

**NOTE:** All systems Should be Considered as Investigational Use Only in the Context of the NIH BRAIN Initiative, and Protocol Support is Subject to Medtronic Clinical Research Board Approval

### **Nexus Systems (-D [distributed] and-E [embedded])**

The Nexus Systems are meant to serve as an algorithmic development tool for first principled approaches to closed loop systems. The Nexus-D System is a data conduit (i.e., bi-directional data port) that transmits data for the Activa PC+S, RestoreSensor or the Activa RC+S systems to a host computer. It transmits real-time sensing data and allows a host computer to update the neurostimulator's stimulation parameters based on real-time analysis of the sensor data by the host computer. All decisions regarding stimulation updates are made by a host computer which is outside the boundaries of the Nexus-D System, using algorithm prototyping environments such as Matlab or C#. This functionality provides the ability for research sites to explore potential closed-loop therapy algorithms in a flexible manner to assess the feasibility of closed loop therapy adjustment. The Nexus-E system allows for firmware upgrades to the system for algorithms that are shown promising using the Nexus-D. This frees up the restrictions imposed by the computer-in-the-loop, but also brings about additional risk mitigations that the investigator should consider.

Refer to the specifications of the neurostimulator intended to be used in conjunction with the Nexus- D/Nexus-E System for stimulation and sensing performance specifications.

Further description of the architecture and capability of Nexus are available in the paper: Afshar P., et. al 2013 *Frontiers in Neural Circuits*, included as Appendix D.