EML4501 - Group 5

John Adler, Carley Daniele, Sebastian Diaz, Manae Kokobun, Matthew Musial, Marc Navetta, Camille Rodriquez

THE "GET UP AND GO" GAIT(OR) AIDE

Herbert Wertheim College of Engineering Department of Mechanical & Aerospace Engineering UNIVERSITY of FLORIDA

Product Overview

The "Get Up and Go" Gait(or) Aide is a lift and harness system that provides offset weight support for users undergoing neuromuscular rehabilitation on elliptical machines. The user is strapped into a harness that connects to an overhead cable that statically lifts using a motor and winch. Once suspended, the Frame translates the user over top the elliptical. When exercising, the Dynamic Weight Offset Mechanism adjusts and maintains the tension in the cable to be equal to the desired weight offset. Novel features include lifting patients from their wheelchair, and dynamic variable weight offset between 0-350 lbs.

Harness

The harness is made up of nylon webbing with polyurethane foam padding at the torso and waist for the user's comfort It facilitates users in wheelchairs by first lifting from the torso, then the rest of the harness can easily be attached It attaches to the cable with a mount consisting of a rigid bar, evebolt, and clevis grab hooks

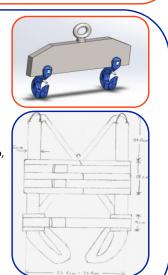


Figure 2. Harness Mount and Textile Sketch

Static Lift Mechanism

- The electric winch uses a 12 V 3horsepower copper permanent magnet motor and has a **pulling capability of up to 3000 lbs**, the winch fairlead and winch accessories are made of steel
- 7x19 Galvanized Zinc Coated Carbon Steel Cable, Clear Nylon Coating Minimum Break Strength 2,800 lbs
- Polypropylene case guards the mechanisms and protects against pinch points

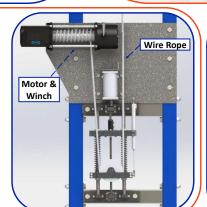


Figure 6. Winch, Motor, Wire Rope



Safety Features

Safety rope has two components, steel carabiners and polyester lanyard, which has 400 lbs of capacity. By wrapping lanyard around an I-beam and attaching carabiner to harness, this system **can prevent user from falling if rope is broken**

- Users can keep balance and body stable using the handle on the frame
- Emergency stops attached to frame have **ability to cut the power with a single push** by user or helper

Product Costs

- OTS Parts: \$3168.30
- Raw Materials: \$1211.50
- Manf. & MFG Labor: \$105.30
- Energy Consumption: \$0.13
- Assembly Labor: \$107.10
- Total Cost: \$4592.33

Frame Design

- 2.2 m high and 1.4 m wide
- Each 2 by 3 inch 11-gauge steel tubing
- Swivel action brakes on each high strength polyurethane wheel



Acknowledgements

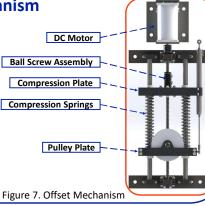
We would like to thank Cummins and Northrup Grumman for their sponsorship, and Dr. Traum for his invaluable guidance in our pursuit and enjoyment of mechanical engineering design.

Dynamic Weight Offset Mechanism

Cable length is held constant; the ball screw assembly and DC motor adjust the compression of the die springs, changing the cable tension to be equal **to any user-defined value between 0% and 100% their body weight**

 Linear potentiometer tracks the change in spring compression as the user vertically translates on the elliptical and commands the ball screw assembly to continuously adjust and maintain the unloading cable tension

 DC Motor capable of 1800 RPM and 12 lb-in torque, supports up to 350 lbs of dynamic weight offset at exceptional fitness intensity of 180 strides/min





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Customer Needs Mapping

i needo mapping				
Need 1	Height and Width	\mathbb{R}		Size of Frame
Need 4	→ Load failure			Weight Capacity
Need 5	Frame F.S			Frame Mat'l
Need 9	Frame Clearance			Frame Height
Need 13	Wheels		[Wheel Locks
Need 15	Height and Width		Frame	Mat'l Strength
NCCU 15	Weight Capacity		Frame	
Need 18	Sits on Floor			Frame Layout
Need 24	Material Cost			> \$4000
Need 27	Screen			Control Box
Need 28	5-10 Years			F.S. >1.5
Need 6	Safety Net			Safety Strap
Need 24	Material Cost			Inexpensive OTS Parts
Need 25	Emergency Stop		Safety	Stop Button
Need 26	Mech Failure		Mechanism	Strap
Need 28	5-10 Years			Reasonable F.S.
		J		
Need 4	Weight Capacity			Mat'l Strength
Need 14	Size Capacity		Harness	Dimensions
Need 24	Material Cost		nainess	Harness Material
Need 28	5-10 Years			Harness F.S.
Need 12		1		Winch
Need 12	→ Lifting via Motor → PID Controller	1	r	Control Box
			Motor/Power	Standard Material
Need 23 Need 24	Plugs into Wall		systems	
Need 28	Motor Cost	1		Inexpensive Motor
Neeu 20	5-10 Years	ſ		Lifetime
	Power output	l.		
Need 2				Standard Motor
	Motor			
Need 4	Capacity			Motor Lifting Capacity
Need 7	Motor Speed			Lifting Motor
Need 8	Motor Speed			Compression Spring
Need 10	Dynamic Control		[Compression Plate
Need 11	Dynamic Control		Primary Lift &	Compression Spring
Need 14	Wire Cable		Weight System	Wire Cable Material
Need 16	Dynamic Control			Adjustable Controller
Need 17	PID Controller			Box
Need 19	Dynamic Control			Ball Screw
Need 20	Dynamic Control			Ball Screw
Need 21	User			Ball Screw
Need 24	Material Cost	r /		> \$4000
Need 28	5-10 Years	K		F.S. > 1.5