Brandon Joel Gonzalez – Curriculum Vitae

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Career Objectives

Interested in the development of wireless 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: wireless embedded systems, RF engineering

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 — 18-429/729: *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

- *Directional Antenna Arrays for LPWANs*
  - Research (in-progress) done under the mentorship of Professor Anthony Rowe and Professor Asim Smailagic, continuing the work of Dr. Artur Balanuta in the WiSE Lab, as part of 18-843 (*Mobile and Pervasive Computing*) at CMU in Fall 2022
  - Planning to deploy client nodes that utilize beam steering, through the use of directional antenna arrays, to access LoRaWAN gateways around CMU's campus
    - Expecting to see better coverage and less interference between clients compared to omnidirectional antennas with similar gain
    - Developing a hotspot offloading algorithm that will allow balancing of loads between gateways through network feedback
  - Will provide a link to a video demonstration and poster at the end of the semester
- *Infrastructure Sensing in Pittsburgh*
  - Research done as part of 18-745 (*Rapid Prototyping of Computer Systems*) at CMU in Spring 2022
  - Focused on developing ways to enhance public transportation in Pittsburgh by using infrastructure sensing to detect problems around the city
    - Worked on Hardware Development team, exploring a number of sensors to collect information about the state of transportation in the city
    - Used image data to detect obstacles on the road and accelerometer data to detect potholes and other bumps while driving
    - Interfaced sensors with Raspberry Pi devices
    - Set up a wireless network to stream data packets 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
- *Human Occupancy Detection*
  - Research done under the mentorship of Professor Camillo Jose Taylor and Dr. Madhu Annapragada as part of ROBO597 (*Master's Thesis*) at UPenn from Fall 2020 to Spring 2021
  - Sought to develop a hybrid sensor system for human occupancy detection
    - Examined a wide variety of sensors including PIR, thermopile array, and mm-wave TI devices
    - Attempted to combine sensors in order to develop an efficient, novel device that accurately counts human occupants
    - Encountered difficulties in the implementation, but learned about embedded systems, signal processing, and sensor fusion
  - Link to the project repository with more information, including the thesis itself and a presentation from May 2021

Activities and Interests

- SEAS Orientation Peer Adviser for Class of 2022 (CIS) and Class of 2023 (CMPE)
- Head of Hardware team for PennApps hackathon from Spring 2019 to Spring 2021, organized with Major League Hacking (MLH)
- Student member of the ECE Diversity, Inclusion, and Outreach Committee
- Build18 Officer for the 2023 Season
- 2022-23 Graduate ECE Representative of TechSpark Student Committee
- 2022-23 CMU Robotics Club Graduate Student Officer
- 2022-23 IEEE CMU Chapter Graduate/Research Committee Chair
- 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
- Future Faculty Program, Eberly Center for Teaching Excellence and Educational Innovation, Carnegie Mellon University