SNS COLLEGE OF TECHNOLOGY
DEPARTMENT OF BIOMEDICAL ENGINEERING

Neuro engineering

Understanding and augmenting brain function

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BRIEF KNOWLEDGE:

- Neuro scientific and engineering approaches and build tools to control, enhance, understand, replace, repair neural system.
- Non living component with living neural system.
- Neural engineers seeks heterogeneity of their colleagues including subspecialists.
- Engineers, neuroscientists, biologists, chemists, therapists and physicians all work and play their important roles in neural engineering.

In medical field:

- Invasive, non-invasive, external and implantable devices
- Deep Brain Stimulation (DBS)
- Parkinson’s disease, Dystonia, OCD, depression, motor impairments
- Cardiac pacemakers (developing) in a different approach with brain
- Spinal cord stimulation for chronic pain
- Cochlear implants – electrically stimulating auditory nerve

in medical field:

- Retinal implants – electrically stimulating retinal neurons (is in early stages of creating this tool)
- Sacral neuromodulation therapy
  - ➢Alleviate symptoms of pelvic floor disorders
  - ➢Over reactive bladder

- LIMBS
  - ✓Advanced artificial limbs interface with nerves that remain after amputation
  - ✓Intuitive closed loop prosthetic control with stimulation of residual nerves
  - ✓Also provide sensor feed back from missing limbs
  - ✓Can close the gap between human and machine

Innovation :

- ✓Neuro scientists must keep on learning and feed information
- ✓In parallel engineers incorporate scientists information with end users need and develop tools accordingly
- ✓Currently Magnetic Resonance Imaging is playing an important role in helping neuro scientist to learn human brain
- ✓Study lots medical cases and importantly in Central and Peripheral Nervous System

Limitations:

- ✓ Limited understanding of how stimulating electrodes interact and interface with nervous tissue
- ✓ Use of incorrect biomaterial for tools can cause inflammation
- ✓ Gap in understanding pathways related to pain and autonomic sensory, cognitive/emotional, motor systems
- ✓ Limited understanding of neural changes in molecular level
- ✓ Factors – performance, efficiency, reliability, safety, cytotoxicity, durability, etc. of neural implants must considered

Future Possibilities:

- Neural engineering first started in the 18th century and now has incredibly developed
- In future – neuro prosthetics
- Brain to machine communication and vice versa
- Biological feedback system
- Nebula from guardians of the galaxy might be possible in future

Thank you !