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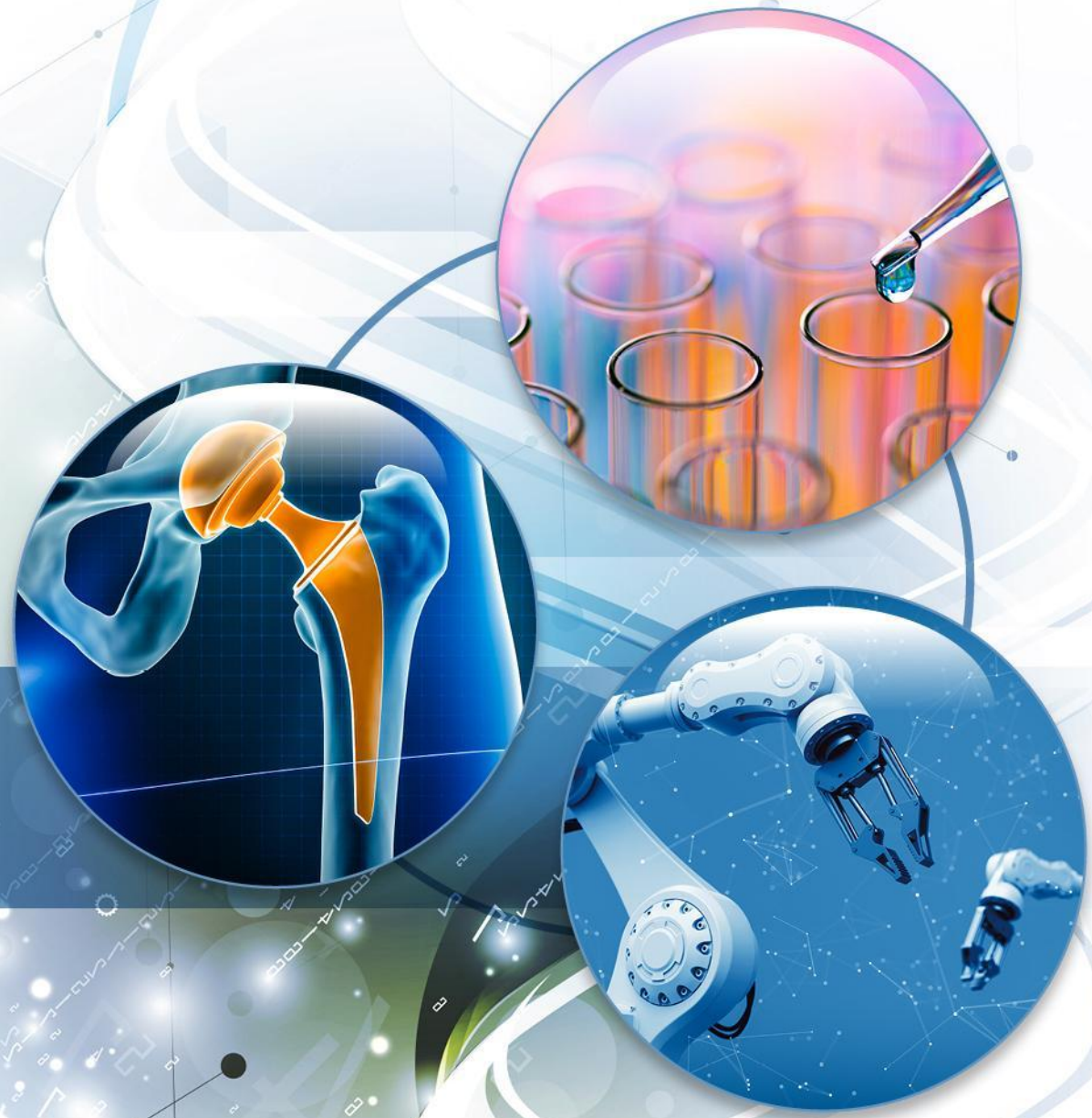
BIOMEDICAL ENGINEERING SOCIETY

