Daniel E. Martinez

LinkedIn

EDUCATION

Georgia Institute of Technology, Ph.D. Robotics — August 2024
George W. Woodruff School of Mechanical Engineering – Robotics – Prof. Jun Ueda — **GPA:** 3.32/4.0
- Thesis: Image Guided High Precision Robotic Positioning in MRI for Medical Applications
- NSF Graduate Research Fellowship Program (GRFP) Fellow

Georgia Institute of Technology, M.S. Mechanical Engineering
George W. Woodruff School of Mechanical Engineering — **GPA:** 3.32/4.0
- NSF Accessibility, Rehabilitation, and Movement Science (ARMS) Traineeship Program (NRT)

Florida International University, B.S. Mechanical Engineering
FIU Department of Mechanical and Materials Engineering — **GPA:** 3.63/4.0
- Ronald E. McNair Scholar

SKILLS

- **Programming:** MATLAB, Python, C++, ROS
- **Process Optimization:** Six Sigma Certified
- **Languages:** English & Spanish (native), Japanese (advanced)
- **CAD:** SolidWorks, AutoCAD, Fusion 360

PROFESSIONAL EXPERIENCE

Robotic Safety Assessment of Medical Implants in MRI — Atlanta, GA
Georgia Institute of Technology BRHML Lab — Oct 2022 – Present
- Established novel method for measuring radiofrequency induced heating of medical implants in Magnetic Resonance Imaging (MRI) environment by navigating an acousto-optic sensor through ASTM standard gel phantom simulating thermoelectric properties of human tissue to comply with FDA, and ISO Standards
- Mechanically characterizing ASTM standard gel phantom for open-loop resistance compensation

MRI Guided Medical Injection Robot — Atlanta, GA
Georgia Institute of Technology BRHML Lab — Aug 2019 – Present
- Designed piezoelectrically actuated 4 Degree of Freedom (DOF) needle guidance robot with sub-millimeter positioning accuracy for stem cell injection into the ventral horn of the spinal cord
- Developed novel method of improving MRI resolution by combining multiple images with sub-pixel shifts induced by the MRI compatible surgical robot through super resolution algorithms
- Experimentally demonstrated 33% improvement in accuracy through the use of Position Sensitive Devices

Robotic Pipe Crawler for Power Plant Inspection — Miami, FL
Florida International University Applied Research Center — Sep 2018 – Aug 2019
- Designed peristaltic robotic pipe crawler to inspect 2 inch diameter pipes in coal power plants
- 3D printed components and integrated sensors, microcontrollers, and motors to control functional prototype
- Optimized pulling force to overcome the friction on the tether cable across several 180 degree bends

Physiological State Estimation for Social Robot Interaction — Wako, Japan
Honda Research Institute Japan — Oct 2022 – Jul 2023
- Integrated a non-invasive wrist sensor and classification model into a table-top social robot's functionality for live streaming and estimation of the user's physiological state as feedback for robot interactions
- Collaborated with researchers internationally to propose design changes to address mechanical issues

Path Planning and Trajectory Optimization of FANUC Robots — Detroit, MI
Fiat Chrysler Automobiles — May 2017 – Aug 2017
- Analyzed cycle time data of crankshaft line over several months to identify bottleneck operation
- Redesigned robot automation movement pattern to reduce cycle time and increase crankshaft production
- Benchmarked neighboring plant automation efficiency to assess transferable improvements
- Assisted contractors Komatsu NTC and PARI to install PLC and ladder logic for six axis FANUC robots

Development of Multi-Agent Swarm Robotics Platform — East Lansing, MI
Michigan State University — May 2018 – July 2018
- Designed and built a Wi-Fi enabled differential drive swarm robot test-bed to study swarm algorithms
- Interfaced ESP8266 Wi-Fi module with Arduino to demonstrate coverage control algorithm by processing data from VICON overhead camera system in MATLAB and wirelessly transmitting path-finding commands

