

Luis G. Rosa

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LOOKING FOR:

** Full-time job starting ~Fall 2022

Looking for the intersection among robotics, machine learning, and humans.

SKILLS:

- Programming: Python, MATLAB, C++, Machine Learning, ROS, Gazebo, CAD (NX, ProE, Solid Works)
 - Biomechanics: kinematics/dynamics, motion capture (Vicon), ultrasound (Telemed), force treadmills (Bertec), electromyography (Delsys), accelerometers (Dytran), exoskeletons (Humotech), dynamometers (Biodex), & more.
 - Manufacturing: 3D printing, laser cutting, carbon fiber, traditional manufacturing tools, power tools, and more.
 - ML & AI: image processing, signal processing, optimization, sensor fusion, real-time implementation, neural nets, path planning, bayes nets, pattern recognition, game playing, and more.
 - Multi-level systems integration, quality assurance automation, mechatronics, navigation, Arduino, and more.
 - Fully Bilingual in English and Spanish plus some Portuguese *Work hard, work smart, work together*
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EDUCATION:

Ph.D. in Robotics	<i>Georgia Institute of Technology</i>	<i>Atlanta, GA Expected 2022</i>
M.S. in Mechanical Engineering	<i>Georgia Institute of Technology</i>	<i>Atlanta, GA December 2019</i>
B.S. in Mechanical Engineering	<i>University of Puerto Rico at Mayagüez</i>	<i>Mayagüez, PR January 2017</i>

RESEARCH EXPERIENCE:

Georgia Institute of Technology | PoWeR & IRL Labs: *May 2018 – Present*
Graduate Researcher / PIs: Prof. Gregory Sawicki & Prof. Omer Inan – Atlanta, Georgia

- Thesis Topic: Machine learning implementation towards real-time in-the-loop sensor fusion for optimized gait and joint health
- Aim #1: Real-time implementation of supervised machine learning algorithms for muscle fascicle length measurement from ultrasound with small amounts of data (Journal Paper Published)
- Aim #2: Achilles tendon loading measurement via active vibration stimulation and acoustical response as an alternative non-invasive measuring technique to inverse dynamics and musculoskeletal models (Writing Paper)
- Aim #3: Real-time gait modulation via biofeedback and exoskeleton assistance given machine-learning-enabled sensor fusion capturing under-the-skin physiological measurements (In process, completed pilot studies)
- All towards optimizing and controlling walking dynamics, to improve metabolic cost, patient health, and safety

Georgia Institute of Technology | Robotic Musicianship Lab: *August 2017 – April 2018*
Graduate Researcher / PI: Prof. Gil Weinberg – Atlanta, Georgia

- Explored novel sensing and actuation methods for dexterous prosthetic hands and exoskeletons that enable amputees and stroke survivors to play piano and perform common tasks
- Combined ultrasound and EMG through machine learning to control both gestures and force of assistive devices
- Developed mismatched muscle control schemes for prosthetic and orthotic device actuation given limited stroke patient mobility

Georgia Institute of Technology | Jiao Lab:*May 2016 – July 2016**Assistant Researcher / PI: Prof. Roger J. Jiao – Atlanta, Georgia*

- Summer Undergraduate Research in Engineering/Sciences (SURE)
- Thoroughly studied and surveyed modeling, simulation and analysis tools that facilitate the design of manufacturing systems (SysML, SIMIO, M. Excel, and many more)
- Determined solutions for integration problems between design tools to maximize engineer efficiency

University of Puerto Rico at Mayaguez | BioMEMS Research Laboratory:*August 2015 – April 2017**Assistant Researcher / PI: Prof. Pedro J. Resto – Mayaguez, Puerto Rico*

- Developed an in-situ sensor for automatic detection of bacteria concentration on public waters
- Integrated pumps, heaters, fluorescence monitoring, data transfer, bioassays, and more with Arduino
- Designed CADs for 3D prints, laser cuts, molds and other manufacturing techniques used for buoy prototype