2024 ANNUAL MEETING

OCTOBER 23-26, 2024

THE BALTIMORE CONVENTION CENTER

BALTIMORE, MD



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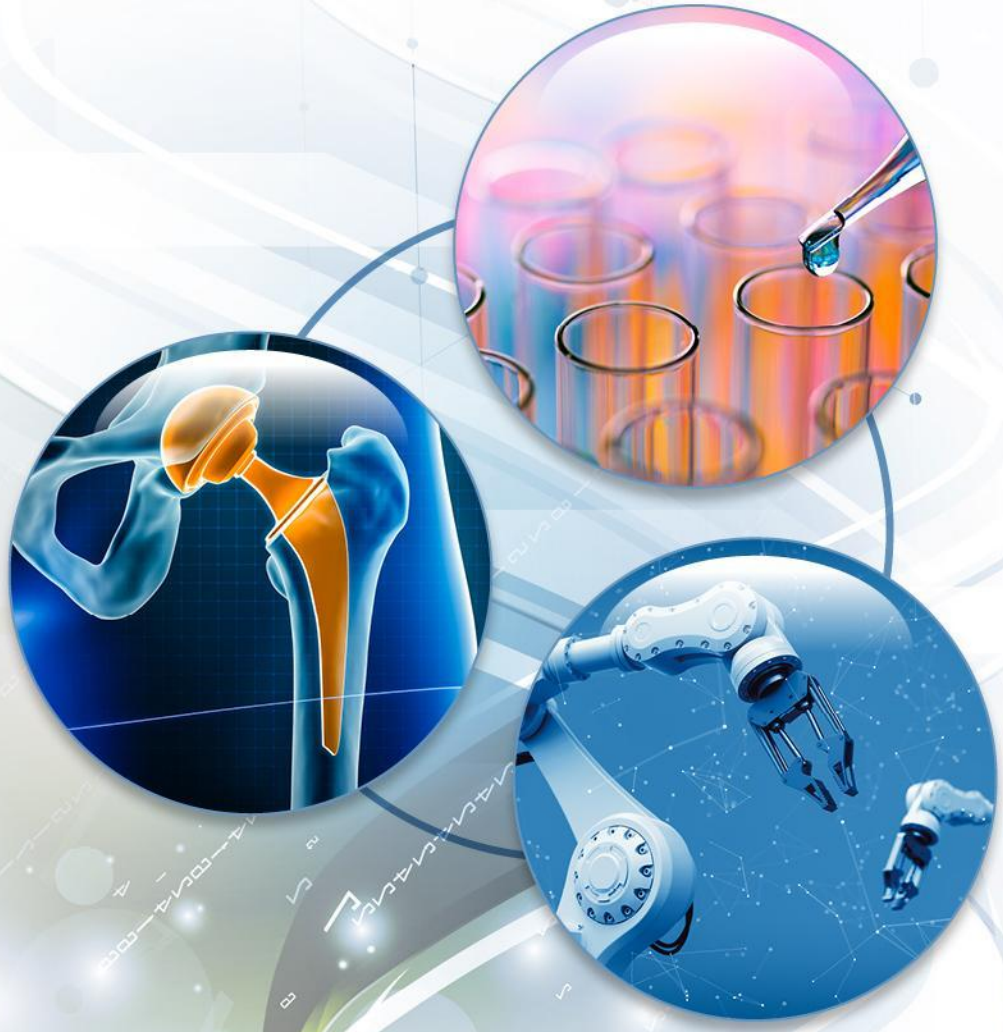
SteadyStride: Self- Stabilizing Cane for Parkinson's Disease



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[1]Cornell University College of Engineering

