Nanlin Shi

PhD Candidate

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Education

Tsinghua University *Beijing*

PhD in biomedical engineering *2018 - present*

- Advisor: Prof. Xiaorong Gao

Xi'an jiaotong University *Xi'an, Shannxi*

Bachlor in biomedical engineering *2014 - 2018*

Research Topics and Interests

EEG-based noninvasive visual BCIs

Broadband visual BCIs: Developed high-speed visual BCI with real-time feedback utilizing broadband white noise

Plug-and-play BCIs: Enhanced generalizability and stability by leveraging cross-subject/device/session knowledge.

Clinical application : Deployed home-based visual BCI spellers for ALS patients.

Temporal dynamics of sensory representation

Sensory system identification :Investigated basic characteristics of auditory and visual Temporal Response Function using EEG, exploring attention-modulated and brain-state dependent properties.

Information theory: Estimated maximum information rate of primary visual processing via E/MEEG.

Inear BCIs

Wearable Electronics : Designed visual and auditory BCIs based on in-ear conformal electronics.

Publications

Published

†*as co-first author*

Wang, Z.†, **Shi, N.**†, Zhang, Y., Zheng, N., Li, H., Jiao, Y., ... & Feng, X. (2023). Conformal in-ear bioelectronics for visual and auditory brain-computer interfaces. Nature Communications, 14(1), 4213.

Shi, N., Li, X., Liu, B., Yang, C., Wang, Y., & Gao, X. (2023). Representative-Based Cold Start for Adaptive SSVEP-BCI. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 31, 1521-1531.

Shi, N.†, Wang, L.†, Chen, Y., Yan, X., Yang, C., Wang, Y., & Gao, X. (2020). Steady-state visual evoked potential (SSVEP)-based brain–computer interface (BCI) of Chinese speller for a patient with amyotrophic lateral sclerosis: A case report. Journal of Neurorestoratology, 8(1), 40-52.

Li, X., Chen, J., **Shi, N.**, Yang, C., Gao, P., Chen, X., ... & Gao, X. (2023). A hybrid steady-state visual evoked rsesponse-based brain-computer interface with MEG and EEG. Expert Systems with Applications, 223, 119736.

Liu, B., Chen, X., **Shi, N.**, Wang, Y., Gao, S., & Gao, X. (2021). Improving the performance of individually calibrated SSVEP-BCI by task-discriminant component analysis. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 29, 1998-2007.

Under Review

Shi, N., Miao, Y., Huang, C., Li, X., Song, Y., Chen, X., ... & Gao, X. (2023). Estimating and approaching maximum information rate of noninvasive visual brain-computer interface. arXiv preprint arXiv:2308.13232.

Miao, Y., **Shi, N.**, Huang, C., Song, Y., Chen, X., Wang, Y., & Gao, X. (2023). High-performance cVEP-BCI under minimal calibration. arXiv preprint arXiv:2311.11596.

Huang, C., **Shi, N.**, Miao, Y., Chen, X., Wang, Y., & Gao, X. (2023). Visual tracking brain computer interface. arXiv preprint arXiv:2311.12592.

Presentations

Invited Talks

Spring 2020. *The applications of flexible electronics in BCI studies* . Invited talk: Seminar at Center for Flexible Electronics Technology, Tsinghua University

Spring 2022. *The final escape: from metaverse to BCIs*. Invited talk: Seminar at School of Journalism and Communication, Tsinghua University

Summer 2023. *Ear BCIs*. Invited talk: The BCI Contest, World Robot Conference

Teaching Experience

Spring 2018 **Information and Life**, Teaching Assistant
Spring 2017 **Information and Life**, Teaching Assistant
Fall 2016 **Information and Life**, Teaching Assistant
Fall 2015 **Brain-computer interface and neural signal processing**, Teaching Assistant

Mentoring undergraduates

2022-2023 **Yining Miao**, mentor, Tsinghua University
2022-2023 **Changxing Huang**, mentor, Tsinghua University

Relevant Skills

Coding **Python, Matlab**, MNE, eelbrain, sklearn, Psychotoolbox, PsychoPy, seaborn,
Lab skills **EEG acquisition**, Curry
Languages **English,Chinese**,

Referees

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Prof. Yijun Wang
Institute of Semiconductors, Chinese Academy of Sciences
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