WORK EXPERIENCE:**Woodruff School of Mechanical Engineering:***August 2019 – May 2020**Teaching Assistant – Atlanta, Georgia*

- Experimental Methodology Course - focused on developing student's ability to collect, analyze, and interpret experimental data using a variety of sensors common in mechanical engineering
- Labs included: signal processing, vibrations, acoustics, stress-strain, stabilization, experiment design, and more
- Gave lectures, in-lab support, fixed equipment, graded, coached writing, guided project development, and more

Boeing:*April 2017 – July 2017**Systems Development Engineer (Intern) – Everett, Washington*

- GLIDE Team, developing the automated blade stringer forming process for the composite wings of the 777X
- Developed Python model to provide ideal composite charge geometries that minimize compression forces
- Developed concept of operations for complete stringer assembly line to increase throughput and efficiency
- Managed requirement definition, verification & closure; assessed maturity for development to production change

Boeing:*May 2015 – August 2015**Systems Engineer (Intern) – Everett, Washington*

- 777X Airplane Level Integration Team (ALIT)
- Develop 100+ count list of metrics and corresponding execution plan for a Service Ready airplane
- Identify the source, capture values, and efficiently compile the metrics and knowledge obtained for each

General Electric:*January 2015 – May 2015**Process and Quality Engineer (Intern/COOP) – Humacao, Puerto Rico*

- Undertook projects to ensure the breaker contacts produced met or exceeded quality requirements
- Programmed new laser vision system to inspect contacts with integrated decision making for quality validation
- Ensured 7 distinct machines got optimized, repaired, and installed to increase production and efficiency

Vector Marketing:*June - August 2013**Assistant Manager / Field Sales Leader – Arecibo, Puerto Rico*

- Trained representatives, gave support, advice, and increased office average order from \$290 to \$335
- Sold over \$22,000 of kitchen cutlery with an average order of over \$900 and 92% closing ratio in 7 weeks
- Key staff, Presidents Club, and 10K alliance after selling \$12,500 in two weeks with a \$1,500 average order

LEADERSHIP ACTIVITIES:

RoboGrads (Robotics Graduates Student Organization) <i>President</i>	<i>May 2020 – May 2021</i>
LOGRAS (Latino Organization of Graduate Students) <i>Vice-President</i>	<i>April 2020 – April 2021</i>
RoboGrads (Robotics Graduates Student Organization) <i>Vice-President of Social Activities</i>	<i>May 2018 – May 2020</i>
LOGRAS (Latino Organization of Graduate Students) <i>Social Chair</i>	<i>April 2018 – April 2020</i>
Tarzanbot (Building robotic bulldog to represent school mascot - special project) <i>Captain</i>	<i>January 2014 – May 2015</i>
College Robotics of Mechanical Engineers (CROME) (Robotics Student Organization) <i>Vice-President of Projects</i>	<i>May 2014 – May 2015</i>
AWAKE (Youth Group) <i>Vice-President</i>	<i>January 2014 – December 2014</i>

PUBLICATIONS:

