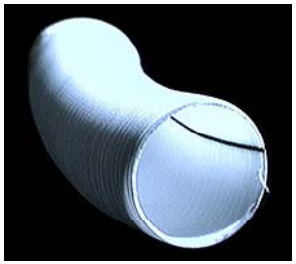
Introduction to Biomedical Engineering

Biomedical Engineering

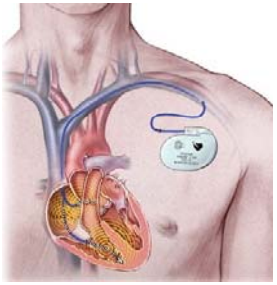
- Biomaterial
- Biomechanical
- Bioelectrical (instrumentation)
- Biocomputing (Imaging)
- Rehabiliation
- Tissue and Cellular
- Bioinformatics

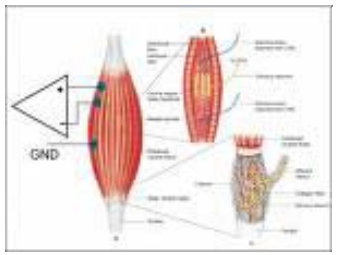
Biomaterial

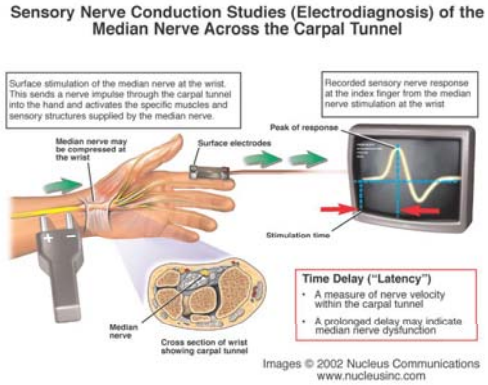


From: Stryker

Bioelectrical

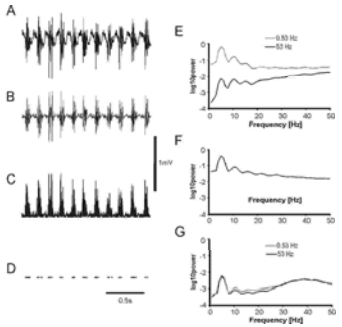


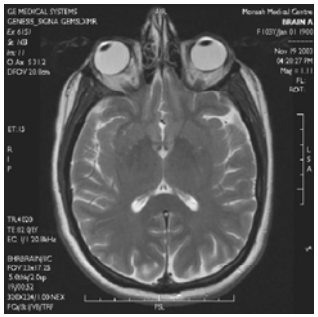




Biocomputing

- Bioinformatics
- Signal processing
- Image processing





Rehabilitation

Lokomat

Tissue and Cellular

From: discover magazine

Tissue and Cellular

- Stem Cell research = Biomedical Engineering?
- Biomedical Engineering vs. bioengineering?
- What is Tissue and Cellular engineering?

Biomechanical Engineering

- When?
- Where?
- What?
- Why?
- How?

Biomechanical Engineering Vs. Mechanical Engineering in Medical

- Engineering – Mechanical, Electrical, Computing, Tissue, Material Science, etc.
- Statistics, IT, Math…
- Biology, Chemistry, Physics …
- Medicine
- Device, Equipment …

Robot

From: da Vinci website

Leg Orthosis

HAL

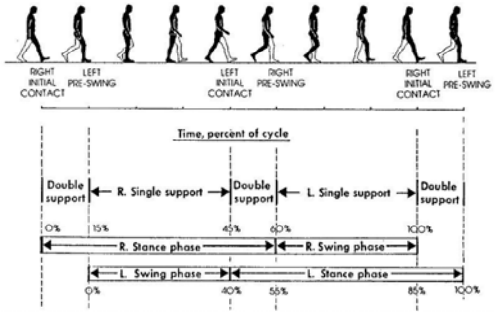
BLEEX

Yobotics

P. Neuhaus and H. Kazerooni, "Design and control of human assisted walking robot," in *the IEEE International Conference on Robotics and Automation*, vol. 1, 2000, pp. 563–569.

H. Kawamoto and Y. Sankai, "Power assist system hal-3 for gait disorder person," in *International Conference on Computers for Handicapped Persons*, vol. 2398, 2002, pp. 196–203.

