Junhong LIN

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Education

Massachusetts Institute of Technology, Boston, United States 09/2022 – 06/2026 (expected)

- ***Ph.D. Student*** in **Electrical Engineering & Computer Science**
- **Research Area:** Graph Neural Network, Graph Learning, Parallel Algorithm, Efficient Computing
- **Advisor:** Julian Shun

Massachusetts Institute of Technology, Boston, United States 09/2019 – 09/2022

- ***Master of Science*** in **Electrical Engineering & Computer Science**
- **Overall GPA:** 4.9/5.0
- **Research Area:** Optical Imaging, Optical Coherence Tomography, Deep Learning, Image Segmentation
- **Advisor:** James G. Fujimoto

Huazhong University of Science and Technology, Hubei, China 09/2015 – 07/2019

- ***Bachelor of Engineering*** in **Electronic and Information Engineering**
- **Overall GPA:** 3.81/4.0; **Major GPA:** 3.88/4.0;
- **Ranking:** 4/30 (In an experimental class selected only top 30 students from the entire grade of 242 students)

Stanford University, Palo Alto, United States 06/2018 – 09/2018

- ***Visiting Research Intern*** in Jeremy Dahl Ultrasound Lab, Stanford Ultrasound Research Group
- **Advisor:** Jeremy Dahl

Publication

- **Lin, J.**, Zhu, Y., Guo, X., Mitchell, S., Altman, E., Shun, J. (2024). *FraudGT: A Simple, Effective, and Efficient Graph Transformer for Financial Fraud Detection.* International Conference on AI in Finance, Under Review.
- **Lin, J.**, Guo, X., Zhang, S., Zhou, D., Zhu, Y., Shun, J. (2024). *When Heterophily Meets Heterogeneity: New Graph Benchmarks and Effective Methods.* arXiv preprint arXiv:2407.10916.
- Su, J., Jiang, C., Jin, X., Qiao, Y., Xiao, T., Ma, H., Wei, R., Jing, Z., Xu, J., **Lin, J.** (2024). *Large language models for forecasting and anomaly detection: A systematic literature review.* arXiv preprint arXiv:2402.10350.
- **Lin, J.** (2022). *Deep-learning Enabled Accurate Bruch's Membrane Segmentation in Ultrahigh-Resolution Spectral Domain and Ultrahigh-Speed Swept Source Optical Coherence Tomography*. MS Thesis, MIT.
- Chen, S., Potsaid, B., **Lin, J.**, Hwang, Y., …, Fujimoto, J.G. (2021). *High-Speed, Long-Range Swept-Source Optical Coherence Tomography for the Anterior Segment of the Eye*. IOVS, 62(11), pp.75-75.
- Chen, S., Potsaid, B., Li, Y., **Lin, J.**, …, Fujimoto, J.G. (2022). *High speed, long range, deep penetration swept source OCT for structural and angiographic imaging of the anterior eye*. Scientific reports, 12(1), pp.1-14.
- Herickhoff, C., **Lin, J.** and Dahl, J. (2019). Low-cost sensor-enabled freehand 3D ultrasound. In 2019 IEEE International Ultrasonics Symposium (IUS) (pp. 498-501). IEEE.
- **Lin, J.**, Wang, B., Yang, G. and Zhou, M. (2018). *Indoor localization based on weighted surfacing from crowdsourced samples.* Sensors, 18(9), p.2990.

