What is Bioengineering?
Examples of Bioengineering?
What Does the Neural Engineering Lab at O.U. Do?
• Bridge the gap between Medicine and Engineering.

• Use engineering techniques to solve medical problems.

• Use biological systems to solve engineering problems.
Glucose Watch

Uses ultrasound at 20KHz to increase permeability of Skin To allow monitoring of glucose level in the interstitial fluid.

1: J Pharm Sci 2000 Sep;89(9):1170-9

Transdermal extraction of interstitial fluid by low-frequency ultrasound quantified with 3H2O as a tracer molecule.

Cantrell JT, McArthur MJ, Pishko MV.
Hand-Held Ultra Sound
Deep Brain Stimulator
Defibrillator
The LVAS provides circulatory support by taking over most of the workload of the left ventricle, the heart’s main pumping chamber. Blood enters the pump through an inflow conduit connected to the left ventricle and is ejected through an outflow conduit into the body’s arterial system.
The development of devices and techniques to directly interface with the central nervous system to augment or restore functionality.
Cortical Visual Prosthetics

Figure 1. Blind volunteer with sub-miniature TV camera mounted on the right lens of his sunglasses, and the laser-pointer (position monitor) on the left temple piece.

Figure 2. The complete artificial vision system showing the computer and electronics package on the belt with output cable to the electrodes on the brain.

Figure 4. X-ray of electrode array on the medial surface of the right occipital lobe.

Prosthetic Limbs
Behavioral Guidance
Neural Engineering @ OU

Sensory Prosthetic Device
- Camera
- Microphone
- Pressure Sensor

Signal Processing
- Stimulate

Neural Interface
- Record

Nervous System

Environment

Modeling
Electrodes
Auditory Cortex
Trial FRA: 14 Tones
What is next?
What can you imagine?