

# ANDRES PENA, PHD

(754) 204-0870 | aepena@fiu.edu

Biomedical research engineer with over 9 years of experience in Engineering and Neuroscience. Interested in the areas of Neural Engineering, Neuroprostheses, Electroceuticals, Therapeutic and Reparative Neurotechnology, and Brain-Computer Interfaces.

## EDUCATION

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<b>Florida International University</b> PhD in Biomedical Engineering, GPA: 3.83/4.00 Research Area: Therapeutic and Reparative Neurotechnology Adviser: Ranu Jung, PhD	April 2020
<b>Florida International University</b> BS in Biomedical Engineering	April 2013
<b>Florida International University</b> BS in Electrical Engineering	April 2010

## RESEARCH AND PROFESSIONAL EXPERIENCE

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<b>Doctoral Candidate.</b> <u>Adaptive Neural Systems Laboratory</u> <i>Florida International University</i>	2017 – 2020 <i>Miami FL</i>
<ul style="list-style-type: none"><li>- Conceptualized, developed and implemented a novel non-invasive electrical neurostimulation platform for restoration, enhancement, and/or modulation of neurophysiological functions.<ul style="list-style-type: none"><li>o Dissertation title: <i>Enhanced Surface Electrical Neurostimulation (eSENS): A Non-invasive Platform for Peripheral Neuromodulation</i></li></ul></li></ul>	
<b>Graduate Research Assistant.</b> <u>Adaptive Neural Systems Laboratory</u> <i>Florida International University</i>	2013 - 2017 <i>Miami FL</i>
<ul style="list-style-type: none"><li>- Designed and fabricated a modular testbed and conducted mechanical and electrical tests for a branched electrode lead system to interface an implantable neurostimulator to peripheral nerves. These tests were instrumental for receiving investigational device exemption approval from the FDA for an implanted wirelessly controlled neural-interface system, allowing for a first-in-human clinical trial of a neural-enabled prosthetic hand system to restore sensation to an individual with upper limb amputation.</li><li>- Developed clinical metrics for assessing telescoping of the phantom limb in amputees receiving sensory feedback from a neural-enabled prosthetic hand system.</li><li>- Designed and fabricated devices and tools for the collection of human psychophysics data during sensory feedback experiments.</li><li>- Designed and prototyped implantable and percutaneous components of a neural interface for a project funded by the Defense Advanced Research Projects Agency (DARPA) for the development of effective and reliable peripheral interfaces for prosthetic control.</li></ul>	
<b>Biomedical Technology Specialist.</b> <i>Aplimed Supplies, Inc.</i>	2011 - 2014 <i>Doral FL</i>
<ul style="list-style-type: none"><li>- Biomedical engineering consultation.</li><li>- Technical support specialist for medical imaging equipment including the Sentinella 102 Portable Gamma Camera.</li><li>- Training of oncology surgeons and nuclear medicine physicians as well as demonstrations on the use of different medical devices in the operating room setting.</li></ul>	

**Undergraduate Research Assistant. Adaptive Neural Systems Laboratory**  
*Florida International University*

2011 - 2013  
*Miami FL*

- Worked on the design, simulation, prototyping and manufacturing of experimental devices for the collection of human psychophysics data as well as designing of instrumentation circuitry for experimental data collection.
- Designed and developed a fully functional prototype of an automated device for the filtration of Circulating Tumor Cells (CTCs) from blood samples. This device went through the process of project planning, concept and prototype development, FDA quality systems regulations, design controls and regulatory pathways for the commercialization of the medical device.

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## **TECHNICAL SKILLS**

### **Clinical Research:**

- Experience in medical devices, FDA and human subject regulations (IRB), design of scientific and engineering experiments, data collection and analysis, real-time signal processing, advanced statistics, scientific programming, and exploratory research.
- Deep knowledge of how the brain controls motor output and senses and perceives stimuli with the aim of providing sensation to a prosthetic device.
- Experience in exploratory research of neuromodulation methods for sensory function restoration, delivering safe transcutaneous and intraneural electrical stimulation to peripheral nerves and characterizing stimulation evoked responses.
- Experience in recording/processing neural recordings, electromyography, and more.
- Strong background in independent development of research projects, grant writing and scientific publishing.

### **Industry & Technical:**

- Experience with the full cycle of medical device design and development
- Proficiency with lab equipment (oscilloscopes, signal generators, etc).
- Skilled in creative, analytical and critical thinking, problem solving, working in cross-functional and cross-cultural teams, managing multiple tasks and projects, and handling ambiguity and uncertainty.
- Able to acquire new technical knowledge and skills rapidly.
- Strong oral and written communication skills (technical and non-technical).

