Center for Integrated Circuits and Systems
Microsystems Technology Laboratories
Massachusetts Institute of Technology
May 1, 2024

Center for Integrated Circuits and Systems

Ruonan Han, CICS Director

Department of Electrical Engineering and Computer Science

Room 39-527A

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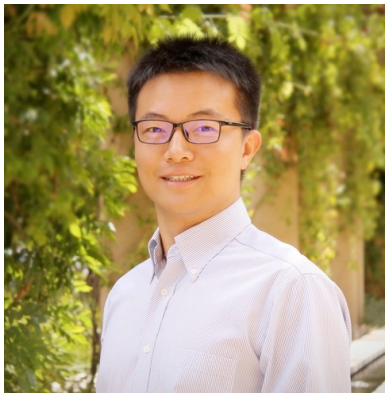
CICS Faculty

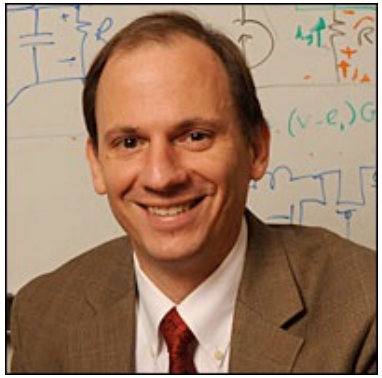
Ruonan Han, Director
RF-THz, Quantum, Security

Anantha Chandrakasan
Low Power, AI, Security, Biomedical

Hae-Seung (Harry) Lee
Analog, Mixed-Signal, AI, Biomedical



Song Han
Tiny ML



David Perreault
Power Electronics

Negar Reiskarimian
RF, Analog

Charlie Sodini
Biomedical

Vivienne Sze
Energy Efficient AI, Robotics

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Agenda

Morning

9:00 AM	Prof. Ruonan Han	Welcoming Remarks
9:10 AM	Prof. Song Han	Research Overview
9:20 AM	Guangxuan Xiao	StreamingLLM: Efficient Streaming Language Models with Attention Sinks
9:45 AM	Prof. Vivienne	Research Overview
9:55 AM	Fisher Xue	Tailors: Accelerating Sparse Tensor Algebra by Overlooking Buffer Capacity
10:20 AM		*Coffee Break and Demo*
10:35 AM	Prof. Jelena Notaros (Guest Speaker from MIT)	Silicon Photonics for LiDAR, Augmented Reality, Biophotonics, Quantum Engineering, and Beyond
11:05 AM	Prof. Negar Reiskarimian	Research Overview
11:15 AM	Shahab Mohin	A Blocker-Tolerant mm-Wave MIMO Receiver with Spatial Notch Filtering Using Non-Reciprocal Phase-Shifters
11:40 AM	Jamie Koerner (Co-Advised by Thomas Heldt, Vivienne Sze and Charlie Sodini)	Recording Eye Movements using Mobile Devices for Individualized Assessment of Neurocognitive State
12:05 PM		*Lunch*

Agenda

Afternoon

1:10 PM	Prof. Anantha Chandrakasan	Research Overview
1:20 PM	Maitreyi Ashok	A Secure Digital In-Memory Compute Macro with Protections Against Side-Channel and Bus Probing Attacks
1:45 PM	Deniz Umut Yildirim	A 0.7cm^2 3.5GHz, -31dBm Sensitivity Batteryless 5G Energy Harvester Backscattering Chip for Asset Identification in IoT Enabled Warehouses
2:10 PM		Coffee Break and Demo
2:40 PM	Prof. David Perreault	Research Overview
2:50 PM	Adam Pressel & Sarah Coston	Modulated Inverter and Frequency Multiplier Techniques for Efficient High-Frequency Power Generation
3:20 PM	Prof. Harry Lee	Research Overview
3:30 PM	Mohamed Elsheikh	TIA-Less, Zero-Crossing Based ADC System for Analog Compute-in-Memory
3:55 PM	Prof. Ruonan Han	Research Overview
4:05 PM	Pradyot Yadav (Co-Advised by Tomas Palacios & Ruonan Han)	Gallium Nitride / Silicon CMOS 3D Integrated Circuits for Next-Gen W-G Band Wireless Systems
4:30 PM		*Adjourn*

CICS Membership Benefits

- **Access to all research conducted by participating faculty**
  - **Non-CICS faculty (in quantum, photonics, nano devices, etc.) are invited to the annual review to present their research and to foster their collaboration with the CICS members**
- **Bi-annual reviews in early May and early November**
  - **Research in all stages from concepts to completion, often unpublished, is presented**
- **Attendees get familiarized with CICS faculty & students as well as network with other industrial participants**
- **Close technical interaction and possibility of future collaborative research and/or research contracts**

CICS Membership Benefits (III)

- CICS assists organizing meetings with graduate students on or around research reviews upon request
- Invitation to MTL/CICS reception at ISSCC
- CICS assists organizing meetings in Bay Area with graduate students traveling to the West Coast at ISSCC each year upon request

