# PAOLO ARGUELLES

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**Electrical and Computer Engineering**

## SUMMARY


- **Began university at the age of 14** and graduated with a master's degree at 20
- Highly motivated and results-driven engineer with experience in MATLAB and Simulink, C and Python, PCB design, public speaking and presentation design, and technical writing
- Research work **produced four publications** and is highly interdisciplinary with special focuses in **aerospace systems, bio-inspired swarm robotics, and MEMS technology**


## EDUCATION

**Cornell University** *Aug 2018 – Jun 2019*

Master's Degree in Electrical and Computer Engineering

**Thesis:** *In-Situ Inertial Characterization of a SAW-Bulk Gyroscope*

**California State University, Los Angeles** *Aug 2013 – Jun 2018*

Bachelor's Degree in Electrical Engineering

**GPA:** *3.99 / 4.00, Summa Cum Laude*

## SELECTED PROJECTS and RESEARCH

### Solid-State Gyroscope for Missile Guidance (DARPA)

*Cornell University; United States Department of Defense*

- Provided regular technical updates to DARPA program managers
- Developed scripts to determine S-parameters in MEMS resonator
- Created testing scripts with a MATLAB/Python codebase to drive a high-velocity rate table while simultaneously conducting frequency sweeps
- Wrote graduate thesis and presented academic poster

### Inflatable Robot for Human-Swarm Interaction

*Collective Embodied Intelligence Research Lab, Cornell University*

- Co-authored paper submitted to IEEE robotics journal
- Designed PCB for power and logic distribution with Eagle
- Implemented time-of-flight sensing array for obstacle avoidance
- Hand soldered rover connections

### Massively Deployed Ultrasonic Imagers for Digital Agriculture

*Geegah LLC*

- Conducted research in the use of sound waves to measure soil properties
- Designed circuits to support soil-based microsystems
- Used CMOS GHz imaging technology to detect nematodes
- Created cinematic visualizations of ongoing research for grant proposals using Adobe Premiere Pro and After Effects
- Provided daily technical memoranda and final report
- Helped secure over $1M in grant funding from organizations like the Gates Foundation, ARPA-E, and NSF

### Spacecraft Flight Simulator and Attitude Testbed

*Space Systems Design Studio, Cornell University*

- Sole electrical engineer in a 4-person engineering team
- Responsibilities included complete realization of a Simulink-based control interface, real-time telemetry handling, and wireless control for cold gas thrusters and reaction wheels
- Worked with the former NASA Chief Technologist, Dr. Mason Peck and demonstrated working prototype to Cornell engineering faculty

### CubeSat Solar Sail Attitude Control

- Worked with Northrop Grumman engineers to develop a small spacecraft technology concept for solar steering in CubeSats
- Built wirelessly controlled CubeSat test model with custom PCB and microcontroller to demonstrate PID closed-loop control functionality in a wind tunnel
- Including system requirements, preliminary design, and final design reviews
- Co-authored peer reviewed ASME paper

### Machine Learning for Microfluidic Medical Diagnostic Devices

- Built and trained artificial neural network with MATLAB and Simulink to predict glucose concentration based on colorimetric change with 90+% accuracy
- Co-author of paper published in peer-reviewed chemistry journal
- Presented and defended undergraduate thesis to an interdisciplinary panel of 5 professors

## SKILLS

- **Software:** MATLAB, Simulink, LabVIEW, Eagle, COMSOL, Adobe Premiere/After Effects
- **Programming:** C/C++, Python, Bash, HTML/CSS
- **Writing (Technical and Creative)**
- **Public Speaking and Communication**
- **Presentation and Report Design**
- **Project Management and Planning**

## LEADERSHIP EXPERIENCE

### Campus President, Institute for Electrical and Electronics Engineers (IEEE)

- Worked with local IEEE leadership to connect our students with the local IEEE Los Angeles professional chapter
- Managed emailing list of 1000 students and alumni
- Spearheaded rebranding effort to boost student interest and involvement in IEEE

