

# NinjaNIRS 2022 Backpack System

Team 8: **Robert Bing, Benjamin Lissner, Juan Luis Ugarte Nunez**

Technical Advisors: **David Boas, Walker J. O'Brien, Bernhard Zimmermann**

Brain monitoring devices like fNIRS and EEG offer valid approaches to monitor the cognitive states and activity of the brain. Moreover, it's been found that utilizing fNIRS and EEG in tandem creates a hybrid fiber system that attains greater success than each individually. However, use of this improved method has been limited by its lack of portability and inability of long-term continuous monitoring of brain activity during movement, perception, and social interaction in real time while in the real world. Therefore, we propose a multimodal portable brain monitoring system that incorporates fNIRS, EEG, and an Eye Tracking System into a lightweight backpack that can capture the data in real time. The case to house the fNIRS system was designed using the CAD software, SolidWorks. The purpose-built casing was created to accommodate a greater array of optodes and updates on the custom NinjaNIRS system. The backpack was designed such that it safely houses each system and is ergonomic towards the user. An interior composed such that it will secure systems from damage, while maintaining accessibility to components for easy troubleshooting and data collection. Upon finalization of the realized hybrid backpack system, it's within expectations that we'll have found and designed a prototype that best exemplifies desired traits for long duration real time clinical brain recordings. The device will open up a whole new field of experimentation and testing from which valuable data can be collected and analyzed.

