Virtual Rehabilitation

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Why we care
Outline of Content

• What is CAREN
• How does CAREN work
• Who it affects
• Cost and Benefit
• Other Applications
• The future of the prosthetics' field
• Conclusion, road ahead
History of CAREN

- **Computer Assisted Rehabilitation Environment**
- 2003 - developed by Motek Medical
- 2006 - first clinical use in Israel
- 2007 – used in US

http://www.motekmedical.com/sheba.html
How CAREN Works

- Three overlapping projectors
- Dual treadmill with 6 degrees of freedom
- 180° view screen and surround sound

http://www.youtube.com/watch?v=ZCiGOWUPYZY

Who Uses CAREN

- Wounded military personnel
- Sports and fitness athletes
- Orthopedic patients
- Neurological disorder patients
- Medical researchers

http://bioproj.informe.com/gallery/main.php?g2_itemId=137
http://hollywoodhatesme.files.wordpress.com/2010/02/usain-bolt.jpg
Cost/Benefit

- Typical financial: $250,000 - $1.5 M
- Spatial Requirements: 23’X23’X20’ (average size)
- Personnel Requirements: One computer operator
- Government grants, loans, etc.

How CAREN Helps Amputees

- **Arm**
  - Transradial
  - Transhumeral

- **Leg**
  - Transtibial
  - Transfemoral

http://openprosthetics.ning.com/profiles/blogs/prosthetic-history-the

The Future of Prosthetics

• Target Muscle Reinnervation (TMR)
  o Redirect dead end nerves to functional muscle
  o Sense muscular contraction with electrodes

• Neural Interfacing
  o Communicating with the nervous system
    • Dr. Miguel Nicolelis – Duke University
    • Dr. John Donoghue – Brown University

http://www.thinkartificial.org/machine-interfaces/monkey-brain-makes-robot-walk/

http://www.gizmag.com/go/3503/
More Applications

- Has been used to develop special orthopedic shoes
- Natural environment instead of a lab one
- Can study each body part individually
Psychological Application

- NICoe has purchased special version of CAREN
- Use in psychological rehabilitation
- Large portion of soldiers return with psychological problems
- phobias

Concluding Thoughts

• Innovation change the way injured military personnel recuperate.

• The cost and benefit of CAREN systems.

• Other applications
  o Psychology
  o Orthopedic
The Road Ahead

- Cost effectiveness as technology advances
- Advancement in prosthetics may cause CAREN to become obsolete.
- Virtual technology is advancing to consumer market.
References


• http://www.delphifaq.com/faq/household/f916.shtml
Questions?