Principles and Applications of Closed-Loop Neural Interfaces

February 7

Tuesday, 12:30 pm

Zoom Only

SPEAKER:

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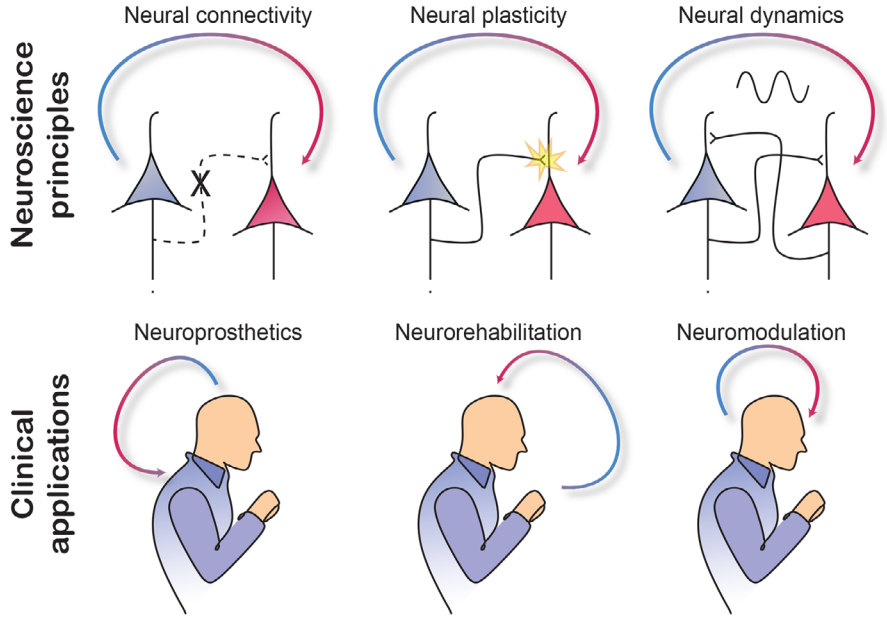
Abstract

Recent years have seen substantial recent progress in technologies for monitoring and manipulating brain activity. Research in my lab focusses on neural interfaces that combine sensing and stimulation to allow continuous 'closed-loop' interactions with the nervous system. Such interfaces can act as neuroprosthetic devices to replace connections lost through injury, neurorehabilitation devices to drive plastic changes in brain circuits, and neuromodulation devices to regulate oscillatory dynamics. I will discuss example applications in the areas of spinal cord injury (Guiho et al. 2021), stroke (Hodkin et al. 2018) and epilepsy (Zaaimi et al. 2022), as well as describe recent efforts to develop a non-invasive closed-loop interface using music. Since many neurological conditions are increasingly seen as disorders of neural connectivity, plasticity and dynamics, closed-loop neural interfaces may in future have wide-ranging applications for repairing brain circuits, regulating brain activity and restoring brain function.



Publications:

1. Zaaimi B, …, Jackson A (2022) ***Closed-loop optogenetic control of the dynamics of neural activity in non-human primates.*** Nat Biomed Eng. doi: 10.1038/s41551-022-00945-8.

2. Guiho T, Baker SN, Jackson A (2021) ***Epidural and transcutaneous spinal cord stimulation facilitates descending inputs to upper-limb motoneurons in monkeys.*** J Neural Eng 18 046011.

3. Hodkin EF, Lei Y, Humby J, Glover IS, Choudhury S, Kumar H, Perez MA, Rodgers H, Jackson A (2018) ***Automated FES for Upper Limb Rehabilitation Following Stroke and Spinal Cord Injury.*** IEEE TNSRE 26 1067-1074