BME 580 Group Project

Jefferson Bercaw, Arnav Singh, Rushil Yerrabelli

**Meetings**: 1/31/2023 at 9:45a, and 2/2/2023 at 9:45a after lecture

**Group Summary:** Jefferson is a first-year PhD student researching Injury Biomechanics in the Bass Lab. He works closely with a novel in-ear kinematic sensor that measures head impact exposure in a variety of scenarios. Our group comes from a diverse background of experiences and skills, which will enable us to succeed on this project.

Arnav is a Durham native and second year undergraduate in the department of Biomedical Engineering. He loves to create devices that can have a direct and immediate impact in his community. On campus, he is involved in organizations such as QuadEx and Duke Vertices Academic Journal, holding the position of President of Wannamaker Quad and Senior Editor of the Publication. He also is a TA for EGR 103: Computational Methods in Engineering and does research in computational and mathematical modelling of cellular systems.

Rushil is from West Hartford, Connecticut and a sophomore studying Biomedical Engineering. Rushil is very interested in computational genomics research. On campus Rushil is a bassist in the Duke Jazz Ensemble and very actively involved in research on campus. Rushil does research in on single cell RNA sequencing data on brain cells in the Sampson Lab.

**Project Ideas:** Our group discussed analyzing a wide array of data. Jefferson proposed analyzing kinematic data from an ongoing study analyzing the validity of two popular instrumented mouthguard (iMGs) in simulated football impacts in a cadaveric model. Data here comes in a variety of formats and would need to be transformed to the center of gravity of the head.

Arnav proposed analyzing patient data from an NIH study on the effects of 26 different genetic and physical risk factors for cardiovascular disease. Upon analysis, an algorithm could be constructed to determine the level of connection between various risk factors and the likelihood of developing cardiovascular disease.

Rushil proposed an idea to analyze CDC data with several variables outlining potential risk factors for Alzheimer’s disease. We can analyze this data to study which risk factors have the greatest effect on Alzheimer’s disease, and build an algorithm to predict Alzheimer’s. We could also obtain datasets of brain imaging and also attempt to predict the onset of Alzheimer's through imaging.

**Github Repository Link:** https://github.com/jefferson-bercaw/BME\_580\_Project.git