Brandon Joel Gonzalez – Curriculum Vitae

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Career Objectives

Interested in the development and innovation of electronics engineering and related fields. Long-term goals of pursuing a doctorate in electrical engineering and working in higher education. Love of learning, teaching, and helping guide others to their fullest potential.

Education

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

- M.S.E. in *Robotics* — Spring 2021 — GPA: 3.28/4.00
  - Master's Thesis: "Exploring Development of Novel Sensor Systems for Occupancy Detection", which aims to design a hybrid single-chip solution by combining optimal sensor technologies
    - Primary advisor: Dr. Camillo Jose Taylor of GRASP
    - Secondary advisor: Dr. Madhu Annapragada of Automation Research Group
    - Work done in collaboration with InstaHub
    - Began in June 2020 and expected to complete in May 2021
- B.S.E. in *Computer Science*, minor in *Mathematics* — Fall 2019 — GPA: 3.54/4.00 — *Cum Laude*
  - Senior Project: TeaBot, a mechatronic robot arm that uses computer vision to harvest tea leaves
    - Advisor: Dr. Camillo Jose Taylor
    - Began in August 2018 and completed in May 2019

Teaching Experience

UPenn SEAS — CIS/ESE Teaching Assistant

- TA for the Department of Computer and Information Science (CIS) & Department of Electrical and Systems Engineering (ESE)
- Responsibilities include: lecturing, recitations, lab and review sessions, lab and office hours, explanation videos, forum monitoring, staff meetings, grading, project advising, development of course labs, projects, and curricula
- Semesters as head TA denoted with * and semesters online denoted with ^
- TA history:
  - 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
  - CIS380/548/CIT595: *Operating Systems* — Fall 2019, Spring 2020*^, Summer 2020*^
    - Advanced course exploring design and implementation of operating systems, primarily Unix-based, in C
  - CIS371/501: *Computer Architecture* — Fall 2019, Spring 2020^
    - Advanced course exploring design and optimization techniques in modern computer architecture
  - ESE190: *Introduction to Hardware/Software Lab* — Spring 2019
    - Introductory laboratory course exploring the Arduino platform, primarily to students without engineering background

- ➢ ESE350/519: *Embedded Systems Lab* — Fall 2020^, Spring 2021*^
  - ■ Advanced laboratory course covering the foundations and design of embedded systems platforms, across hardware and software levels
- ➢ 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

Research Experience

Pennovation — Embedded Systems Researcher — Occupancy Detection Device

- ❖ Goals:
  - ➢ Designing a hybrid sensor device for occupancy detection
  - ➢ Collecting in-lab occupancy test data in order to identify which combinations of sensors most accurately detect occupants, while optimizing power consumption
  - ➢ Seeking to manufacture a prototype board incorporating best available sensors
  - ➢ Aiming to enhance automatic lighting control, as a possible application
- ❖ Based in Pennovation, working with Automation Research Group and Instahub
- ❖ Using C, MCU (ATmega328p), mm-wave sensors, PIR sensors, Intel RealSense camera, Altium
- ❖ Began in June 2020

UPenn — Robotics Research Assistant — SMORES-EP Robot

- ❖ Goals:
  - ➢ Built and enhanced robotics simulations for SMORES-EP
  - ➢ Sought to more easily test configurations and commands for the robot
- ❖ Based in the ModLab under the guidance of Dr. Mark Yim, Department of Mechanical Engineering and Applied Mechanics, and MEAM doctoral candidate Chao Liu
- ❖ Used Unity, C#, ROS, Unix shell
- ❖ Funded by the Littlejohn Scholars Summer Research Grant
- ❖ Began in May 2019 and ended in August 2019

UPenn — Computer Graphics Research Assistant — Virtual Reality Hand-Tracking

- ❖ Goals:
  - ➢ Designed interface using uSens Fingo device to integrate hand-tracking into VR
  - ➢ Sought to provide recording and playback of hand models inside VR environments
- ❖ Based in the SIG Center under the guidance of Dr. Stephen Lane, Department of Computer and Information Science
- ❖ Used Unity, C#
- ❖ Began in May 2018 and ended in August 2018

UPenn — Physics Research Assistant — Neutrino Interaction Studies

- ❖ Goals:
  - ➢ Programmed and ran simulation tools to collect data on neutrino interactions
  - ➢ Sought to understand trends of particle interactions based on detector geometries, particle energy levels, and particle locations inside of the detector
- ❖ Based in the SNO Laboratory under the guidance of Dr. Joshua Klein, Department of Physics and Astronomy
- ❖ Used C++, Unix shell
- ❖ Funded by the Penn Undergraduate Research Mentoring (PURM) Grant
- ❖ Began in May 2017 and ended in August 2017

Skills and Coursework

Languages: Native in English, fluent/heritage in Spanish, elementary in French
Key Courses Taken: Operating Systems, Computer Architecture, Computer Graphics, Signal Processing, Control Systems, Digital Circuits, Laboratory Electronics, Embedded Systems, Mechatronic Systems, Autonomous Robotics
Technologies Learned/Utilized:

- Software
  - Programming languages such as C, C++, Python, MATLAB
  - Hardware description languages such as Verilog
  - Programming environment tools such as ROS, Simulink
  - Operating systems tools such as Unix shells
- Hardware
  - Microcontrollers such as ATmega328P, ESP32
  - Circuit simulation tools such as SPICE, Ngspice
  - PCB design tools such as Altium, EAGLE
  - Various electrical components such as resistors, capacitors, inductors, diodes, MOSFETs, BJTs, op-amps, transducers, sensors, servomotors, DC motors, batteries, power supplies, voltage regulators, etc.

Projects

Battle Bot

- Custom 4-wheel robot for tower defense game constructed from laser-cut CAD models, using differential drive with continuous servos, powered by AA/9V/LiPo batteries with C++ code on ESP32 boards

Balance Bot

- 2-wheel self-balancing robot, using PID controls to correct tilting and displacement

Memory Design

- SRAM FIFO queue built at the MOSFET transistor level with SPICE circuit simulator

LC4 Processor

- 16-bit RISC processor written in Verilog, implementing a pipelined superscalar datapath

PennOS

- Unix-like operating system written in C, with priority scheduler, flat filesystem, user shell

Activities and Interests

- SEAS Orientation Peer Adviser for Class of 2022 (CIS) and Class of 2023 (CMPE)
- Head of Hardware team for PennApps hackathon since Spring 2019, organized with Major League Hacking (MLH)

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
- Recipient of the 2019-2020 J.P. Eckert Fellowship
- 2020 inductee of the CIS TA Hall of Fame

References available upon request.