# Daniel E. Martinez

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## EDUCATION

**Georgia Institute of Technology**, Ph.D. & M.S. 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

**Florida International University**, B.S
*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
- 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
- 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
- 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
- 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
- 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

**Development of Multi-Agent Swarm Robotics Platform** East Lansing, MI
Michigan State University
- 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

## PUBLICATIONS

- 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
- **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