

# Jiachen Xu

jiachen@cmu.edu  
Pittsburgh, PA

## Research Topics

---

- Machine learning for sensor interfacing, analog IC control, and hardware security
- ASIC and FPGA design for deep neural network acceleration
- Energy-efficient embedded systems design for IoT and biomedical applications

## Education

---

**Ph.D. in Electrical and Computer Engineering** **May 2020 – Dec 2024**

Carnegie Mellon University, Pittsburgh, PA

Advisor: Prof. Vanessa Chen

**B.S. in Computer Engineering** **Aug 2016 – May 2020**

Purdue University, West Lafayette, IN

Advisors: Prof. Jan Allebach, Prof. Pedro Irazoqui, and Prof. Ramses V. Martinez

Senior design project: RoboTar: a robot guitar player

## Honors and Awards

---

- Analog Devices Outstanding Student Designer Award, 2022
- Carnegie Institute of Technology Dean's Fellowship, Carnegie Mellon University, 2020
- Eli Shay Scholarship, Purdue University, 2019
- Dean's List & Semester Honors, College of Engineering, Purdue University, 2016-2020

## Experience

---

**Research Assistant, Energy-Efficient Circuits and Systems Lab, CMU** **May 2020 – Present**

- ASIC design, tape-out, and testing of a deep reinforcement learning chip with fixed-point inference and training for reconfigurable RF power amplifier control in cryogenic environments.
- Machine learning algorithms and hardware acceleration for IC and sensory applications (e.g., RF fingerprinting, analog hardware security, HDD data symbol detection, and neural spiking sorting) with publications.

**Research Assistant, Electronic Imaging Systems Lab, Purdue Univ & HP Inc.** **Dec 2019 – June 2020**

- HP printer imaging ground truth labeling software development in Python and MATLAB for printing quality inspection with machine learning.

**Teaching Assistant (Purdue ECE 362: Microprocessor Systems and Interfacing)** **Jan 2019 – May 2020**

- Circuits & embedded systems course teaching assistant and project mentor for three semesters.

**Electrical Engineer, Center for Implantable Devices, Purdue University** **Oct 2018 – Aug 2019**

- Firmware (Nordic nRF52) and Software (Python with GUI) development for wireless biomedical implantable devices (Bionode) for neural signal recording and stimulation research.
- Next-generation Bionode prototyping with Cypress PSoC5 and tiny PCB fabrication tool development.

**Research Assistant, Flexilab, Purdue University** **Jan 2018 – May 2018**

- Bionics robotic tentacles design with three-dimensional mobility based on flexible elastomers.

**Electrical Engineer, Internship, Samjin Ltd., Qingdao, China** **May 2017 – July 2017**

- Testing automation software development for Samsung Artik modules and smart controllers.

## Publications

---

- **J. Xu**, Y. Shen, J. Deng, E. Chen, and V. Chen, "A Reinforcement-Learning-Assisted 14000-Timestamped-EM-Signature Generator Enabled by A Reconfigurable PA with Closed-Loop Control in CMOS 65nm", IEEE Transactions on Circuits and Systems (submitted).
- **J. Xu**, Y. Shen, J. Yi, E. Chen, and V. Chen, "Deep Reinforcement Learning on FPGA for Self-Healing Cryogenic Power Amplifier Control," IEEE Open Journal of Circuits and Systems, 2023.
- J. Kan, Y. Shen, **J. Xu**, E. Chen, J. Zhu, and V. Chen, "RF Analog Hardware Trojan Detection through Electromagnetic Side-Channel," IEEE Open Journal of Circuits and Systems, vol. 3, pp. 237-251, Sep. 2022.
- V. Chen, **J. Xu**, Y. Shen, and E. Chen, "RF Fingerprint Classification With Combinatorial-Randomness-Based Power Amplifiers and Convolutional Neural Networks," IEEE Solid-State Circuits Magazine, 2022.
- J. Yi, **J. Xu**, E. Chen, M. Chamanzar, and V. Chen, "Multichannel Many-Class Real-Time Neural Spike Sorting with Convolutional Neural Networks," IEEE Open Journal of Circuits and Systems, vol. 3, pp. 168-179, Sep. 2022.
- **J. Xu**, Y. Shen, J. Yi, E. Chen, and V. Chen, "Combinatorial-Randomness-Based Power Amplifier Datasets with RF Fingerprint Classification," in tinyML Research Symposium, Burlingame, CA, March 2022.
- Y. Shen, **J. Xu**, J. Yi, E. Chen and V. Chen, "Class-E Power Amplifiers Incorporating Fingerprint Augmentation With Combinatorial Security Primitives for Machine-Learning-Based Authentication in 65 nm CMOS," in IEEE Transactions on Circuits and Systems I: Regular Papers, 2022.
- **J. Xu**, Y. Shen, E. Chen and V. Chen, "Bayesian Neural Networks for Identification and Classification of Radio Frequency Transmitters Using Power Amplifiers' Nonlinearity Signatures," in IEEE Open Journal of Circuits and Systems, vol. 2, pp. 457-471, 2021.
- **J. Xu**, E. Chen and V. Chen, "Energy-Efficient Data Symbol Detection via Boosted Learning for Multi-Actuator Data Storage Systems," 2021 IEEE International Symposium on Circuits and Systems (ISCAS), 2021, pp. 1-5.
- E. Chen, **J. Xu**, J. -G. Zhu and V. Chen, "Wireless Bayesian Neural Networks with Self-Assembly DNA Memory and Spin-Torque Oscillators," 2020 IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS), 2020, pp. 269-272.

## Presentations

---

- TinyML Research Symposium 2022, "Combinatorial-Randomness-Based Power Amplifier Datasets with RF Fingerprint Classification", Mar. 2022.
- ISCAS21, "Energy-Efficient Data Symbol Detection Via Boosted Learning for Multi-Actuator Data Storage Systems", May. 2021.
- MWSCAS20, "Wireless Bayesian Neural Networks with Self-Assembly DNA Memory and Spin-Torque Oscillators", Aug. 2020.
- Purdue Spark Challenge, "RoboTar: a robot guitar player", Dec. 2019.
- Purdue Spark Challenge, "LED Display on Bike Wheel", Dec. 2018.

## University Courses

---

### Carnegie Mellon University

Reconfigurable Logic

Neural Signal Processing

Modern Computer Architecture and Design

### Purdue University

Computer Design and Prototyping

ASIC Design Lab

Microprocessor Systems & Interfacing

Signals and Systems

Probabilistic Methods

Advanced Digital Integrated Circuit Design

Hardware Arithmetic for Machine Learning

Deep Learning

Software for Embedded Systems

Data Structures

Software Engineering Tools

Advanced C Programming

Object-Oriented Programming with C++ and Java