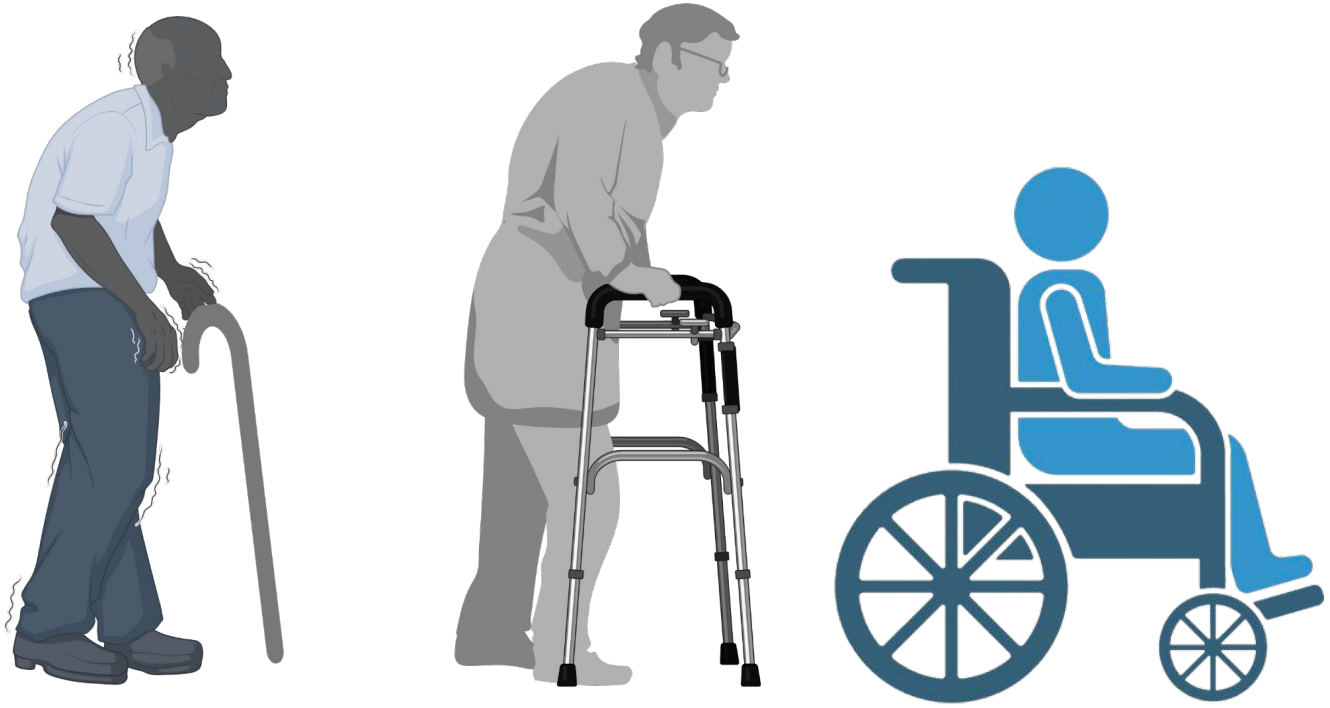
Device Inspiration

2011	First Sign of Symptoms
2012	Diagnosed with Parkinson's Disease (PD)
Mo. 6	Cane User
Mo. 9	Walker User
Mo. 12	Wheelchair User

Effects of Parkinsonian Tremor

Neural Circuitry Disruptions

Uncontrollable Hand Tremors



Walking Assistive Device Progression

Parkinson's Patients Testimonials

"I have thought about a walker and I get a slight **sinking feeling** … I don't want to think about the end game."

"**Moving is medicine** for me and it is just as important as pills. Anything that will help me to continue to walk will help me **stay a part of the world.**"

"I get scared to go to the store because I don't want to walk into a person or candy display. When I do go shopping, **my anxiety just explodes.**"

STEADYSTRIDE

Parkinson's Disease Progression

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Mild physical tremors	Intense physical tremors	Motor Skill Impairment	Loss of Independent Movement	Leg-Stiffness and Complete Impairment

Early Stage

Modern Parkinson's Research Extends Stages 2 - 4 (From Months to Years)

Target Market for PD Devices

End Stage

Customer Product Needs

Device On-Market

Patient Needs

- Passive Tremor Reduction
- Discrete Profile
- Physically Supportive
- Stability while Walking
- All-terrain Mobility

STEADYSTRIDE

A Confident Self-Stabilization Solution for Parkinson's Patients

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Sleek Design - Passive Damping - All-Terrain

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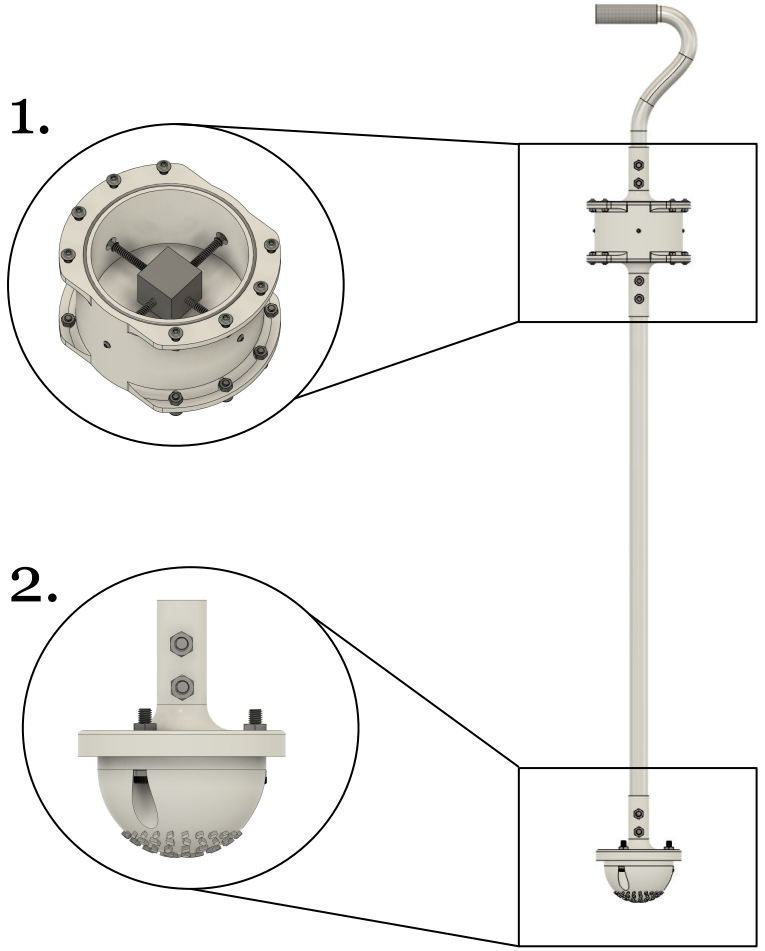
STEADYSTRIDE

