Brandon Joel Gonzalez – Curriculum Vitae

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Career Objectives

Interested in the design of embedded systems and RF engineering. 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* — August 2021 - Present
  - Research Advisor: Dr. L. Richard Carley
  - Research Interests: embedded systems design, RF engineering, wireless communications and sensing systems

University of Pennsylvania — School of Engineering and Applied Science (SEAS)

- M.S.E. in *Robotics* — May 2021
- B.S.E. in *Computer Science*, minor in *Mathematics* — December 2019 — Cum Laude

Teaching Experience

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

- 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
- CMU — 18-429/729: *Board-Level RF Systems for IoT* — Fall 2022*
  - Experimental laboratory course exploring RF engineering concepts, including transmission lines, antenna design, SDR, MIMO, and beamforming
- UPenn — ESE450/451: *ESE Senior Design* — Fall 2019, Spring 2020^, Fall 2020*^, Spring 2021*^
  - Two-part senior capstone project series for students in the Electrical and Systems Engineering department 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, primarily for students without engineering background
- 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

- *Open Fab Lab*
  - Research part of 18-469/669 (Special Topics in Integrated Systems Technology) at CMU in Spring 2023
  - Designing an open-source lab on CMU's campus, capable of fabricating CMOS transistors from silicon using maskless photolithography
  - Goal is to fabricate a functional transistor with 10um gate width by May 2023, then hoping to expand the capabilities of the lab to integrated circuits
  - Planning to use the lab for a new courses in Fall 2023 that will allow students to fabricate their own ICs on-campus, as well as help contribute to the improvement of the lab's machines and process development
  - Links to the lab's Github and Twitter, where resources and updates are logged
- *On-Chip Interferometer*
  - Research part of Prof. Rick Carley's research group, starting in February 2023
  - Attempting to develop 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
  - RFIC will be taped out in May 2023 using TSMC 28nm PDK and Skywater 130nm PDK; planning to test and evaluate the chip in Fall 2023, and will share results then
- *F1TENTH Testing Suite*
  - Research part of 18-540/745 (*Rapid Prototyping of Computer Systems*) at CMU in Spring 2023
  - Building an autonomous vehicle testing suite using the F1TENTH open-source platform, partnered with Honda's 99P Labs
  - Guided students through the engineering process as a TA, including work with hardware systems design and embedded software development
  - Aiming to design a track that will allow engineers to test obstacle avoidance and other autonomous vehicle algorithms
  - Planning to share the final results of the course with 99P Labs so that they may continue this research initiative
  - Link to course final report and final demonstration video will be provided by the end of the semester
- *Infrastructure Sensing System*
  - Research part of 18-540/745 (*Rapid Prototyping of Computer Systems*) at CMU in Spring 2022
  - Focused on infrastructure sensing to detect transportation issues in Pittsburgh
  - Worked on Hardware Development team, exploring a number of sensors to collect information about the state of transportation in the city
  - Used accelerometer data to detect potholes while driving, which was streamed using a Raspberry Pi via a cellular network to a cloud database for offline analysis, resulting in these issues around the city being flagged on a map
  - Link to course final report; see section on "Infrastructure Sensing - Hardware" on page 90 for my specific team's work

Activities and Interests

- 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)
- 2022-24 CMU Robotics Club Graduate Student Officer
- 2022-23 Officer of the Eta Kappa Nu (HKN), Sigma Chapter at Carnegie Mellon University

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 TA Hall of Fame
- Recipient of the Summer 2020 TA Award for Excellence in Student Support with Distinction
- 2021 ESE Diversity, Equity, and Inclusion Fellow
- Honorable Mention for the 2021 Penn Engineering Outstanding Teaching Award
- Carnegie Institute of Technology Dean's Fellow
- 2022 inductee of the Eta Kappa Nu (HKN), Sigma Chapter at Carnegie Mellon University
- 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