

## 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: 3.39/4.00
  - 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<sup>^</sup>, Spring 2021<sup>^</sup>
  - 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<sup>^</sup>, Fall 2020<sup>^</sup>, Spring 2021<sup>^</sup>
  - Two-part senior capstone project series for students in the Electrical and Systems Engineering department and related majors

## **Research Experience**

### **Pennovation – Electronics Design 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.***