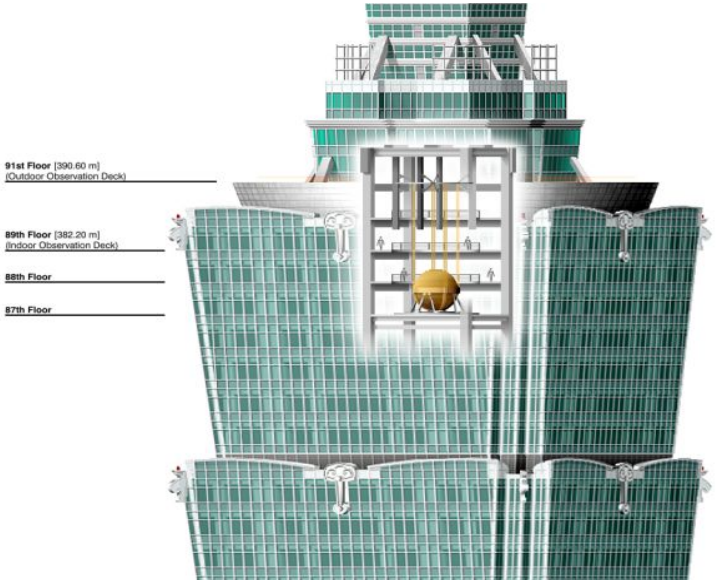
Product Components and Novelty

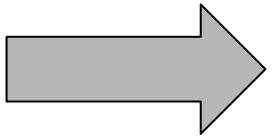
1. Tuned Mass Damper (TMD)
Restores Equilibrium Position

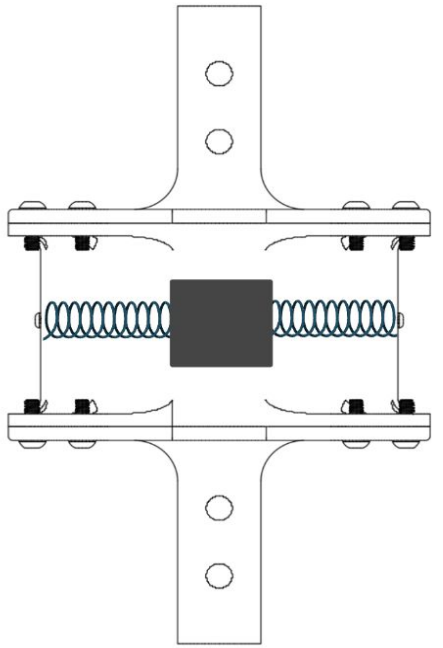
2. Dynamic Stabilizing Base
Flexible Design, Treaded for All-Terrain