**Programming:** MATLAB & Simulink, Python, LabVIEW, Arduino, RaspberryPi, graphical user interfaces (GUIs)

**Prototyping and fabrication:** CAD / Drafting (AutoCAD, SolidWorks), Circuits & Electronics (Microcontrollers, DipTrace, Pspice, Multisim), CNC and 3D Printing (FDM, SLA).

**Other applications:** Statistics (GraphPad Prism, SPSS), Graphics (Adobe Photoshop, Illustrator), Reference Management (Endnote, RefWorks), Microsoft Office Suite (advanced Excel, Word, Power Point, Project), Multiple OS (Windows, MacOS, Linux).

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## **HONORS AND AWARDS**

<b>Dissertation Year Graduate Fellowship</b> Florida International University – University Graduate School	2019
<b>Military Health System Research Symposium</b> Award for Excellence - Third Place Poster presentation	2019
<b>American Institute for Medical and Biological Engineering</b> Travel award to the 2015 AIMBE Public Policy Institute in Washington DC	2015
<b>Alpha Eta Mu Beta BME Honor Society</b> Outstanding member award	2014

<b>National Science Foundation's Bridge to the Doctorate Fellowship</b> Florida Georgia Lois Stokes Alliance for Minority Participation (FGLSAMP).	2013 - 2015
<b>Graduate Scholarship</b> The FIU College of Engineering and Computing - Dean of Engineering Scholarship	2014
<b>Florida International University Engineering Student Council</b> Future Engineering leader's team Award	2005 - 2006

## TEACHING EXPERIENCE

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<b>Graduate Teaching Assistant.</b> Department of Biomedical Engineering <i>Florida International University</i>	2015 - 2017 <i>Miami FL</i>
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Undergraduate courses covering different engineering topics:

- Introduction to Engineering (Freshmen course)
- Orthopedic Biomechanics
- Biomedical Engineering Laboratory (BME Lab) 1 and 2 (Senior courses)

Developed quizzes, exams, and homework. Lead weekly discussions and advised students regarding project or class concerns, monitored progress, and graded assignments.

## PUBLICATIONS

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### *Journal Publications*

Pena, A. E., Kuntaegowdanahalli, S. S., Abbas, J. J., Patrick, J., Horch, K. W., & Jung, R. (2017). Mechanical fatigue resistance of an implantable branched lead system for a distributed set of longitudinal intrafascicular electrodes. *Journal of neural engineering*, 14(6), 066014.

Pena, A. E., Rincon-Gonzalez, L., Abbas, J. J., & Jung, R. (2019). Effects of vibrotactile feedback and grasp interface compliance on perception and control of a sensorized myoelectric hand. *PLoS one*, 14(1), e0210956.

### *Conference Presentations*

(Oral Presentations)

Pena, A. E., Rincon-Gonzalez, L., Abbas, J. J., & Jung, R. (2017, November). Effect of vibrotactile feedback and hand interface compliance on grasp force and hand opening. Annual Society for Neuroscience Conference, Washington, DC

Pena, A. E., & Jung, R. (2018, February). Longitudinal Intrafascicular Electrodes (LIFEs): Restoring Sensation with a Neural-Enabled Prosthetic Hand System for Home Use: A First-in-Human Study. Electrodes Session of the 2018 DARPA HAPTIX Program Review Meeting, Charleston, SC

Pena, A. E., & Jung, R. (2018, April). The Bioethics of Implantable Biohybrid Systems. 9th International Conference on Ethics in Biology, Engineering & Medicine, Miami, FL

Pena, A. E., & Jung, R. (2018, April). The Bioethics of Implantable Biohybrid Systems. Invited Talk at the Barry University Chapter of Sigma Xi Induction Ceremony and 20th Anniversary Celebration, Miami, FL

Abbas, J. J., Kuntaegowdanahalli, S. S., Thota, A. K., Pena, A. E., Jung, R. (2018, August). Development of a Sensory-enabled Neuroprosthetic Hand System. 2018 Military Health System Research Symposium, Kissimmee, FL

(Poster Presentations)

Pena, A. E., Kuntaegowdanahalli, S. S., Abbas, J., & Jung, R. (2013, May). Design and development of hand-opening and pinch force sensors. In Biomedical Engineering Conference (SBEC), 2013 29th Southern (pp. 167-168). IEEE. doi: 10.1109/SBEC.2013.92

Pena, A. E., Kuntaegowdanahalli, S. S., Jung, R., & Abbas, J. J. (2014, February). Modular multi-channel inline connector system to link electrodes to percutaneous leads or an implanted electrical device. 2014 DARPA RE-NET Program Review, Scottsdale, AZ

