**Video Title**

Interdisciplinary Activities in Bioengineering at the Neural Engineering Data Consortium

**Video Caption Describes video in concise and plain language that is easily understood by the general public because it will be used for public voting. Should not exceed 50 words (300 characters):**

Students receive training in advanced software engineering techniques while contributing to multidisciplinary projects involving the application of machine learning and big data to bioengineering problems. Students describe the impact our research projects have on their professional development.

Our students participate in a broad range of activities from basic research on physical signals such as speech, electroencephalograms and pathology images, to commercialization activities with several local start up companies. The common thread across these diverse applications is rigorous training in software engineering. They learn to become disciplined, self-motivated engineers, and are prepared to pursue successful careers in industry. We emphasize professional skills such as technical communications and introduce them to project management techniques. We attract students from a diverse STEM population at Temple University, one of the most diverse universities in the nation.

**Intended Audience Describes the target audience for your work (e.g., this work is meant to be viewed by field experts, general public, etc.”) Should not exceed 50 words (300 characters):**

High school students and early-stage undergraduate students interested in STEM careers.

**Video Description Describes the programs, activities, policies, events, and partnerships developed and the outcomes of your work. Your description must demonstrate promotion of a diverse and competent U.S. workforce through partnerships with a potential focus on informing citizenry on the principle uses of STEM, advancing STEM knowledge, and/or supporting cross-disciplinary STEM innovation. As an NSF initiative with a mission to enhance U.S. leadership in STEM by facilitating partnerships, NSF INCLUDES is lending its support to the NSF STEM DIVE Challenge. Your description should take this into consideration when defining your work. Please do not use jargon and make sure to spell out any acronyms. Should not exceed 500 words (3000 characters):**

We prepare students for professional life as data scientists or software engineers by introducing them to research in the fields of big data, machine learning and software engineering. Our center employs students from a wide range of disciplines including traditional STEM disciplines such as engineering and computer science. However, we also employ students from the life sciences, such as neuroscience, biochemistry, and from mathematics disciplines such as statistics. Students typically enter the group working on the development of big data resource, such as the TUH EEG Corpus – the world’s largest open source collection of electroencephalograms (EEGs). This is their first exposure to peer review of their work since we have thousands of users of these resources and receive many inquiries about their work.

As they gain more familiarity with the research process, which includes training in technical communications, project management and high-level programming through scripting languages such as Python, they begin to transition into more advanced functions such as data management and curation, programming, and eventually machine learning research. They also get a chance to participate in hosting of an annual professional society conference and the development of community-wide collaborations (the topic of an NSF CCRI grant that we have). They learn how to develop and maintain open source software resources. They are exposed to the complete lifecycle of machine learning, from the development of big data resources, including annotation of data, to the development of state of the art complex and computationally demanding algorithms. They learn how to manage computing resources and optimize the performance of code on these resources.

The center actively participates in securing summer internships and future employment for students. We work closely with a number of employers in the defense industry, startups incubated in the Delaware Valley region, finance and healthcare. We actively collaborate with Temple University Hospital on several projects. A number of our students work in laboratories at the hospital collected data, which exposes them to the frontlines of the healthcare industry.

Some also work on the commercialization of the technology in collaboration with our startup, Biosignal Analytics Inc. The primary grant funding the development of this video was a follow-on to a small business innovation research (SBIR) grant. Students are exposed to the process of developing a business plan and pitching that business plan to potential investors. They develop technology demonstrations and learn how to market technology to potential investors.

The cumulative effect of these experiences is that students are well prepared for professional life. The primary goal of our activities is to prepare students for success in the STEM job market. Participation of underrepresented groups in our research traditionally exceeds national averages in STEM disciplines.

**Intended Use of Your Entry/Sustainability/Benefit Describes the utility of the work illustrated in your entry (e.g., an aid in a classroom, as part of a recruitment tool, as part of a scientific paper, etc.). Also, please indicate how the work that you have completed can be expanded upon or fits into a larger project. If this project was previously funded, describe if and how you were able to continue the work demonstrated in the video. If the work demonstrated in the video is currently being funded, how will the work be adopted or institutionalized? How has your work impacted the greater STEM community? Should not exceed 100 words (600 characters):**

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