Tuned Mass Damper (TMD) Theory







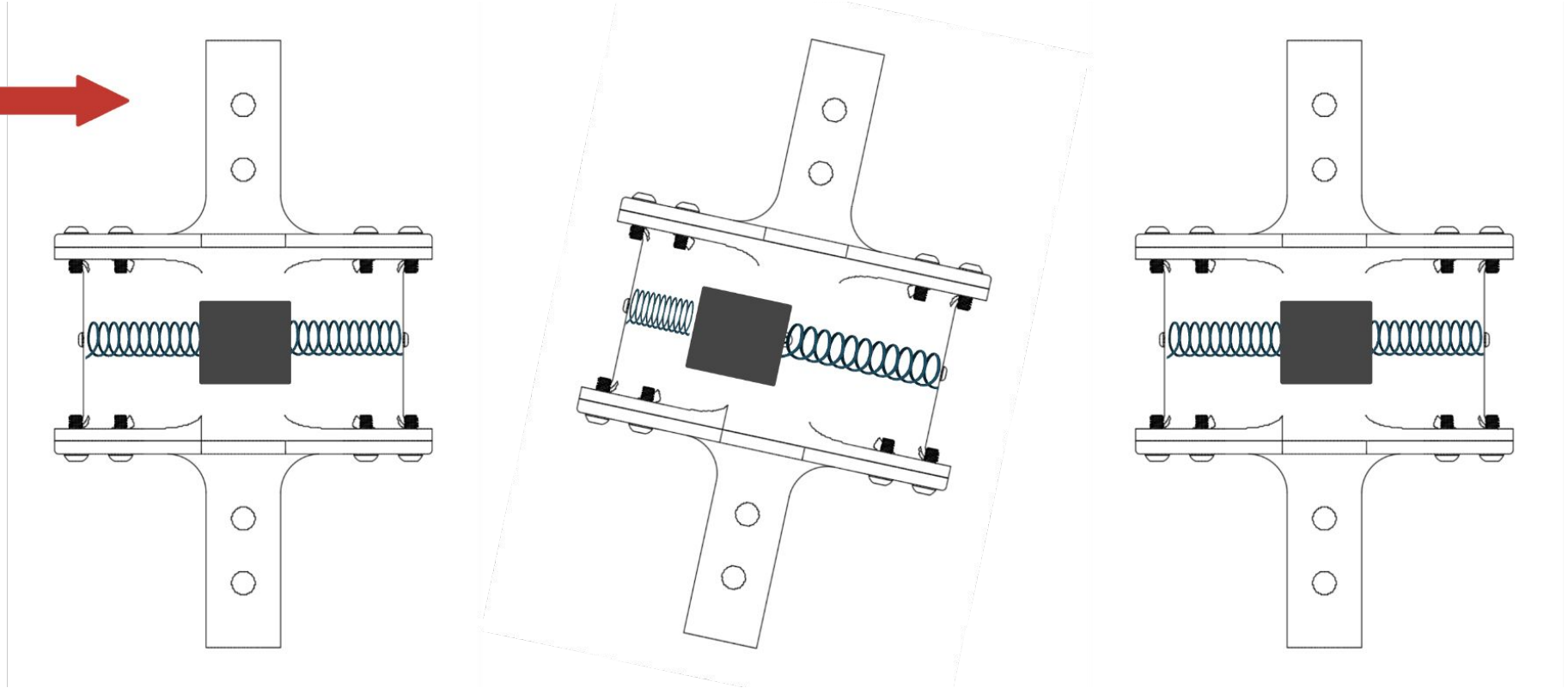
Taiwan's tallest building survived the earthquake[1]: Pendulum TMD

Parkinsonsian tremor mechanically mitigated during gait: Lateral TMD

Source: The Washington Post[1]

Tuned Mass Damper (TMD) Usage

Applied Tremor Force

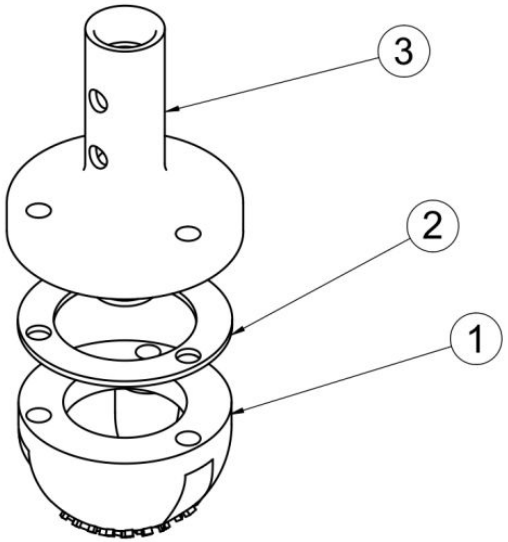


Tremor Occurs

Mass Oscillates

Equilibrium Restored

Dynamic Stabilizing Base



Non-Slip, Treaded Base for Stability Across All-Terrain

Cane Base

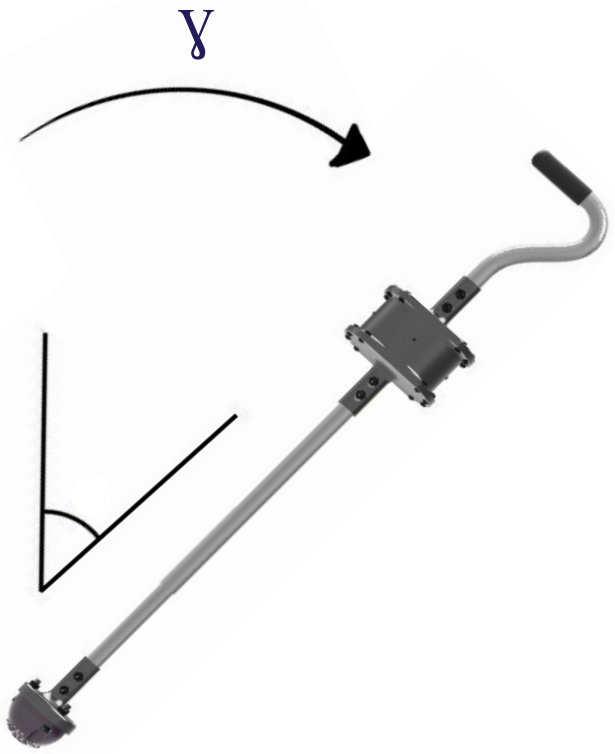
Expected Device Performance

Independent Var.

