WALKING PERTURBER

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BACKGROUND

- 20-30% of falls among the elderly may result in injury, hip fracture, and death
- Understanding the body's compensatory mechanism to instability is necessary in gauging health
- Limited research has been conducted on perturbed walking beyond the lab setting

GOALS

- Develop a wearable device to subtly track and analyze an individual's response to randomized perturbations throughout their daily routine
- Acquired data would provide a better representation of user's health
- Doctors utilize device's data to recommend lifestyle changes patients with stability issues

OBJECTIVES

- Sensors record perturbation and patient's results
- Results are uploaded, plotted, and analyzed
  - Standard deviation and confidence intervals will be used to quantify patient's balance
  - Patient's results will be compared to a control sample (An average of our own results)
- Physicians then notify patients of their results and the proper course of action

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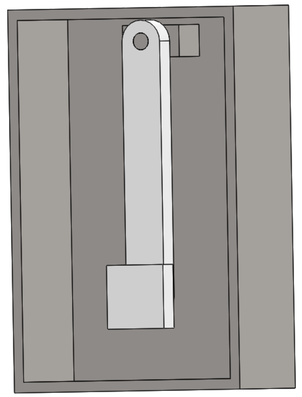
INNOVATION

Simple Pendulum

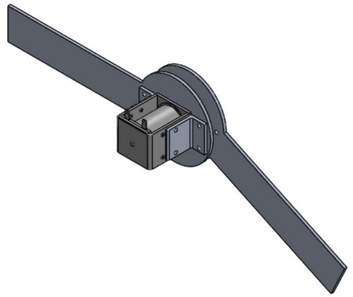
PROS
- Simple design to manufacture
- Controlled via an electro-magnet
- Utilizes walking to generate perturbations

CONS
- Health hazard due to electro-magnets
- Similar to a backpack

PARAMETERS
- 3 lb mass
- 6-inch pendulum



Knee Locking Mechanism



PROS
- Attaches to walking appendage
- Non-obtrusive
- Variable tripping

CONS
- Increased likelihood of device damage due to attachment location

PARAMETERS
- Need to withstand 5.8 lb·ft torque

Motorized See-Saw

PROS
- Ease of adjustment for the mass
- Consistent controlled motion
- High durability
- Low up-keep

CONS
- Requires multiple machined parts
- Requires stronger motor and power source

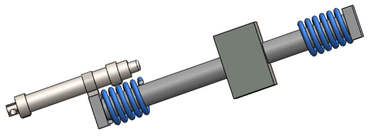
PARAMETERS
- 10 lb mass
- 8-inch rod
- 60 degree incline
- $L = 24.65 \frac{lb*ft}{s^2}$

Piston-Rod-Mass System

PROS
- Simple Design
- Adjustable parameters
- Easy to manufacture

CONS
- Bulky
- May be intrusive
- Limited to linear motion

PARAMETERS
- 9-inch rod
- 3 lb mass
- 10 lb piston force



Week 2 Establish team dynamics

Week 3 Research problem, background, & target audience

Week 4 Brainstorm ideas

Week 5 Define requirements & specifications

Week 6 Refine preliminary designs

Week 7 Generate computer aided models

Week 8 Develop calculations and parameters

Week 9 Evaluate individual designs

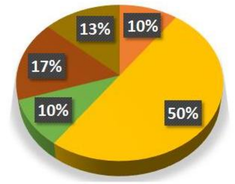
Week 10 Use specifications to compare designs

SPECIFICATIONS

On a scale of 1-5, 5 being most important:

5	User Noticeability, Weight
4	Size, Offset from Body
3	Simplicity
2	Cost, Sturdiness

BUDGET



- Vest Development ($60)
- Perturbance Development ($300)
- Customization Materials ($60)
- Sensors ($100)
- Meeting/Building Supplies ($80)

BIGGER PICTURE

- Improve quality of life for aging people
- Expand user's understanding of their susceptibility to falls thus reducing possible injuries
- Increase patient's overall life expectancy and allow them to continue their normal routine

NEXT STEPS

- Finalize CAD model
- Purchase device components
- Fabricate & program prototype
- Test and analyze data
- Evaluate device performance
- Refine as necessary