Huili Sun

PhD Candidate · Engineering

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Education

Yale University *New Haven, CT*

PhD Biomedical Engineering *Jan 2021 - Expected. Dec 2025*

- Advisor: Dr. Dustin Scheinost

University of Electronic Science and Technology of China *Chengdu, China*

BS Electronic Information Engineering *Sep 2016 - June 2020*

- Advisor: Dr. Shi Gu

Experience

Research

MINDS Lab *Yale University*

Graduate Researcher *01/2021-Now*

- Worked on fetal and neonatal brain dMRI, fMRI and EEG data and constructed **machine learning** models to understand the develop pattern with brain activity **time series** and brain networks
- Employed network control theory to monitor the development of brain structure and function from fetus to early infancy; managed to achieve **age prediction error <2 weeks**
- Developed edge-centric network control framework and successfully **predicted autism risks** (r>0.3) at 18 months for term and preterm infants using brain MRI data at birth
- Analyzed brain activity time series with **LSTM and transformer** to mark pivot brain states and state transitions

The First 1000 Days (1kD) *Wellcome Leap*

Graduate Researcher *05/2022-Now*

- Collaborated with labs from US, Brazil, South Africa and Singapore to collect, (**harmonize**) and analyse longitudinal infant brain EEG data
- Used graph neural network (**GNN**) and connectome-based predictive modeling to outline the group-averaged brain development trajectories for analysis of individual deviations
- Unraveled the impact of maternal mental health on infant brain maturation and future cognitive development with the **normative brain aging** model across continents

Brain and Intelligence Lab *Glasgow College, UESTC*

Research Assistant *03/2018-05/2020*

- Modeled the dynamic brain state transitions with the reconfiguration of brain network community structure and revealed its association with human intelligence

Teaching

Introduction to Biomedical Computation *Yale University*

Teaching Fellow *Spring 2022/ 2024*

- Led the introductory discussion of biomedical computation topics using Python/MATLAB for 40 students from different majors weekly.
- Assisted course instructors in syllabus designing, exam preparation, and final evaluations.

Skills

Coding	**Python, MATALB, R, bash**,
Packages	**PyTorch, Numpy, Pandas; EEGLAB; DSI-Studio, Freesurfer**,
Keywords	**Neurodevelopment, Computational neuroscience, Network Control**,

Publications

Published

Matthew Rosenblatt, Link Tejavibulya, **Huili Sun**, Chris C. Camp, Milana Khaitova, Brendan D. Adkinson, Rongtao Jiang, Margaret L. Westwater, Stephanie Noble, Dustin Scheinost. Power and reproducibility in the external validation of brain-phenotype predictions. *Nature Human Behavior*. 2024

Huili Sun, Javid Dadashkarimi, Matthew Rosenblatt, Raimundo X. Rodriguez, Dustin Scheinost. Edge-centric controllability of the human brain structural network. *Imaging Neuroscience*. 2024

Huili Sun, Rongtao Jiang, Wei Dai, Alexander J. Dufford, Stephanie Noble, Shi Gu, Marisa Spann, Dustin Scheinost. Network controllability of structural connectomes in the neonatal brain. *Nature Communications*. 2023

Jean Ye, **Huili Sun**, Siyuan Gao, Javid Dadashkarimi, Matthew Rosenblatt, Raimundo X. Rodriguez, Saloni Mehta, Rongtao Jiang, Stephanie Noble, Margaret L. Westwater, Dustin Scheinost. Altered Brain Dynamics Across Bipolar Disorder and Schizophrenia During Rest and Task-switching Revealed by Overlapping Brain States. *Biological Psychiatry*. 2023

Javid Dadashkarimi, Amin Karbasi, Qinghao Liang, Matthew Rosenblatt, Stephanie Noble, Maya Foster, Raimundo Rodriguez, Brendan Adkinson, Jean Ye, **Huili Sun**, Chris Camp, Michael Farruggia, Link Tejavibulya, Wei Dai, Rongtao Jiang, Angeliki Pollatou, Dustin Scheinost. Cross Atlas Remapping via Optimal Transport(CAROT): Creating connectomes for different atlases when raw data is not available. *Medical Image Analysis*. 2023