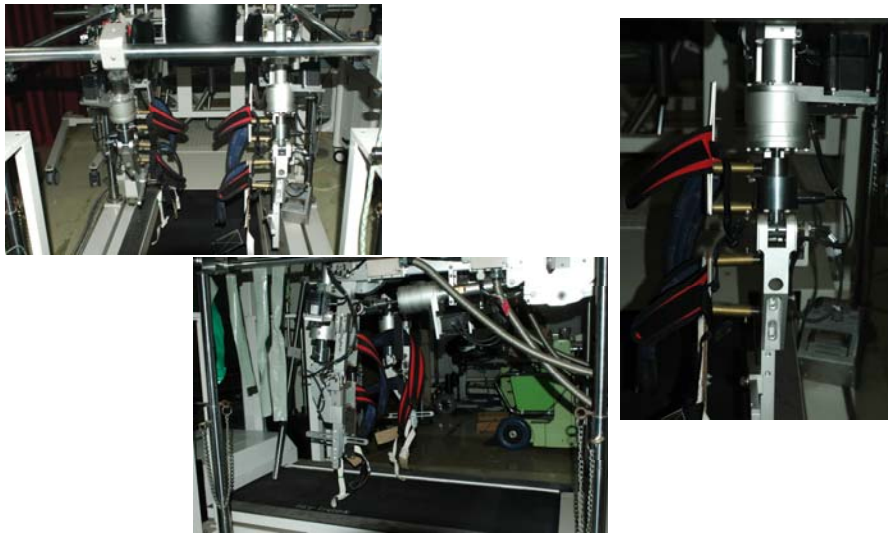
Gait Analysis



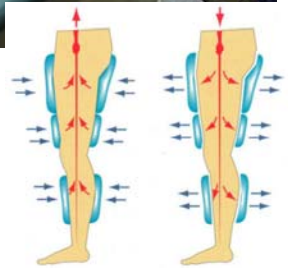
Gait Analysis ____ picture from: Science of Rehabilitation

Biomechanical Device

Biomechanical + Rehabilitation



Bioinstrumentation



- EECP
- Environment?
- Condition?
- Restriction?
- Discussion?
- Bioethic?

From: Guidant Corp

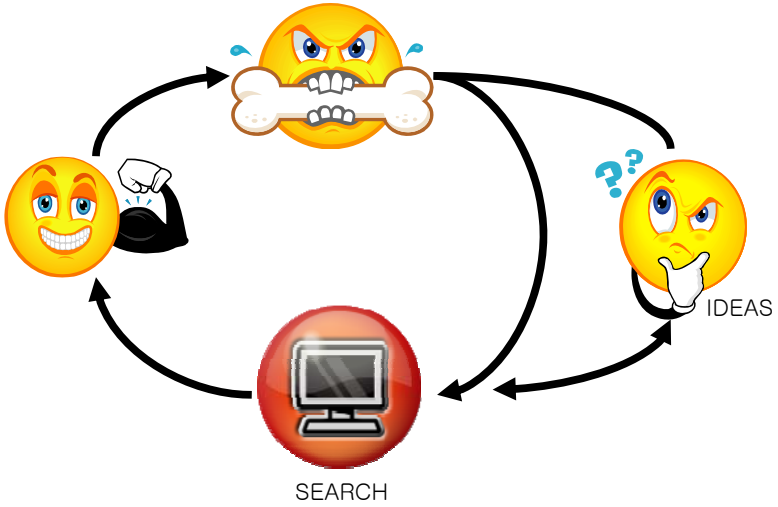
Imaging

From: allproduct.com

Combination?

Neuromuscular Biomechanics Lab

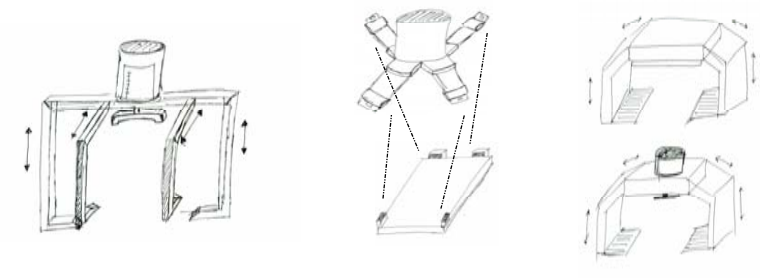
- Computational Physics, neuromuscular biology, biomedical imaging, robotics, and neuroscience
- To Analyze muscle, movement abnormalities, design medical technologies, guide surgery



Example

- Automated CPR

Design



Manufacture + Experiments

Future?

Discussion Section

Problems?

Any questions