Accompanying transcript for 2024 New Module Integration – Demonstration video
Video is found on Youtube at: https://youtu.be/qFsUOagjAbA
Format:
[TIME] Section
[TIME]
Description

[0:08] Outline

[0:14] WING - Wearable Interoperable Neuroprosthetic Gear
[0:14] Demo of new COSMIIC Charger and Coil with smart location tracking for positioning of wireless charging. The Charger control emits a beeping noise that increases in repetition as the Coil becomes closer to optimal charging connection. The beep becomes constant when the Power Module and Coil are positioned at the best distance and angle for efficient charging.

[0:32] Benchtop long-term soak test demonstrated with the COSMIIC Charger and Coil. COSMIIC team members have been maintaining testing of the platform COSMIIC System with an orientation of 3 stimulating modules and 1 recording module for over 1 year–this system is analogous to the orientation typically used in the Grasp-Release Assessment of a Networked Neuroprosthesis Device (GRANND) trial. The Charger box reads out live charging data from communication with the Power Module.

[0:40] The WING module demonstrates live stimulation in multiple channels based on 3D accelerometer input. Acceleration in the direction of the positive axes affects stimulation in each dimension's corresponding channel. On-board buttons can also be used to turn stimulation on and off. Accelerometer data is sent to the Power Module in the saltwater bath by radio and the Power Module sends a command over the implanted network to stimulate (demonstrated by lights on evaluation board of a stimulating module).

[0:55] Stimulation parameters can also be affected by Bluetooth connections through the nRF Toolbox. With stimulation changing based on positioning, the Bluetooth device is able to shut off individual or all channels.

[1:16] SWARM - Sensor Withdrawn from A Remote Module
[1:16] The SWARM module will also include a 3D accelerometer or IMU. With calibration, the modeling program is able to track the positioning of a known object in 3D space as it is repositioned. Here the development board is also able to directly communicate with the Power Module.

[1:32] Images of prototyped SWARM boards (red boards) under testing; further revisions will become the implantable module.

[1:38] HIVE - High-density Interconnect with Variable Electronics
[1:38] On display are the HIVE development board (square palm-sized board) and the module flex circuit board (thumb-sized boards with flexible connectors). The electronics from the development board will be sized down to fit the minimal sizing of the flex board. Available are 64-channels for recording and stimulation. HIVE is in the process of introducing communication to interact with the platform COSMIIC System and developing machined prototypes for the implantable enclosure.

[1:47] Engineers interacting with the HIVE development board.

[1:56] NECTAR - Nerve Excitation Control Through AC Regulation
[1:56] Engineers interacting with the NECTAR prototype system.

[2:11] Bottom left: 1 Hz stim is used to elicit muscle contractions in an animal model. 10kHz stimulation from NECTAR module partially blocks twitches at amplitude of 2.5 mAp and fully blocks twitches at amplitude of 3.0 mAp.

[2:11] Top right: Stimulation parameters of the NECTAR prototype can be controlled through a graphical user interface (GUI). As the parameters are altered on the computer's GUI, output from the NECTAR module on the oscilloscope changes in correspondance. The NECTAR module can toggle stimulation characteristics by amplitude, frequency, pulse width, and interpulse delay.