- **L. Rosa**, J. Zia, O. Inan, G. Sawicki, Machine Learning to Extract Muscle Fascicle Length Changes from Dynamic Ultrasound Images in Real-Time. *Journal Article*. PLOS ONE, *May 2021*
- **L. Rosa**, S. Gharehbaghi, O. Inan, *et.al.*, Joint Acoustic Emissions as a Biomarker to Differentiate Between Active and Inactive Juvenile Idiopathic Arthritis via 2-stage Machine Learning Classifier. *Poster Presentation*. ACR 2021. *Virtual, November 2021*
- S. Gharehbaghi, **L. Rosa**, O. Inan, *et.al.*, Joint Acoustic Emissions as a Biomarker to Assess Unilateral Knee Involvement in Children with Juvenile Idiopathic Arthritis. *Poster Presentation*. 2021 Annual Southeastern Pediatric Research Conference. *Virtual, June 2021*
- **L. Rosa**, G. Sawicki, Real-time muscle fascicle length measurement via machine learning. *Oral Presentation*. American Society of Biomechanics ISB – ASB Conference. *Calgary, AB, Canada. Aug 2019.*
- **L. Rosa**, G. Sawicki, Machine Learning driven feedback for real-time muscle fiber length modulation. *Poster Presentation*. ARMS Research Symposium. *Atlanta, GA, May 2019*
- **L. Rosa**, K. Bimbraw, F. Hammond III, G. Weinberg, Comparison and Integration of SMG and EMG. *Oral Presentation*. BMES 2018 Annual Meeting. *Atlanta, GA, October 2018*
- **L. Rosa**, K. Bimbraw, F. Hammond III, G. Weinberg, Ultrasound and EMG implementation for real-time gesture and force control. *Poster Presentation*. NSF Research Traineeship (NRT) Annual Meeting. *Washington D.C., Sept. 2018*
- **L. Rosa**, K. Bimbraw, F. Hammond III, G. Weinberg, Combined application of electromyography and sonomyography for muscle activity detection and measurement. *Poster Presentation*. ARMS Symposium. *Atlanta, GA, April 2018*
- **L. Rosa**, M. Carlino, R. Jiao, Integrated process modeling and simulation analysis for manufacturing systems design. *Oral & Poster Presentations*. SURE Research Symposium. *Atlanta, GA, July 2016*
- D. Wang, O. Duran, **L. Rosa**, P. Resto, Automated in-situ biosensor for quasi real-time detection of bacteria in public waters. *Poster Presentation*. CARICOOS General Assembly. *San Juan, PR, May 2016*

FELLOWSHIPS:

- **Grad Retaining Inspirational Scholars in Technology and Engineering (GRAD-RISE) Fellow** 2021
\$3,000
- **NIH R01 Minority Supplement Fellowship** May 2020 – May 2021
\$50,000
- **The Goizueta Foundation Fellowship** (2-time winner) August 2017 – May 2021
\$16,000
- **NSF NRT: Accessibility, Rehabilitation and Movement Science (ARMS) Fellowship** Aug 2017 – July 2019
\$92,000

MENTOR FOR:

- **LOGRAS Mentorship Program** (*Mentor First Year PhD Students*) August 2019 – Present
- **Project ENGAGES**, Georgia Tech May 2019 – July 2019
- **Summer Undergraduate Research Experience (SURE)**, Georgia Tech May 2019 – July 2019
- **MentorSHPE**, Georgia Tech August 2018 – May 2019
- **Summer Undergraduate Research Experience (SURE)**, Georgia Tech May 2018 – July 2018
- **GT Vertically Integrated Projects (GT VIP)**, Georgia Tech August 2017 – December 2017

MEMBERSHIPS:

- Latin American Student Organization 2020 – Present
- American Society of Biomechanics 2019 – Present
- Latino Organization of Graduate Students 2018 – Present
- Hispanic Heritage Month (HMM) Planning Committee 2018
- Biomedical Engineering Society 2018 – Present
- Mechanical Engineering Graduate Association 2017 – Present
- Robotics Graduate Student Organization 2017 – Present
- National Society of Professional Engineers (NSPE) 2014 – 2017
- College Robotics of Mechanical Engineers (CROME) 2014 – 2016
- Society of Hispanic Professional Engineers (SHPE) 2012 – Present

EXTRACURRICULAR ACTIVITIES:

- Chosen to represent all grad students working on the institute level plan for improving diversity for the next 10 years at Georgia Tech as part of the Diversity Equity and Inclusion Committee
- Mechanical Engineering, Graduate Student Development Committee Member, representing grad student interests
- Math tutor and personal development coach for undergrads
- Volunteered as middle and high school tutor for kids with special needs
- Was an NSPE All-Star Member, IDEA Platform trainee
- Avid drummer and drum teacher, also play guitar and other percussion instruments
- Won trophies in several sports, including golf and baseball, and practice *many* others
- Creator of a 40 young professional Puerto Ricans group in Atlanta