

Exoskeletons

Perspectives in Assistive Technology--- Stanford, 2017

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Outline

- The Exoskeleton
- Design of An Exoskeleton
 - Design Requirements
 - Design Features
- Demo/Q&A

What is an
Exoskeleton?

Exoskeletons: Helping People Move

Exos on the Market



Indego

Parker.com



Rex

Rexbionics.com



ReWalk

Argomedtec.com



Ekso GT

Eksobionics.com

Ekso



Diagnoses

Who can benefit from exoskeleton use?

- Spinal Cord Injury
- Stroke

- Multiple Sclerosis
- Traumatic Brain Injury
- Etc.

Benefits

Why use an exoskeleton?

- Gait Training
 - Repetitive stepping
 - Varied assistance
 - Balance training
- Long-Term Use?
 - Bone Density?
 - Bowel & Bladder Function?
 - Pain?
 - Circulation?
 - Emotions?

Exoskeletons on the Market

- FDA Clearances for Medical Devices
- Most are cleared for Spinal Cord Injury in clinics
 - Some for SCI in community environment
 - Ekso is cleared for Stroke in clinics

Designing an Exoskeleton

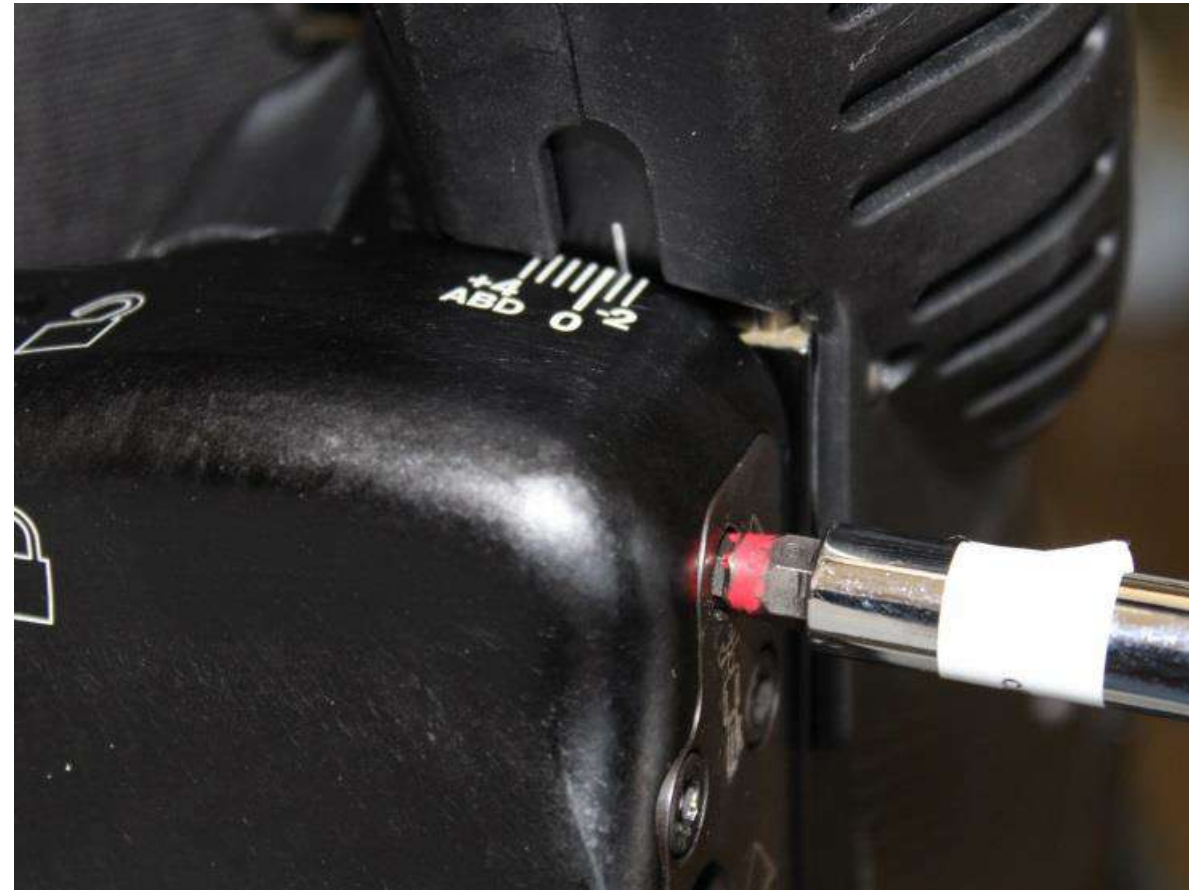
Design Requirements

- Brainstorm time!