PROJECT EXPERIENCE

Senior Capstone Project: Low Cost Modular Hand Prosthesis — Miami, FL
Florida International University — Aug 2018 – May 2019
- Led team of 4 engineers to design, manufacture, and patent prosthetic fingers for hand amputees
- Improved accessibility to affordable prosthesis for both insured and uninsured veterans
- Modelled prosthesis for compatibility with different amputations and hand sizes

Pneumatic muscle system — Miami, FL
Florida International University, MAIDROC Lab — Sep 2017 – May 2019
- Prototyped pressurized contracting actuators to simulate human bicep and triceps movement
- Controlled an arrangement of solenoid valves with transistors to regulate air flow in pneumatic muscle

Virtual Reality Haptic Weight Sensing — Sendai, Japan
Tohoku University — Jul 2019 – Aug 2019
- Designed vibrational haptic feedback device to improve VR (Virtual Reality) training by enabling user to distinguish between weight of objects held in a VR environment
- Scripted C# physics for user to manipulate models with hand gestures read by Leap Motion sensor

IEEE SoutheastCon Robot — Miami, FL
Florida International University — Jan 2017 – Dec 2017
- Developed a six probe arm to decipher a password encoded as five different electronic components
- Nested Arduino probes in spring loaded retracting mechanisms to adjust for possible navigation errors

"RealWorks" Augmented Reality Furniture Visualizer — Miami, FL
Florida International University — Feb 2017 – Feb 2017
- Designed 3D SolidWorks models and exported them to Unity game engine for augmented reality
- Scripted C# physics for user to manipulate models with hand gestures read by Leap Motion sensor

LECTURES / SEMINARS

Kobe University, Robotics in Medicine Lecture Series — Mar 2021
- "AutoSPINE: High-Precision MRI-guided Direct Cell Injection Robot"

Hiroshima University, Invited Technical Seminar — Oct 2020
- "High-Precision MRI-guided Direct Cell Injection Robot"

LEADERSHIP

JSA (Japan Student Association) — Atlanta, GA
Events Coordinator — Sep 2021 – May 2022
- Plans and executes cultural and social events to educate on Japanese culture and foster community

RoboGrads (Robotics Graduate Student Organization) — Atlanta, GA
Social Vice President — May 2021 – May 2022
- Hosts social events to strengthen the community of graduate students studying robotics

LOGRAS (Latino Graduate Student Organization) — Atlanta, GA
Social and Cultural Chair — Jan 2021 – May 2022
- Plans events to strengthen the community of Latin American graduate students and to promote and educate members about different Latin American cultures
- Mentors new graduate students in their transition to graduate school and a different culture

Theta Tau Professional Engineering Fraternity — Miami, FL
Chapter President — Dec 2017 – May 2018
- Hosted a regional conference for over 100 members from all across Florida
- Led the 5 other executive board positions in handling all the operations of the chapter

Professional Development Chair — Dec 2016 – Dec 2018
- Collaborated with FIU Career Services to host workshops about professional development
- Managed a committee of 4 members to critique 100 resumes and cover letters

STEM Outreach Chair — May 2016 – Dec 2016

- Regularly visited elementary and middle schools to teach students about engineering
- Introduced students to the many fields in engineering, describing their career opportunities