CICS Industry Members

- **Membership fee: $50k/year**
  - MTL full member can choose to use $50k/year out of the $150k/year MTL membership fee to join CICS
- **This community needs your support**

CICS Student Awards

- **Mohamed Elsheikh:** 2024 ADI Outstanding Student Designer Award
- **Hanrui Wang**
  - Rising Star in Solid-State Circuits at WiC ISSCC, 2024
  - Rising Star in Machine Learning and Systems, awarded by MLCommons, 2023
  - Best Demo Award, DAC 2023
  - Best Poster Award, NSF Athena AI Institute Annual Meeting, 2023
  - First Place, ACM/IEEE Quantum Computing for Drug Discovery Challenge, 2023
- **Zhijian Liu**
  - Rising Star in Machine Learning and Systems, awarded by MLCommons, 2023
  - Rising Star in Data Science, awarded by UChicago and UCSD, 2023
- **Soroush Araei**
  - 2024 SSCS predoctoral achievement award
  - 2023 ISSCC Analog Devices outstanding student designer award
- **Shahab Mohin**
  - ISSCC 2024 Student Travel Grant Award
  - RFIC 2024 Best Student Paper Award Finalist
- **Melania St. Cyr:** Draper Scholar Fellowship
- **Maitri Ashok:** Rising Star 2024 Candidate (ISSCC)

CICS Student Awards

- **Eunseok Lee**
  - EECS Mathworks Fellowship
  - 2023 IEEE CICC Student Paper Award Finalist
- **Fisher Xue:** NSERC Postgraduate Scholarship – Doctoral (PGS D)
- **Peter Li:** EECS Mathworks Fellowship
- **Tanner Andrulis:** ISPASS Best Paper Finalist
- **Xibi Chen**
  - 2024 IEEE Microwave Theory & Technique Society Graduate Fellowship
  - 2024 IEEE Microwave Theory & Technique Society Tom Brazil Graduate Fellowship
- **Pradyot Yadav**
  - 2023 SRC Jump 2.0 CHIMES Annual Review Best Poster Award
  - 2023 IEEE MTT-S Graduate Fellowship
  - 2023 National Defense and Science Graduate (NDSEG) Fellowship

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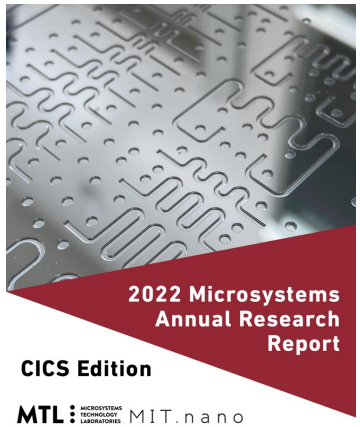


Find Out More: https://cics.mit.edu
- Student resumes
- Annual research reports
- Presentation slides

CICS Faculty for MIT Circuit Courses

6.2000 Electrical Circuits: Modeling and Design of Physical Systems (Perreault)

6.2040 Analog Electronics Laboratory (Mike Coln)

6.2080 Semiconductor Electronic Circuits (Han, Reiskarimian, Berggren)

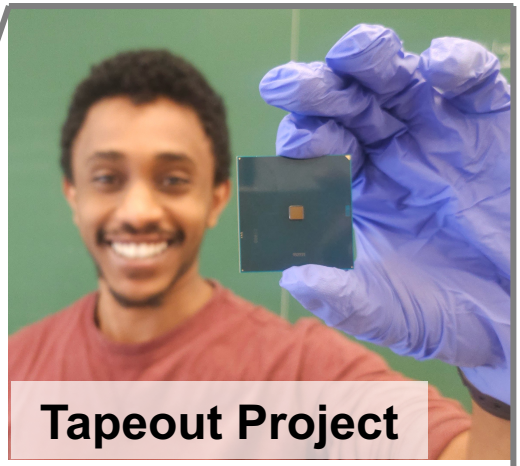
6.2090 Solid-State Circuits (Reiskarimian, Lee)

6.6010 Analysis and Design of Digital Integrated Circuits (Sze)

6.6000 CMOS Analog and Mixed-Signal Circuit Design (Lee)

6.6020 High-Frequency Integrated Circuits (Han)

6.6220 Power Electronics (Perreault)



Tapeout Project

Enrollment from ~15 (2023) to ~60 (2024)

Enrollment from ~25 (2022) to ~50 (2024)

Your participation and support are welcome! (Tapeout Cost, TAs, Technical Guidance, Seminar Talks, Internships…)

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Microsystem Technology Labs (MTL)

- **A research home at MIT for semiconductor and micro/nano technologies**
  - 66 core faculty members (circuit, device, material, photonics, quantum, …)
  - 15 company members (including ADI, IBM and TI)
  - Community events: MARC (Microsystems Annual Research Conferences), MTL seminar series, center reviews (CICS annual review, AI Hardware Program Symposium…)
  - MTL 40th Anniversary Celebration (Nov. 19 & 20, co-held with MIT ILP Research and Development Conference)
- **MTL is looking for ways to strengthen collaborations with CICS members!**

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Thank You and Welcome!