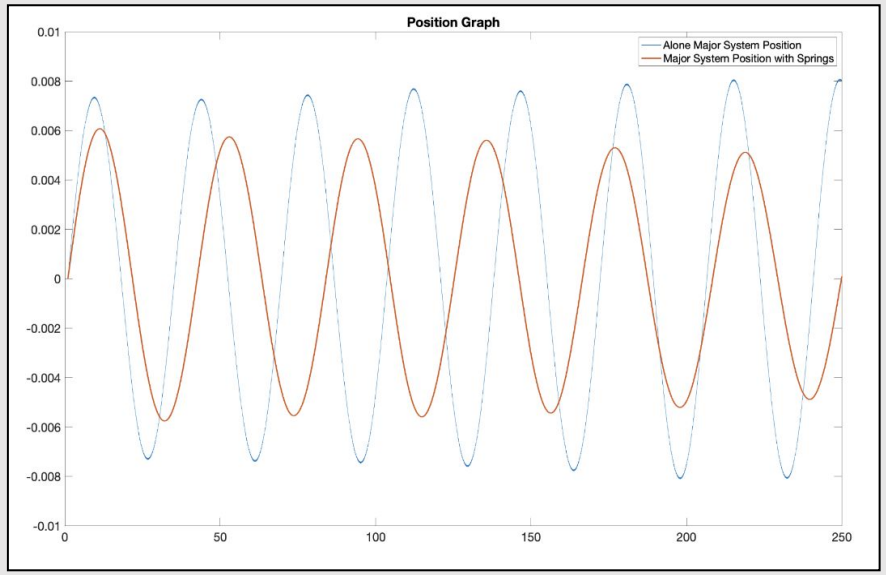
- Mass of TMD
- Spring Const. of TMD

Dependent Var.

- Angular Displacement (ɣ) of Total Cane



System Model:
ɣ = f(m,k)



Position vs. Time of a Ideal Mass and Spring Constant Combination

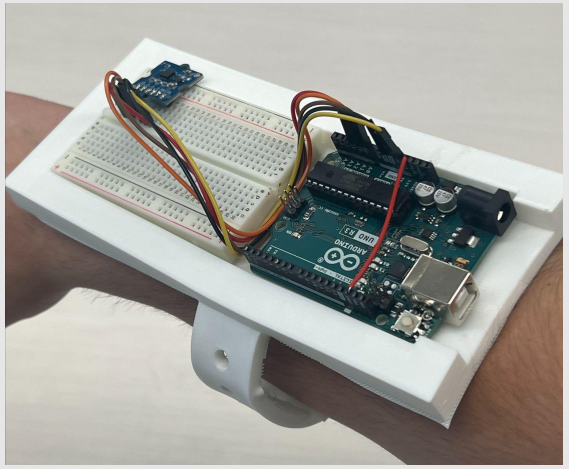
IRB Study

SUNY Cortland Biomechanics Lab, Dr. Bauer

*pictures provided with participants' consent

Trials and Data Collection

Data Collection Device: Accelerometer Data



**450 Points Average Per Trial*

Simple Motions

B: No Motion
T1: Straight
T2: Left Turn
T3: Right Turn

Complex Motions

T4: Sit Up
T5: Sit Down
T6: Stairs

STEADYSTRIDE

Future Development

Damper Fluid: Kinetic Energy Dissipation

Model Parameters: Height & Weight

Device Specification: TMD Tuning by Weight Tier

Multi- Symptom Care: Freezing of Gait and Postural Instability

Comparison to On-Market Products

Assistive-Devices for Parkinson's Patients on Market					
Products	*Passive Reduction*	*Discrete*	*Price (No Insurance)*	*Terrain*	*Target Tremors*
Cala kIQ	✘	√	$3200.00	All	Hand
Saeboglove	√	✘	$350.00	All	Hand
Rollz Motion Rhythm	√	✘	$2000.00	Some	None
SteadyStride	√	√	$220.00	All	All