Rongtao Jiang, Stephanie Noble, Jing Sui, Kwangsun Yoo, Matthew Rosenblatt, Corey Horien, Shile Qi, Qinghao Liang, **Huili Sun**, Vince D Calhoun, Dustin Scheinost. Associations of physical frailty with health outcomes and brain structure in 483 033 middle-aged and older adults: a population-based study from the UK Biobank. *The Lancet Digital Health*. 2023

Dustin Scheinost, Angeliki Pollatou, Alexander J. Dufford, Rongtao Jiang, Michael C. Farruggia, Matthew Rosenblatt, Hannah Peterson, Raimundo X. Rodriguez, Javid Dadashkarimi, Qinghao Liang, Wei Dai, Maya L. Foster, Chris C. Camp, Link Tejavibulya, Brendan D. Adkinson, **Huili Sun**, Jean Ye, Qi Cheng, Marisa N. Spann, Max Rolison, Stephanie Noble, Margaret L. Westwater. Machine Learning and Prediction in Fetal, Infant, and Toddler Neuroimaging: A Review and Primer. *Biological Psychiatry*. 2022

In Preprint

Huili Sun, Saloni Mehta, Milana Khaitova, Bin Cheng, Xuejun Hao, Marisa Spann, Dustin Scheinost. Brain age prediction and deviations from normative trajectories in the neonatal connectome. Under Review *Nature Communications*

Awards, Fellowships, & Grants

2024	**ISDP Travel Award**, International Society for Developmental Psychobiology	*$325*
2024	**Yale Nomination for Google PhD Fellowship**, Yale Graduate School of Arts and Sciences	
2023	**FIT'NG Young Investigator Award**, Fetal, Infant, and Toddler Neuroimaging Group	*$175*
2023	**Flux Student Travel Award**, Flux Program	*$500*
2023	**Yale WFF Seed Grant**, Yale Women Faculty Forum	*$800*
2022	**ISDP Travel Award**, International Society for Developmental Psychobiology	*$325*
2020	**Outstanding Graduates**, Department of Education, Sichuan, China	
2018	**National Scholarship**, Ministry of Education, China	*CN¥10,000*
2017,2018	**Excellent Student Scholarship**, UESTC	*CN¥2,000*
2017,2018	**First-Class Student Scholarship**, Glasgow College, UESTC	*CN¥30,000*

Presentations

Invited Talks

Feb 2024. *Altered infant brain ages by maternal effects and prediction of later cognition*. Yale Child Study Center 2024, New Haven, CT, USA.

Nov 2023. *Developmental of Network Controllability in the Neonatal Brain*. Yale BME Seminar 2023, New Haven, CT, USA.

Oct 2023. *Network controllability of structural connectomes in the neonatal brain*. Glasgow College Alumni Talks 2023, UESTC, Chengdu, China.

Sep 2023. *Maternal postnatal depression is associated with older brain age in infants and worse toddler cognitive performance*. FIT'NG Conference 2023, Santa Rosa, CA, USA.

Selected Posters

Sep 2023. *Edge-centric control theory applied to neonatal structural connectivity in term and preterm neonates predicts cognitive and social outcomes at 18-months*. Flux Conference 2023, Santa Rosa, CA, USA.

Nov 2022. *Controllability of the infant structural brain network*. ISDP 2022, San Diego, CA, USA.

Jun 2020. *Fundamental Multilayer Community Structure Detection in Resting-state Brain*. OHBM 2020, Virtual.

Outreach & Professional Development

Service and Outreach

2018 **Licensee**, TEDxUESTC *UESTC*

Professional Mentorships

Rachel A. Ababio, (Posbac in Columbia, 2024): advised on research projects

Kayla M. Delapenha,(Posbac in Columbia, 2024): advised on research projects

Danielle Gruber, (Undergrad in Yale, 2023-2024): advised on graduate school application

Joshua Ceballos, (Undergrad in UCLA, 2023): advised on graduate school application