Research

Graph Neural Network Enabled Financial Fraud Detection 06/2023 – 08/2023

Machine Learning Research Intern **in Watson AI Lab, IBM Research, Collaboration with Wells Fargo Bank**

- Delved into financial fraud detection on **large-scale** heterogeneous graph using graph neural network and **graph transformer** under the supervision of Dr. Yada Zhu and Dr. Xiaojie Guo
- Designed **the first** real-world heterophilic and heterogeneous graph benchmark ($\mathcal{H}^2$GB)
- Design **the first** unified, **scalable** graph transformer framework (UnifiedGT) on **large-scale graph mining**.
- Conducted comprehensive experiments using **PyTorch** and **PyTorch Geometric Library (PyG)**.
- Achieved state-of-the-art on 9 large-scale datasets proposed in $\mathcal{H}^2$GB and enhanced the node classification accuracy by **5-10%**, including RCCD (**14 million nodes, 160 million edges**).
- Achieved state-of-the-art on 6 Anti-Money Laundering (AML) datasets (**180 million edges**) and enhanced the link classification F1 score by **8-18%** while delivering **2.4× greater throughput** and reduced latency.

Near-Work-Efficient Practical Parallel Graph Planarity Testing 09/2022 –

Prof. Julian Shun, Parallel Algorithms and Programming Group, MIT CSAIL

Research Assistant

- Designing parallel algorithm for planarity testing problem, which has no practical parallel algorithm available.
- Literature reviewed the current state-of-art sequential planarity testing algorithm, such as Hopcroft-Tarjan (cycle based), Boyer-Myrvold, Lempel-Even-Cederbaum (PQ-tree), Shih-Hsu (PC-tree), etc.
- Generated planar / random graph data using LEDA and Open Graph Drawing Framework in **C++**.
- Developing and benchmarking a parallel algorithm based on **divide-and-conquer** technique in **C++**.

Next-generation Optical Coherence Tomography Imaging and Analysis 09/2019 – 08/2022

Prof. James G. Fujimoto, Biomedical Optical Imaging and Biophotonics Group, MIT

Research Assistant

- Worked on the next-generation ophthalmic ultrahigh-speed optical coherence tomography (OCT) imaging system development.
- Investigating early outer retina structural changes in early/intermediate age-related macular degeneration (AMD) taking advantage of the clinical deployed ultrahigh-resolution OCT.
- Developed **large-scale** parallel OCT image processing pipeline for over **100TB clinical data** using Python.
- Developed the state-of-art deep-learning-based (U-Net) segmentation pipeline in **Python** and **PyTorch.**
- Performed accurate segmentation on ultra-high resolution spectral-domain OCT and ultra-high speed swept-source OCT for the application of early AMD and DR pathogenesis investigation.
- Performed linear mixed-effect **statistical analysis** using **Statsmodels** library and calculated p-value.

Indoor Localization based on Weighted Surfacing from Crowdsourced Samples 09/2018

Researcher

- Proposed a novel cross-domain cluster intersection algorithm under the supervision of prof. Bang Wang.
- Several algorithms to process wireless signal are used: validated crowdsourced sample selection, radio propagation surfaces construction, entropy-like measure to weight constructed surfaces.
- Conducted experiments and achieve higher accuracy of localization to validate our algorithm.

Next-generation Handheld 3D Ultrasound Imaging 06/2018 – 08/2018

Jeremy Dahl Laboratory, Stanford University Canary Center

Summer Research Intern

- Delved into ultrasonic wave and transducer by referring to specialized documents and thesis with Dr. Carl Herickhoff under the supervision of Prof. Jeremy Dahl.
- Detected the deficiency in the design of circuit board and revised the original design.
- Obtained real-time information retrieved from probe through inertial sensor (IMU).
- Immersed in the algorithm design and three-dimensional reconstruction of ultrasonic images.
- Optimized 3D ultrasound image reconstruction, and built 3D display platform based on **C++** and **OpenGL**.