Prototyping & Manufacturing Budget

Prototype Manufacturing Methods

Manual Milling	Laser Cutting
3D Printing	Small Stock

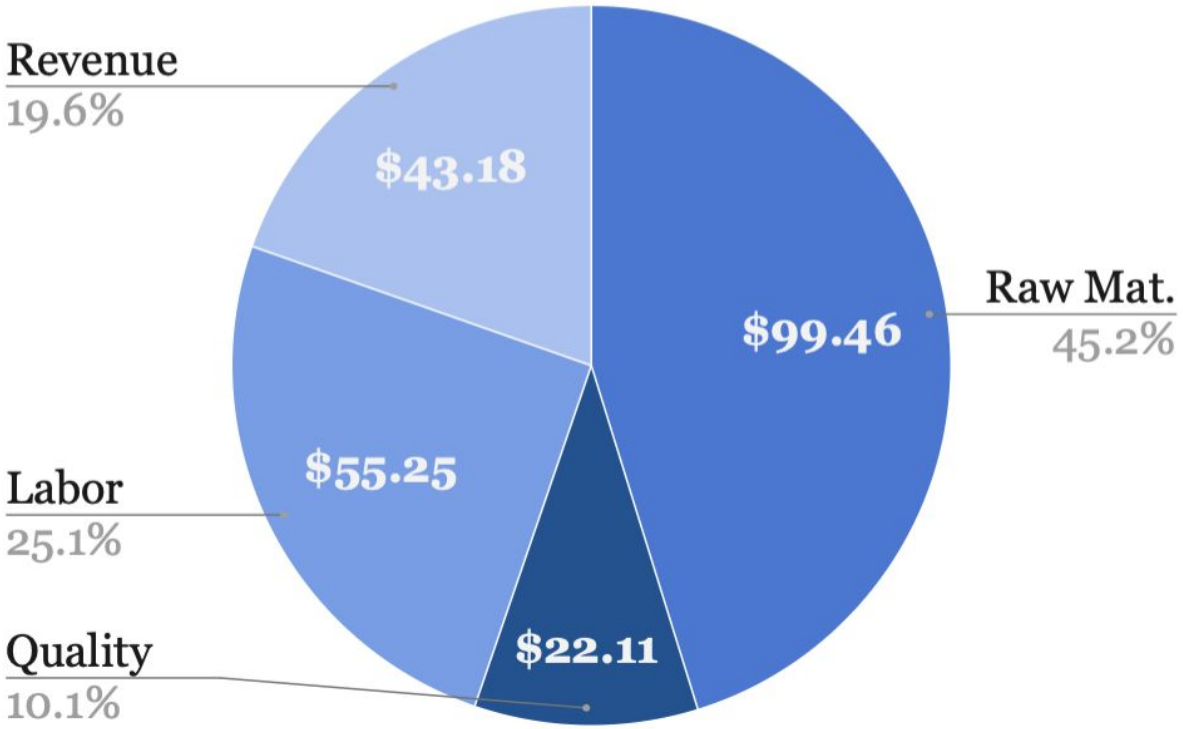
Proto. Costs: $227.88

High-Volume Manufacturing Methods

CNC Milling	Assembly Lines
Urethane Casts	Bulk Stock

Manufact. Costs: $99.46

Product Cost Breakdown



Raw Material	$99.46
Manufacturing	$77.36
Revenue (~20%)	$43.18
Base Cost	$220.00

Business Model

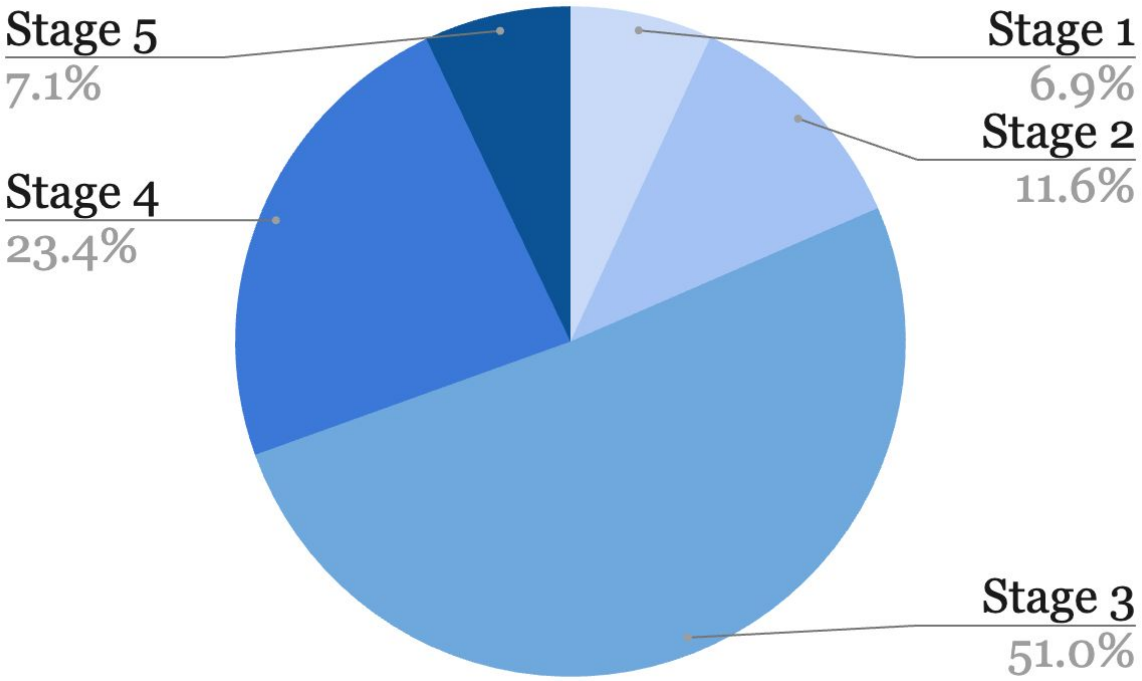
	Consumer Costs		Expenditures		Gross Profit
Insured	Medicare	$44.00 / unit	Payment for Contract Manufacturing	$176.82 / unit	$220 / unit
Off-the-Shelf	ex. CVS	$250.00 / unit			
Revenue	Investors, etc.	$43.18 / unit			