Size Adjustment



Size Adjustment



Fit Kit & Padding



Donning / Doffing



Safe Motion / Fail Safe

- Hard stops & soft stops
- Adjustable settings for SW Joint limits
- Normally-on brakes

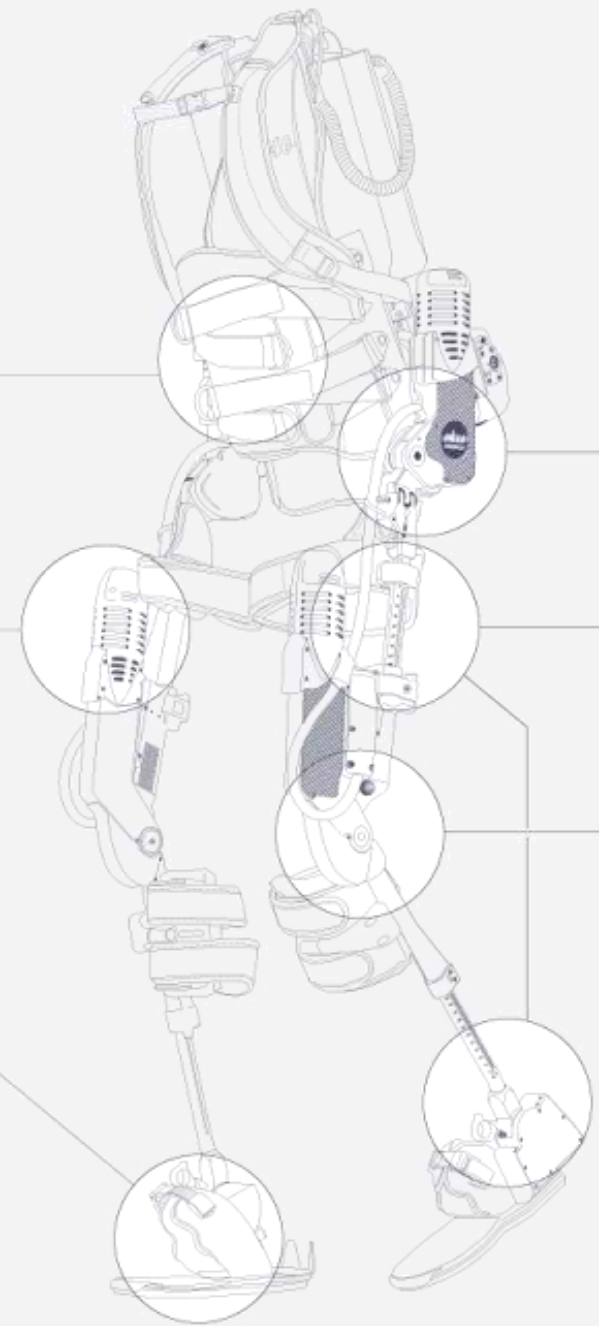
CUSTOMIZE GAIT FOR EACH INDIVIDUAL



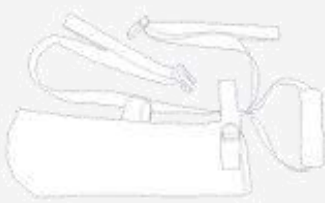
VARIETY OF SOFT GOODS TO ACCOMODATE/CUSTOMIZE A WIDE RANGE OF BODY TYPES

ADJUSTABLE POWER INDIVIDUAL TO EACH LEG
OPTION TO TURN OFF POWER IF PATIENT HAS ENOUGH STRENGTH ON ONE SIDE

FULLY SUPPORTED DEVICE; PATIENT MANAGES OWN WEIGHT



OPTION TO SUPPORT AN IMPAIRED UPPER EXTREMITY



RECIPROCAL GAIT ACHIEVING TRAILING-LIMB POSTURE.

STEP INITIATION OPTION CONTROLLED BY PATIENT'S OWN STRENGTH.

CUSTOMIZE JOINT MOTION TO PROTECT WEAK JOINTS AND MANAGE CONTRACTURES



THANK
YOU

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