Highly Precised Indoor Positioning System based on Reliable Sample Selection and Surface Fitting

Algorithm Designer, National Undergraduate Innovation Training Program 03/2018 – 03/2019

- Applied surface fitting to building continuous radio map according to crowdsourced signal strength
- Designed and implemented algorithm through Matlab to achieve highly precised indoor localization
- Collected data, conducted field test and composed research report

Entrepreneurship

Entrepreneurial Team of Mental Pressure Manager ***Hardware Engineer*** 06/2017 – 06/2018

- Complete the design of "Mental Pressure Manager", a biotechnology-based medical hardware device targeted to detect the psychological pressure by cortisol through the strip test
- Incorporated the embedded system, Internet of Things and bioinformatics technique into the design
- Collaborate with teammates with biomedical background to develop hardware prototype and finish the field test
- Started up the Hua Ce Kang Nuo (Wuhan) Biotechnology Inc. for this product

Internship

***Research Intern* | AI Lab, Shanghai ByteDance Technology Co., Ltd** 05 – 08/2019

- Delved into computer vision, video understanding, attention and memory architecture by referring to specialized thesis

under the supervision of Dr. Changhu Wang

- Proposed a novel memory-guided video recognition algorithm on the Kinetics-400 dataset.
- Conducted experiments and achieve higher accuracy to validate our algorithm

Xilinx University Program, Xilinx Inc., Shanghai 10/2018 – 05/2019

Application Engineer

- Grasped the gist of Xilinx Python Productivity for ZYNQ (PYNQ-Z2) FPGA platform
- Developed sensor fusion algorithm and designed other embedded software in the ARM Cortex-A9 core of PYNQ-Z2 under the supervision of Mr. Joshua Lu.
- Adopted HW/SW resource to upgrade the PYNQ-Z2 to a general robot development platform

Wuhan Jiantong Information Technology Co., Ltd 07 – 10/2017

FPGA Logic Design Engineer

- Designed parallel algorithm based on FPGA technique on Altera® A10 platform
- Achieved successful simulation result on Modelsim and implementation on FPGA
- Realized significant increase of DNA sequencing speed by 60x improvement

Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences 08/2016

Hardware Engineer

- Dug into basis of software defined radio and explored the operating principle of wireless transceiver
- Completed wireless chip configuration and succeeded in implementing new communication protocol under supervision of Dr. Shimin Gong

Texas Instruments Semiconductor Technologies (Shanghai) Co., Ltd 07/2016

Hardware Engineer

- Probed into microcontroller system during the production practice
- Familiarized with micro-controllers of different models and involved in programming practice

Patent

- Portable Psychological Pressure Detector, CN 108294766 A 07/20/2018
- Indoor Positioning Method based on Weighted Surface Fitting from Crowdsourced Sample, CN 109059919 B
- Location Map Building Method based on Virtual Source Estimation and Trajectory Correction, CN 108919177 B

Honor

- 2024 J. Francis Reintjes Excellence in 6A Industrial Practice Award 5/2024
- **Outstanding Undergraduates in Term of Academic Performance in 2017 (top 1%)** 12/2017
- **National 1st Prize & 1st Award for Selected Topic** in “Renesas Cup" National Undergraduate Electronic Design Contest 12/2017
- **TI Cup Winner & 1st Award** in "TI Cup" Hubei Undergraduate Electronic Design Contest 12/2017
- **Meritorious Winner** in Mathematical Contest in Modeling, COMAP 04/2017
- **The 2nd Award** in "TI Cup" Hubei Undergraduate Electronic Design Contest 12/2016
- **National Endeavor Scholarship** 09/2015 & 09/2016
- **Learning Merit Scholarship** 09/2016

Certificate

- National Computer Test (Band Three: Embedded system development technology) 03/2017
- National Computer Test (Band Two: C language programming) 03/2016

Activity

Electrical and Electronic Innovation Center ***Leader*** 12/2015 - 12/2017

- Handled the outward contact business and settled problems in application, proceeding and work submission
- Managed the task distribution and coordination during hardware production and algorithm development

Skill

- Skilled in Microsoft Office, C, C++, Python, PyTorch, Java and Pascal;
- Proficient in Matlab, LabVIEW, PSpice, Multisim, Altium Designer, Autodesk, LaTex