Huili Sun

PhD Candidate · Biomedical Engineering

Yale University, 300 Cedar St, New Haven, CT 06510

huili.sun@yale.edu | @huili_sun

Education

Yale University *New Haven, CT*

PhD Biomedical Engineering *Jan 2021 - present*

- 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*

- Advisor: Dr. Dustin Scheinost
- Deniosed and pre-processed infant brain **dMRI, fMRI and EEG** raw data and constructed brain activity time series and brain networks
- Employed network control theory to comprehend the development of brain structure and function from fetus to early infancy; managed to predict infant ages with errors smaller than **2 weeks** from brain MRI
- Developed edge-centric network control framework and successfully predicted (Pearson's r>0.3) the **autism risks** at 18 months for term and preterm infants using brain MRI data after birth
- 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**) with connectome-based predictive modeling to outline the group-averaged brain development trajectories for further analysis of individual deviations
- Unraveled the impact of maternal mental health on infant brain maturation and future cognitive development with a normative **brain aging** model
- Implement network control theory to **neurofeedback** study to reveal the role of amygdala-frontal pathways on anxiety

Brain and Intelligence Lab *Glasgow College, UESTC*

Research Assistant *03/2018-05/2020*

- Advisor: Dr. Shi Gu
- Modeled the dynamic brain state transitions with the reconfiguration of brain network community structure and revealed its association with individual 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.

Publications

Published

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 Revision

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

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*

Awards, Fellowships, & Grants

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

Joshua Ceballos, (Undergrad in UCLA, FIT'NG Mentor-Mentee Matching, 2023): advised on graduate school application
Danielle Gruber, (Undergrad in Yale, SWE Mentorship Pairing, 2023-2024): advised on graduate school application