Energy Requirements for Prosthetic and Orthotic Devices in Research and Clinical Applications

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Overview

• What are prosthetics and orthotics?

• Current features of existing
  o Prosthesis
  o Orthosis

• Power requirements for prosthetics/orthotics
  o Clinical/research
What are prosthetics and orthotics?

- **Prosthetics** are interventions designed to REPLACE a part of the body that is absent, usually due to amputation, trauma or congenital deformity.

- **Orthotics** are interventions that are designed to RESTORE function to a part of the body that is not able through illness, trauma or congenital deformity to function properly.
Some common prostheses
Some common orthoses
Prostheses components

- Socket liner
- Socket
- Adaptor
- Knee joint
- Pylon
- Ankle joint
- Foot
Limb orthoses

- Moulded interventions from a variety of materials.
- Usually patient specific, but can be generic.
- Can be used to aid daily life or for exercising.
- Function of orthoses
  - augmentation
  - training
  - dynamic correctional devices
Clinical power requirements for P&O

- Control
- Actuation
  - Hip, Knee, Ankle
  - Shoulder, Elbow, Hand
Research requirements

- Oxygenation
- Dynamic interface pressure & shear
- Motion tracking
- Activity monitoring
- Bone movement
- Temperature
- Foot pressure
- Tele-Health (monitoring of intervention status)
Harvesting opportunities

Thermal energy (i.e. body device interface thermal differential)

Motion energy:

Flexion & extension of components. (Hydraulic control units).

Structural deformation

Shock absorption/dissipation
Thank you