Assuming:

1. Medicare covers 80% cpu
2. Distributors add 20% for store revenue on cpu

Anticipated Market Size

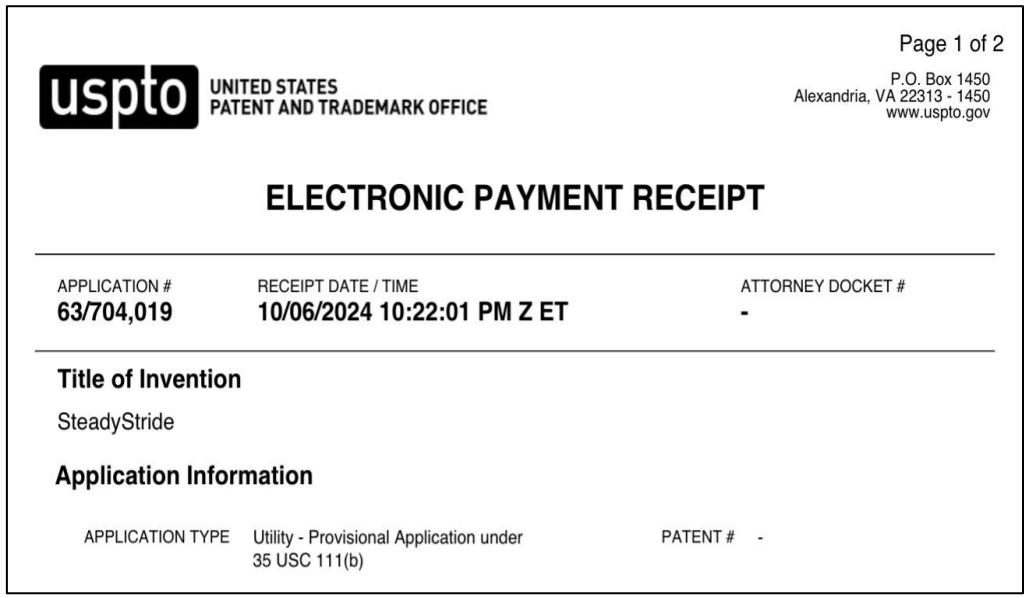
User base of 850,600 Parkinson's patients in the United States



Market Size, *Stages 2-4*[2]	736,160
Market Value, *North America*[3]	$1.31 Billion

Source: Parkinson's Foundation[2]
Grand View Research[3]

Protection Plans and Regulatory Pathway



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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
63/704,019	10/06/2024 10:22:01 PM Z ET	-

Title of Invention

SteadyStride

Application Information

APPLICATION TYPE	Utility - Provisional Application under 35 USC 111(b)	PATENT #	-

✔ SteadyStride has filed for a provisional patent.

FDA Classification

Class 1 Device

Regulatory Pathway

De Novo Classification

Prescription Model

Multiple Products based on Weight of the Patient

Ex.

Typ. 1: 80 - 100 kg
Typ. 2: 100 - 120 kg
Typ. 3: 120 - 140 kg

Milestones and Next Steps

Milestones	***April 15th, 2024***: IRB Trial Validation ***October 6th, 2024***: File Provisional Patent
Next Steps *With Investor Funding*	***December, 2024***: Second-Round Testing with Updated Device *Integrate Testing With Damping Fluid* **January, 2025**: Start FDA Approval Process **August, 2025**: Launch in 10 stores in Upstate New York **October, 2025**: Launch in Tri-State Area

Acknowledgements

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3. Skyler Brown - *Cornell DEBUT*
4. Madison Cohen - *Cornell DEBUT*
5. Senegal Mabry - *Cornell University Affect and Cognition Lab*

Join Our Team!

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