

Microsensors, Implantable Devices and Rodent Surgeries for Biomedical Applications
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Week - 12
Lecture - 55

Hello everyone, and welcome back to the NPTEL course on micro sensors, implantable devices, and rodent surgeries for biomedical applications. This marks our final session together, where we will recap the key takeaways from this comprehensive course and bid you farewell.

Over the past 12 weeks, we've embarked on a journey through various facets of neural engineering. We began by exploring the logistics involved in rodent experiments, with Dr. Shabari Girishan, a neurosurgeon, guiding us through the intricacies of the brain using the rat as a model.

From there, we delved into the realm of microengineering technology, learning how to fabricate implantable sensors, microneedles, and flexible devices for acquiring brain signals. We also discussed the electronic systems necessary for electrical stimulation, empowering you to understand the principles behind these technologies.

We ventured into the world of epilepsy, understanding different seizure types, their detection and classification, and the role of technology in managing this condition. We also examined various rodent species used in neural experiments, focusing on the Wistar rat.

Our exploration extended to other neurological conditions, including stroke, motor movement disorders, and Parkinson's disease. We discussed how to develop technologies to understand these diseases and create relevant animal models. We also touched upon BCI (Brain-Computer Interface) models, microelectrode array fabrication, and the challenges associated with signal acquisition, synchronization, and behavioral correlation.

Furthermore, we covered brain stimulation protocols, rodent micro-neurosurgery techniques, including anesthesia, neuroanatomy, tools, sterilization, craniotomy, and sensor implantation. We also explored spinal anatomy, spinal cord sensors, implantable strategies, peripheral neural anatomy, and the biological basis of contemporary neural networks.

Finally, we wrapped up the course by discussing ERP (Event-Related Potential) and EEG (Electroencephalography) labs, signal processing techniques, and recent trends in neural engineering, including decoding techniques and challenges.

Throughout this course, we've combined lectures, lab classes, and TA sessions to provide you with a holistic understanding of the devices, technologies, and methodologies used in neural engineering. We've also emphasized the importance of understanding brain and spinal cord anatomy and the various implantable devices and strategies available.

I hope this course has equipped you with the knowledge and skills necessary to embark on your own research endeavors in neural engineering. If you are appearing for the exam, I wish you the very best. For those continuing your learning journey through NPTEL, I encourage you to explore the many other fascinating courses available on the platform.

As we part ways, I extend my best wishes for your future endeavors. It has been a pleasure sharing this learning experience with you. Thank you for your dedication and participation. Farewell, and may your passion for neural engineering continue to flourish!