Reverse-Engineering the Brain: From Brain-Computer Interfaces to Neuroergonomics and Beyond

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In the past several decades, the once science-fiction idea of interfacing the human brain and an external computer has been materialized via direct neural interface technology, known as *Brain-Computer Interface (BCI)*. As a direct communication system that does not depend on the brain's normal output pathways of peripheral nerves and muscles, BCI provides alternative methods to interact with the outside world not only for healthy people, but also for patients who cannot use their muscles but are cognitively intact. BCI technology has also applied to better understand the neural mechanisms that underlie human cognition and behavior in natural environments and everyday settings - *Neuroergonomics*. However, there still exist limitations hindering its practical applications despite advances and considerable amount of ongoing research. In this talk Dr. Nam will present his recent BCI and neuroergonomics studies conducted to bridge some of the gaps. After discussing possibilities and new applications of neural interfacing technology, he will open the floor for questions from the audience on any aspects of his BCI and neuroergonomics research.

Dr. Chang S. (CS) Nam is currently professor and head of Industrial and Manufacturing Engineering at Kettering University. Previously he was a professor of Edward P. Fitts Industrial and Systems Engineering at North Carolina State University. He is also an affiliated professor of the UNC/NCSU Joint Department of Biomedical Engineering, Psychology and UNC-CH Brain Research Imaging Center (BRIC). He received a PhD from the Grado Department of Industrial and Systems Engineering at Virginia Tech in 2003. His research interests center around brain-computer interfaces, social cognitive and affective neuroscience, human-robot interaction and human-centered explainable AI. His research has been supported by federal agencies including National Science Foundation (NSF), Air Force Research Laboratory (AFRL) and National Security Agency (NSA). Through his interdisciplinary research, he has published more than 160 papers along with 24 book chapters and 5 edited books with three major publishers such as Elsevier, Springer, and Taylor & Francis. Dr. Nam has received the NSF CAREER Award (2010), Outstanding Researcher Award (2010-2011), and Best Teacher Award (2010-2011). He is the main editor of "Brain–Computer Interfaces Handbook: Technological and Theoretical Advances" (CRC Press). He is the HFES fellow, and a recipient of the 2018 US Air Force Summer Faculty Fellowship Program (AFSFFP) Award and the 2019 Leland S. Kollmorgen Spirit of Innovation Award from the Human Factors and Ergonomics Society (HFES, Augmented Cognition TG). Currently, Dr. Nam serves as the Editor-in-Chief of the journal Brain-Computer Interfaces (which will be Research in Biomedical Engineering and Technology in 2025).