Pena, A. E., Kuntaegowdanahalli, S. S., Abbas, J. J., & Jung, R. (2014, June). Fatigue testing of longitudinal intrafascicular electrodes as a peripheral nerve interface. In Neuromodulation, 17(5), e103. Issn Print: 1094-7159. Annual Neural Interface Conference, Dallas TX

Mustafa, L., Pena, A. E., Jung, R., & Battle, J.C. (2015, October). Developing Patient-Specific, Dynamic Biomechanical Models of the Knee for Surgical Simulations. Annual Biomedical Engineering Society Conference, Tampa, FL

Pena, A. E., Kuntaegowdanahalli, S. S., Abbas, J. J., & Jung, R. (2015, October). Mechanical fatigue testing of an implantable intrafascicular electrode system. Annual Society for Neuroscience Conference, Chicago, IL

Pena, A. E., Kuntaegowdanahalli, S. S., Abbas, J. J., & Jung, R. (2016, February). Mechanical fatigue testing of an implantable intrafascicular electrode system. Annual Louis Stokes Alliances for Minority Participation Research Symposium, National Harbor, MD

Pena, A. E., Rincon-Gonzalez, L., Aguilar, D., Abbas, J. J., & Jung, R. (2016, November). A sensory substitution system for providing grasping force and hand opening feedback from a sensorized myoelectric hand. Annual Society for Neuroscience Conference, San Diego, CA

Herran, L., Pena, A. E., & Jung, R. (2018, October). Evoked Referred Sensations Through Quadripolar Transcutaneous Electrical Neurostimulation. Annual Biomedical Engineering Society Conference, Atlanta, GA

Jung, R., Kuntaegowdanahalli, S. S., Thota, A. K., Pena, A. E., Horch, K. W., Patrick, J., & Abbas, J. J. (2018, November). Neural-Enabled Prosthetic Hand System to Restore Sensation in Upper-Limb Amputees. Annual Society for Neuroscience Conference, San Diego, CA

Abbas, J. J., Kuntaegowdanahalli, S. S., Horch, K. W., Rincon-Gonzalez, L., Pena, A. E., Thota, A. K., Hillen, B. K., Aguilar, D., & Jung, R. (2018, November). Assessment of Functional Benefits Afforded by Sensory-Enabled Prostheses to Upper-Limb Amputees. Annual Society for Neuroscience Conference, San Diego, CA

Pena, A. E., Herran, L., Jung, R. Enhanced Non-invasive Peripheral Nerve Stimulation for Sensory Restoration and Neuropathic Pain Treatment. Abstract #MHSRS-19-01649 – Rehabilitation Following Limb Trauma and Amputation, Military Health Systems Research Symposium. August 19-22, 2019, Kissimmee, FL, USA

## **PROFESSIONAL TRAINING**

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### **Micro Device Fabrication and Materials Analysis**

The Advanced Materials Engineering Research Institute (AMERI), Miami, FL 2016

A two-day training workshop on micro/nano device fabrication, materials analytical techniques, and failure analysis.

### **The Institute on Teaching and Mentoring**, Atlanta, GA, 2014

Four-day conference provides doctoral scholars with the skills necessary to succeed in graduate study and to prepare them for success as minority faculty members.

## **PROFESSIONAL AFFILIATIONS**

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Institute of Electrical and Electronics Engineers (IEEE)  
IEEE Engineering in Medicine and Biology (EMB) Society  
Alpha Eta Mu Beta - BME Honor Society  
Tau Beta Pi – Engineering Honor Society  
Biomedical Engineering Society (BMES)  
National Science Foundation Bridge to the Doctorate Fellowship  
Theta Tau - Professional Engineering Fraternity

## **COMMUNITY SERVICE / OUTREACH**

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Volunteer, 3D-printing PPE for healthcare workers during COVID-19 pandemic, 2020  
Founder/Advisor, Panther Bionics Student Organization, 2017  
Volunteer, FIU CEC Engineering Expo, 2006-2018  
Alumni Panelist, BME Undergraduate Research Day, 2017  
Volunteer, Engineers on Wheels, 2016, 2017  
Project Judge, BME Technology Expo and Competition (Senior Design) - 2016, 2017  
President, Alpha Eta Mu Beta Honor Society at FIU, 2014  
Vice-President, Biomedical Engineering Society at FIU, 2013

## **LANGUAGES**

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**English:** Fluent  
**Spanish:** Native

## **OTHER**

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### **Hobbies and interests:**

- Astronomy and astrophotography
- RC airplanes and drones
- 3D Printing

**Citizenship status:** American citizen