PUBLICATIONS

1. **D.E. Martinez**, H.A. Nieves-Vazquez, Y.S. Yaras, A. Khotimsky, B. Skowronski, L. Bradley, J. Oshinski, F.L. Degertekin & J. Ueda. "MRI Compatible Robotic Dosimeter System for Safety Assessment of Medical Implants", in *2024 IEEE/SICE International Symposium on System Integration (SII)* (pp. 25-29). IEEE. January 2024
2. W. Meinhold, H.A. Nieves-Vazquez, **D.E. Martinez**, J. Lee, S. Li, J. Ueda, and A.-P. Hu. "A Virtual Reality Guidance System for a Precise MRI Injection Robot." In *2023 IEEE/SICE International Symposium on System Integration (SII)*, pp. 1-6. IEEE, 2023.
3. C. Lara, J. Villamil, A. Abrahao, A, Aravelli, G. Daldegan, S. Sarker, **D. Martinez**, D. McDaniel, "Development of an Innovative Inspection Tool for Superheater Tubes in Fossil Fuel Power Plants", *Materials Evaluation*, vol. 79, no. 7 July 2021
4. **D. E. Martinez**, W. Meinhold, J. Oshinski, A.-P. Hu, and J. Ueda, "Super Resolution for Improved Positioning of an MRI-Guided Spinal Cellular Injection Robot", *Journal of Medical Robotics Research*, May 2021
5. W. Meinhold, **D. E. Martinez**, J. Oshinski, A. -P. Hu and J. Ueda, "A Direct Drive Parallel Plane Piezoelectric Needle Positioning Robot for MRI Guided Intraspinal Injection," in *IEEE Transactions on Biomedical Engineering*, vol. 68, no. 3, pp. 807-814, March 2021
6. **D. E. Martinez**, W. Meinhold, J. Oshinski, A. -P. Hu and J. Ueda, "Resolution-Enhanced MRI-Guided Navigation of Spinal Cellular Injection Robot," *2020 International Symposium on Medical Robotics (ISMR)*, 2020, pp. 83-88

PATENTS

1. W. Meinhold, A.-P Hu, J. Oshinski, J. Ueda, and **D.E. Martinez**. "Systems and methods for magnetic resonance imaging guided robotics." U.S. Patent Application 17/404,619 filed February 17, 2022.

AWARDS / SCHOLARSHIPS

- NSF Graduate Research Fellowship Program (GRFP)
- Outstanding Senior Design Proposal
- Fiat Chrysler Automotive Design Challenge 1st place
- NASCAR Ten80 National Aerodynamics 2nd place
- VEX Robotics Florida Build Award and Design Award
- Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) Scholarship
- Gold and Blue Achievement Award
- Florida Medallion Scholarship

TEACHING EXPERIENCE

Teaching Assistant — Atlanta, GA
Georgia Institute of Technology — May 2024 – Aug 2024
- ME 6407: Robotics

Teaching Assistant — Atlanta, GA
Georgia Institute of Technology — Jan 2022 – May 2022
- ME 6407: Robotics

Teaching Assistant — Miami, FL
Miami PREP Summer STEM Program — Jun 2016 – Jul 2016
- Robotics Course

CONFERENCES / PRESENTATIONS

2024 IEEE/SICE International Symposium on System Integration (SII) — Jan 2024
- "MRI Compatible Robotic Dosimeter System for Safety Assessment of Medical Implants" *Oral Presentation*

Institute for Robotics and Intelligent Machines (IRIM) Fall Research Symposium — Nov 2023
- "High Precision Robotic Positioning Device for use in MRI for Medical Applications" *Poster Presentation*

2020 International Symposium on Medical Robotics (ISMR) Nov 2020
– "Resolution-Enhanced MRI-Guided Navigation of Spinal Cellular Injection Robot" *Oral Presentation*

FIU Senior Design Project Showcase Apr 2019
– "Low Cost Modular Hand Prosthesis" *Poster Presentation*

DOE NETL 2019 Annual Project Review Meeting Apr 2019
– "Development of a Pipe Crawler Inspection Tool for Fossil Energy Power Plants" *Poster Presentation*

FIU Senior Design Project Showcase Nov 2018
– "Low Cost Modular Hand Prosthesis" *Poster Presentation*

FIU McNair Scholars Research Conference Oct 2018
– "Development of in vivo Programmable Robotic Swarms" *Oral and Poster Presentation*

FIU McNair Scientific Research Symposium Sep 2018
– "Development of in vivo Programmable Robotic Swarms" *Poster Presentation*

Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE) July 2018
– "Development of in vivo Programmable Robotic Swarms" *Oral and Poster Presentation*