Assistive Mobility Device for Parkinson's Disease

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Retropulsion

1.NEED:

Retropulsion in Parkinson's Patients leads to backward falls which result in severe injuries and economic burden
<u>Objective:</u> To create attachments for a standard walker to prevent backward falls and increase user's stability
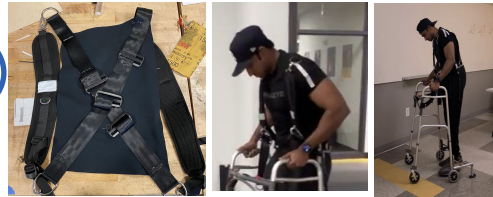
2.DESIGN INPUTS:

R1: User Trunk Angle in backward direction **≤4.5°**
R2: Harness Support Time for user **>1200ms**
R3: Walker Tipping Index (walker's likelihood to tip backwards when force is applied) between **-1 to 0**

$$WTI = \frac{(F_{yl} + F_{yr}) \cdot H}{(F_{zl} + F_{zr} + G) \cdot R_{zi}}$$

Equation 1: used to determine WTI

3. SOLUTION - BUILD

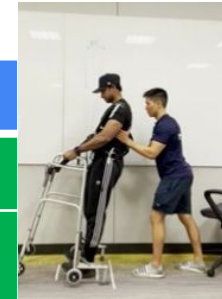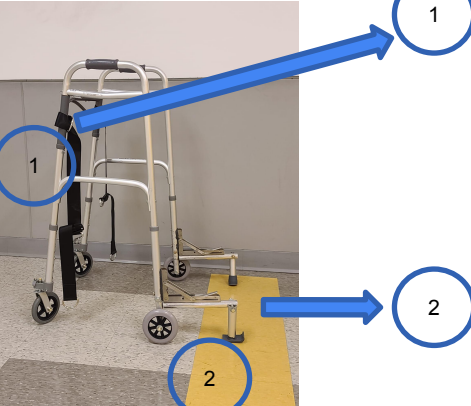Fig 1. Completed Prototype

1

Series of images displaying constructed harness apparatus and use scenario

2

Detachable aluminum extension connected by hinge joint

4. Testing/Result

Test	Criteria	P/F
R1/R2	User held at <4.5 for >1200ms	P
R3	Prototype BTI Value in the Range -1 to 0	P

Video analyzed to determine user's trunk angle and harness support time

5. Conclusion

- Provide user with enough support to prevent backward falls
- Attachments are affordable and removable, walker can be folded for transport

Impact:

PD patients gain accessible device to aid mobility, increase confidence and reduce the economic and physical burden of falls