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Rapidly Deployable Wheelchair Power Assist Device for Healthcare Settings

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Opportunity

Problem Statement

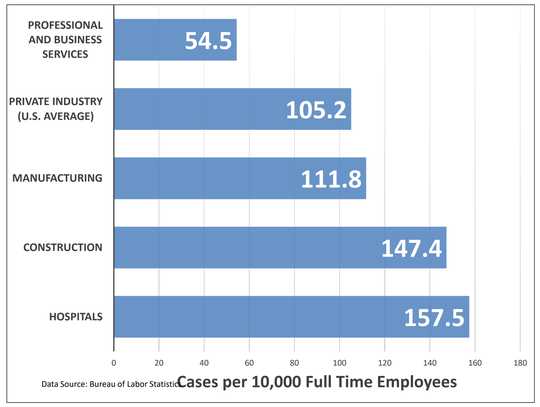
To create a **rapidly-deployable** device which **reduces the force** required to push a wheelchair in a **healthcare setting**.

Healthcare Constraints

- Caregiver stride interference
- Multiple trips per day
- Centralized transport
- Modifications
  - IV poles
  - Oxygen tanks

Industry Demand

Nurses have the highest incidence of back injury in the United States and often complain of physical and mental fatigue.



Approach

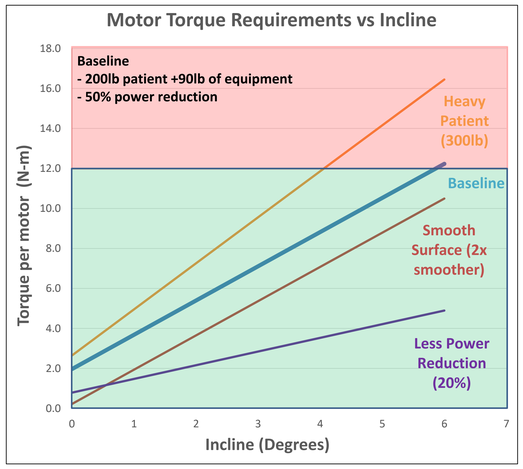
Device Requirements

Functionality

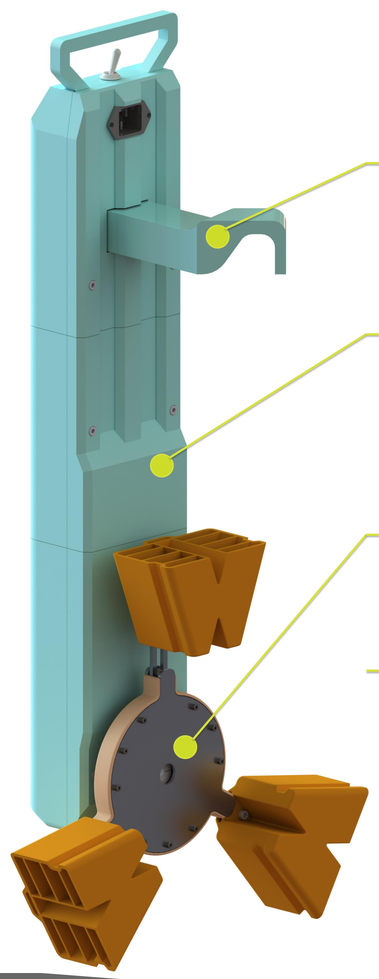
- Provide 50% power assist up to 5° incline
- Final device weight under 10 lb
- Rapidly-deployable and easily installed
- Meet applicable standards (EN/ISO)
- Operate for an entire hospital shift
- Operate intuitively with minimal training

Interaction

- Retain current wheelchair functionality
- Disengage in emergency situations



Results



Key Features

Armrest Support

- Centralized transport
- Quick install onto chair
- Supports weight of device
- Compliant design allows for chair-to-chair variance

Claw Body

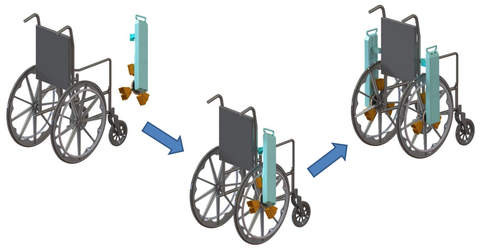
- Provides device structure
- Encloses drivetrain, controls and power system
- Modular architecture promotes iteration

Claw Hub

- Wedges move radially for centering alignment about real wheel axle

Controls

- Gyroscopes and accelerometers determine necessary power-assist output from motor
- User-focused design includes status LEDs and power switch



Installation Steps

1. Hang device onto armrest
2. Extend wedges and move device into final position
3. Release wedges
4. Repeat for opposite side

Impact

Differentiation

- No existing product mounts onto the sides of a wheelchair
- No existing product drives the wheelchair by the spokes of the rear wheels
- No product is as easily or as rapidly deployed
- No existing product meets unique requirements of healthcare

	The Claw Drive	*Roma Power Pack*	*Benoit Light Assist*
			
Price	$3000	$500	$6000
Motor Power	140W	280W	200W
Ease of Installation	★★★★★	★★	★★
Weight	★★★½	★★	★★★½
Ease of Use	★★★★	★★★★	★★★★
Battery Range	★★★½	★★★★	★★½
No Permanent Hardware	✓	✗	✗
No Interference with Attendant	✓	✗	✗

Value for Healthcare

- Reducing physical stress during a nurse's shift will lead to a better patient experience
- For the hospital:
- Reduced
  - Employee turnover
  - Nurse time loss
  - Injury rates

Commercialization

- Wheelchairs in healthcare is a growing $1 billion+ market
- More than 1,000,000 potential chairs for installation
- Potential expansion markets: airports, sporting venues, amusement parks, zoos

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