

Joel Gonzalez – Curriculum Vitae

Email: bgonzale@andrew.cmu.edu – Personal Website: b-joel-gonzalez.github.io

Career Objectives

Interested in electronics engineering, from systems-level design to device fabrication. Pursuing a doctorate in electrical and computer engineering, with a long-term goal of teaching and research at a university. Love of learning and helping guide others to their fullest potential.

Education

Carnegie Mellon University – College of Engineering (CIT)

- ❖ Ph.D. Student in *Electrical and Computer Engineering* – started August '21
 - Research Advisor: Dr. L. Richard Carley
 - Research Interests: integrated systems design, device fabrication, rapid prototyping of computer systems, RF engineering, metrology and instrumentation
 - ❖ M.S. in *Electrical and Computer Engineering*, concentration in *Integrated Systems* – May '24
- #### **University of Pennsylvania – School of Engineering and Applied Science (SEAS)**
- ❖ M.S.E. in *Robotics* – May '21
 - ❖ B.S.E. in *Computer Science*, minor in *Mathematics* – December '19

Teaching Experience

Semesters as lead TA denoted with * and semesters online denoted with ^.

- ❖ CMU – 18-429/729: *Board-Level RF Systems for IoT* – Fall 2022*, Fall 2023*, Fall 2024*
 - Experimental laboratory course exploring RF engineering concepts, including transmission lines, antenna design, SDR, MIMO, and beamforming
- ❖ CMU – 18-540/745: *Rapid Prototyping of Computer Systems* – Spring 2023
 - Capstone project course exploring the development of an F1TENTH autonomous vehicle testing suite, partnered with Honda's 99P Labs
- ❖ UPenn – ESE450/451: *ESE Senior Design* – Fall 2019, Spring 2020^, Fall 2020^*, Spring 2021^*
 - Two-part senior capstone project series for students in ESE and related majors
- ❖ UPenn – ESE350/519: *Embedded Systems Lab* – Fall 2020^, Spring 2021^*
 - Advanced laboratory course covering the foundations and design of embedded systems platforms, across both hardware and software levels
- ❖ UPenn – ESE190/M&TSI: *Introduction to Hardware/Software Lab* – Spring 2019, Summer 2021^*
 - Introductory laboratory course exploring the Arduino platform for beginners
- ❖ UPenn – CIS371/501: *Computer Architecture* – Fall 2019, Spring 2020^
 - Advanced systems course exploring design and optimization techniques in modern computer architecture, with labs in Verilog
- ❖ UPenn – CIS380/548/CIT595: *Operating Systems* – Fall 2019, Spring 2020^*, Summer 2020^*
 - Advanced systems course exploring design and implementation of operating systems, primarily Unix-based, in the C programming language
- ❖ UPenn – CIS240/CIT593: *Introduction to Computer Systems* – Fall 2018, Spring 2019, Summer 2019^
 - Introductory systems course covering topics from CMOS logic gates to architecture design to operating systems programming

Research Experience

- ❖ *Novel Devices Research*
 - Started in Spring 2024
 - Exploring nanoelectronics design and fabrication including:
 - 2D materials for bit-patterned media via scanning tunneling microscopy
 - Vertical nanostructures for gate-all-around transistors
 - In-situ construction of semiconductor devices within a plasma FIB scope
- ❖ *Hacker Fab: Open-Source Semiconductor Fabrication Laboratory*
 - Joined research lab at its inception in Spring 2023
 - Designing an open-source lab on CMU's campus, capable of fabricating CMOS transistors from silicon using a custom-built maskless photolithography stepper
 - Goal is to fabricate a functional NMOS transistor with 10um gate width by May 2023, then hoping to expand the capabilities of the lab to CMOS and then entire integrated circuits
 - Planning to use the lab space for a new course in Fall 2023 that will allow students to fabricate their own ICs on-campus, as well as to continue the development of the lab's machines and processes
 - Links to the lab's [website](#), where resources and updates are provided
- ❖ *FLOCI: Lab-On-Chip Interferometer*
 - Joined research team in Spring 2023
 - Developing an RFIC to measure ferromagnetic resonance using a novel on-chip solution, removing the necessity of a VNA-FMR
 - Using a transmission line differential pair to detect the presence of nanoparticles as an amplitude-modulated signal, which is then amplified and downconverted to be processed off-chip
 - Working on simulating and refining the transmission line design using Ansys Electronics Desktop software, as well as helping design test infrastructure
 - RFIC taped out in May 2023 using TSMC 28nm PDK
 - Planning to test and evaluate chip in early 2024 and publish results
- ❖ *MIT Lincoln Lab: Advanced RF Techniques & Systems*
 - Summer 2023 research intern working on RF systems design and analysis for communication systems
 - Internship completed as part of employer sponsorship via [GEM Fellowship](#)

Activities, Awards, and Recognitions

- ❖ Recipient of the 2017 Penn Undergraduate Research Mentoring (PURM) Grant
- ❖ Recipient of the 2018 Penn Engineering Exceptional Service Award
- ❖ Recipient of the 2019 Littlejohn Scholars Summer Research Grant
- ❖ 2019-20 J.P. Eckert Fellow
- ❖ 2020 inductee of the CIS Max Mintz Undergraduate TA Hall of Fame
- ❖ Recipient of the Summer 2020 TA Award for Excellence in Student Support with Distinction
- ❖ Honorable Mention for the 2021 Penn Engineering Outstanding Teaching Award
- ❖ Carnegie Institute of Technology Dean's Fellow
- ❖ Selected to participate in the 2022 NextProf Pathfinder workshop hosted by UMich and UCSD
- ❖ Completed the Future Faculty Program in Fall 2022 (Eberly Center for Teaching Excellence and Educational Innovation, Carnegie Mellon University)
- ❖ Recipient of the GEM Fellowship, with a sponsorship by MIT Lincoln Lab for Summer 2023
- ❖ UPenn SEAS Orientation Peer Adviser for Class of 2022 (CIS) and Class of 2023 (CMPE)
- ❖ Head of Hardware team for UPenn PennApps hackathon from Spring 2019 to Spring 2021, organized with Major League Hacking (MLH)
- ❖ 2022-25 CMU Robotics Club Officer