### President, Early Entrance Program Club

- Served as a liaison to University administration, representing the interests of 200 early entrance students
- Organized social events and fundraisers, managed a 10-person executive board, and recruited volunteers

### Public Policy Research Intern, Pat Brown Institute for Public Affairs

- Passionate about the emphasis of science and engineering in public policy
- Created visualizations of Institute polling data to allow better accessibility for members of the public; work published on Institute site
- Helped curate curriculum for *Civic University,* the Institute's civic education program for local leaders
- Organized conferences and dinners with local and federal dignitaries such as LA Mayor Eric Garcetti, Sen. Kamala Harris, and Sec. of Commerce Mickey Kantor and managed an audience of hundreds of high-profile attendees

## AWARDS and RECOGNITION

**Barry Goldwater Scholarship**
**2016 Honorable Mention**

**2018 Senior Design Distinguished Student Award**
Awarded to the senior design team member highest rated among peers

**2018 Honors College Dinner Class Speaker**

**2018 Honors Convocation Speaker**
California State University, Los Angeles

**2014 Edison Scholar**

**Tau Beta Pi and Phi Kappa Phi**
Honor Societies

## ADDITIONAL RESEARCH WORK

### WaffleBot: A Shape-Shifting Soft Robotic Platform for Multi-Agent Control

*CEI Research Laboratory, Cornell University*

- Created with PhD students from mechanical engineering and architectural design
- Explores emergent behaviors of a multi-agent swarm given kinematic constraints
- Presented preliminary research and prototypes in a graduate seminar for bio-inspired multi-agent coordination
- Fabricated kinematic models with Ecoflex and 3D-printed flexures
- Outfitted prototypes with smart, actuable tendons using miniaturized microcontroller boards and H-bridge motor drivers
- Co-authored IEEE paper pre-print

### Wireless EMG to Promote Cardiovascular Health

- Co-author of paper describing this novel application of wireless EMG

### Microfluidics and Point-of-Care Diagnostic Devices

- Fabricated and designed microfluidic paper and thread analytical devices for low cost (less than $0.10) medical diagnostics
- Built three electrode potentiostat for *in-situ* voltammetry
- Implemented an automated enzyme-linked immunosorbent assay (ELISA) using digital microfluidic technology

### Voter Engagement in Los Angeles County

*Pat Brown Institute for Public Affairs*

- Helped conduct a political poll surveying voting habits among 1000+ Asian Americans and Latinos in LA County
- Created dynamic visualizations making topline findings more accessible to the general public

### Tessellated Structures in MEMS Devices

*SonicMEMS Research Laboratory, Cornell University*

- Wrote IEEE paper pre-print detailing a compliant MEMS process flow for miniaturized tessellated structures

## PUBLISHED WORK

1. J. Jaramillo, **P. Arguelles,** L. Atriwal, E. Baker, C. Hahn, Y. Liu, T. Yeh, and K. Petersen, "Mobile and Inflatable Interface for Human Robot Interaction," *IEEE Robotics and Automation Letters.*

2. N. Li, **P. Arguelles,** et al., "A Novel Approach for Satellite Attitude Control by Using Solar Sailing." in *ASME 2018 Int. Mechanical Engineering Congr. and Expo.*, vol. 1., 2018.

3. W. Lee, A. Gonzalez, **P. Arguelles,** R. Guevara, M. Gonzalez-Guerrero, and F. A. Gomez, "Thread/paper- and paper-based microfluidic devices for glucose assays employing artificial neural networks," *Electrophoresis*, 39(12), pp.1443-1451.

4. A. Pal, K. Monsalvo, J. Suthonlap, **P. Arguelles,** et al., "Wheelchair Exercise Monitor Development Platform: An Application for Wireless EMG Sensors", in *SENSORNETS 2018.*