

## **Accurate, Secure and Privacy-Preserving Brain-Computer Interfaces**

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**Abstract:** Brain-computer interface (BCI) is a direct communication pathway between the brain and an external device. Because of individual differences and non-stationarity of brain signals, a BCI usually needs subject-specific calibration, which is time-consuming and user unfriendly. Sophisticated machine learning approaches can help reduce or even completely eliminate calibrations, improving the utility of BCIs. Recent studies also found that machine learning models in BCIs are vulnerable to adversarial attacks, and brain signals also contain lots of private information, so the security and privacy of BCIs are also important considerations in their commercial applications. This talk will introduce transfer learning approaches for expedite BCI calibration, and their adversarial attack and privacy protection approaches. The ultimate goal is to implement accurate, secure and privacy-preserving BCIs.

### **Biography:**

Dongrui Wu (IEEE Fellow) received a B.E in Automatic Control from the University of Science and Technology of China, Hefei, China, in 2003, an M.Eng in Electrical and Computer Engineering from the National University of Singapore in 2006, and a PhD in Electrical Engineering from the University of Southern California, Los Angeles, CA, in 2009. He is now Professor and Deputy Director of the Key Laboratory of the Ministry of Education for Image Processing and Intelligent Control, School of Artificial Intelligence and Automation, Huazhong University of Science and Technology, Wuhan, China. Prof. Wu is the Editor-in-Chief of IEEE Transactions on Fuzzy Systems.

Prof. Wu's research interests include brain-computer interface, machine learning, computational intelligence, and affective computing. He has more than 200 publications (11000+ Google Scholar citations; h=54), including IEEE TPAMI, Proceedings of the IEEE, National Science Review, etc. He received the IEEE Computational Intelligence Society (CIS) Outstanding PhD Dissertation Award in 2012, the IEEE Transactions on Fuzzy Systems Outstanding Paper Award in 2014, the IEEE Systems, Man and Cybernetics (SMC) Society Early Career Award in 2017, the USERN Prize in Formal Sciences in 2020, the IEEE Transactions on Neural Systems and Rehabilitation Engineering Best Paper Award in 2021, the Chinese Association of Automation Early Career Award in 2021, and the Ministry of Education Young Scientist Award in 2022. His team won the First Prize of the China Brain-Computer Interface Competition in four successive years (2019-2022).

## Education Reform of Software Engineering in the Age of A.I.

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**Abstract:** In the age of artificial intelligence(A.I.), software engineering is facing unprecedented changes. Software developers need to have a deep understanding of , especially large model technologies, since the traditional software development model cannot meet the new needs. Moreover, software engineering also needs to pay more attention to the value of data. The data-driven software development models are growing, and data analysis and machine learning technologies have also been widely used. Software development requires higher efficiency, quality, and flexibility. New methods such as agile development and DevOps have emerged. Software testing also needs to be more intelligent, and test automation has become an essential part in software engineering. This speech focuses on sharing the opportunities and challenges brought by GPT and other big models to software development and testing. It also looks forward to the changes brought by A.I. to software engineering education and how we coped. The reform of software engineering is an inevitable trend, and software developers need to constantly learn new technologies and master new methods in the age of A.I.

**Biography:** Zhenyu Chen is now Professor of Software Institute, Nanjing University, China. He is the director of the intelligent software engineering laboratory (iSElab.cn) of Nanjing University, and the founder of Moose Technology. Prof. Chen is the initiator of IEEE International Software Testing Competition, and the executive director of the Industrial Working Committee of Jiangsu Computer Society. He is the outstanding speaker of the China Computer Federation (CCF), and director of the national first-class undergraduate course “Software Testing”. Prof. Chen’s research interests include collective intelligence, deep learning testing and optimization, big data quality and mobile application testing. His research results have been transformed by well-known enterprises such as China Shipbuilding Heavy Industry, Aerospace Science and Technology Corporation, China Electronics Technology Corporation, State Grid, Baidu, Alibaba, Tencent, Huawei, etc. The research results have won the first prize of the 2012 Jiangsu Provincial Science and Technology Award, the first prize of the 2015 Hubei Provincial Science and Technology Progress Award, the 2017 CCF NASAC - Youth Software Innovation Award, the first prize of the 2021 China Electronics Society Science and Technology Progress Award, the special prize of the 2021 Jiangsu Provincial Teaching Achievement Award and one first prize and one second prize of the 2022 National Teaching Achievement Award.