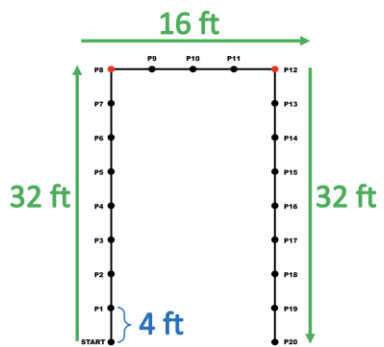
**R7. Wheel Pacing** – Device should maintain acceleration  $\leq 90\%$  that of the standard walker.

## TESTING

Test	Criteria	P/F
R3	Withstands $\geq 106.5$ lbs	P
R7	Acceleration $\leq 90\%$ that of the standard walker	F



Added 55 lbs on each handlebar (total of 110 lbs on system)



Compared user acceleration with the standard & modified walker on a gait testing track

## FUTURE



### Impact

- Retropulsion-specific walking aid that is reliable, affordable, & portable
- Builds upon the most widely used mobility device, making it more easily accessible

### Possible Revisions

- Construct the final handlebar from aluminum
- Make the final handlebar design adjustable
- More ergonomic handgrip
- Perform testing with patient population