**Neuroinformatics Core**

The Neuroinformatics (NI) Core is based in Kansas State University’s Department of Computer Science in the College of Engineering and is highly integrated with Beocat, a campus-wide resource that comprises the largest academic supercomputer in the State of Kansas. Beocat’s hardware includes nearly 400 researcher-funded computers, approximately 3.3PB of storage and ~10,000 processor cores on machines ranging from dual-processor Xeon e5 nodes with 128GB RAM with 100GbE to 128-core, 1.5TB RAM servers with eight GPU accelerators, connected by 40-100Gbps networks (thus 40-100x faster than Google Fiber). Beocat staff include two full-time system administrators with over ten years’ experience in high-performance computing, a full-time applications scientist with a PhD in Physics and 25 years’ experience optimizing parallel programs and assisting researchers, and part-time (~0.5 FTE) director. Under current policy, heavy users are expected to "buy in" through adding computational or personnel resources for the cluster (“condo computing”). Beocat is located in a dedicated 1100-sq.-ft. data center in 1118 Engineering Hall on the K-State campus. K-State's chief information security officer provides technical monitoring and support to ensure systems are not compromised.

The NI Core is supported by the Cognitive and Neurobiological Approaches to Plasticity (CNAP) Center, an NIH-funded Center of Biomedical Research Excellence (COBRE), established in 2017. CNAP owns dedicated computing clusters on Beocat that can be used to conduct analyses on the high-dimensional data that will be collected as part of this project. CNAP users have priority access to 11 servers, including one with four nVidia GPUs, and a fast SSD-based filesystem for data-intensive computation. Users can also purchase archival data storage as needed. Additionally, this Core provides computer scientists to support CNAP work in order to help integrate projects into Beocat, streamline analyses, data storage, and data sharing. Since its inception in 2017, the NI Core has provided research support, infrastructure, and training/outreach to its users. This includes providing customized training modules, applied machine learning, data sharing, data analytics, and high-performance computing (HPC) for all CNAP users in a secure, fast, efficient manner. The NI Core’s functionality is critical for supporting the management, archiving, and analysis of the large data sets collected using EEG, electrophysiology, MRI, confocal microscopy, and other neural and behavioral techniques. With the award of Phase 2 COBRE funds in July 2022, the NI Core began adding further expertise and equipment to support increased machine learning (ML) and artificial intelligence (AI) utilization in this core. To support this growth, the NI Core has recruited two faculty collaborators in the Department of Computer Science with deep expertise in ML/AI in interdisciplinary projects. This core will also hire graduate and undergraduate students with ML/AI expertise. This expertise will help core users advance from experimenting with various ML techniques to understanding which ML technique is most advantageous for their desired application, and why.