

Eugenio Frias-Miranda

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Education

Purdue University – West Lafayette, Indiana

- Doctor of Philosophy in Mechanical Engineering Aug 2022 – May 2028 | GPA: 3.87/4.00
Advisor – Laura H. Blumenschein | Dissertation – *Design and Validation of Soft Wearable Robots for Motor Learning*
- Bachelor of Science in Mechanical Engineering Aug 2018 – May 2022 | GPA: 3.50/4.00

Technical Skills

- **Software:** MATLAB, Python, C++, C#, C, ARM Assembly, Arduino, ROS, LabView, PhaseSpace Mocap
- **CAD:** SolidWorks, Siemens NX, CATIA, Creo Parametric, Abaqus, ANSYS

Research Experience

Wearable Resistance Device's Motor Learning Effects in Exercise | RAAD Lab, Purdue University Mar 2023 – Jan 2024

- Showed reduction in squat form asymmetry by 15% using passive resistance in overhead squats
- Led a motor learning 64 subject 3-day study comparing haptic and visual feedback, using motion capture
- Developed and calibrated a stretch sensor for a wearable device, achieving force-displacement accuracy of $R^2 = 0.88$

Inflatable Rotational Joint for Soft Robots | RAAD Lab, Purdue University Jul 2024 – Sep 2024

- Led experimental validation of tendon-driven actuation, achieving a 10.45 N average buckling force
- Developed an inflatable rotational joint, reducing actuation energy by 46% compared to isotropic designs
- Designed and tested a multi-unit soft robot system, creating reconfigurable motion sequences with modular joints

Vine Robot Localization | RAAD Lab, Purdue University Jun 2022 – Mar 2023

- Developed a localization algorithm for a Vine Robot with less than 5% error in tip position over multi-obstacle paths
- Designed and implemented a sensorized end cap, improving collision detection accuracy by 100%
- Led experiments with a 2.4m Vine Robot using sensorized environments

Folded Pneumatic Artificial Muscle | RAAD Lab, Purdue University Jun 2022 – Aug 2022

- Developed a geometry-controlled actuator prototype, enabling tunable stiffness and tunable strain control
- Conducted experiments on units with varying fold ratios, producing a design space with a maximum strain of 0.37
- Designed and tested a novel foldPAM actuator, achieving force control accuracy within 0.5% of the actuation range

Professional Experience

Software Engineer Intern | M365 Core, Microsoft May 2021 – Aug 2021

- Analyzed data gathered from a TDS machine and logged data analysis results in kusto using C#
- Created a processor which ingests a signal to obtain workplace data analytics

Program Manager Intern | Project Agora, Microsoft Graph, Microsoft May 2020 – Aug 2020

- Defined current problems, customers, and potential solutions within Microsoft Graph's API Review process
- Interviewed 12 Microsoft Graph API reviewers to prioritize solutions

Leadership & Service

President | Mechanical Engineering Graduate Student Association Aug 2022 – Present

- Organized major events for ME as direct link between ME students, faculty, and staff
- Fostered communication skills by leading prospective student tours

Graduate Student Representative | Society of Hispanic Professional Engineers Aug 2019 – Present

- Build professional communication practices through networking and creating events with over 100 attendees

Volunteer | 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023) Oct 2023

Research Interests

- Eugenio is a PhD student in Mechanical Engineering at Purdue University, from San Juan, Puerto Rico. He works in Laura Blumenschein's Robust and Adaptive Design Lab and is currently funded by a graduate research assistantship. His research focus is on soft and wearable robotics. At present, Eugenio is working exploring the motor learning effects of highly wearable kinesthetic force feedback devices. Some of his past work includes the development of a self-sensing obstacle interaction vine robot and folded pneumatic actuators (foldPAMs). He is particularly interested in using soft robotics to enhance the current understanding in human rehabilitation and wearable devices. In his free time, Eugenio enjoys playing soccer and learning about technology.

Publications

1. **E. Frias-Miranda**, M. R. Misterka, M. M. Matthews, and L. H. Blumenschein, "The Effect of a Simple Kinesthetic Force Field with Varying Visual Feedback Complexity on Motor Learning of a Knee Angle Squat Task", In preparation.
2. S. Wang, **E. Frias-Miranda**, A. Alvarez Valdivia, and L. H. Blumenschein, "Anisotropic Stiffness and Programmable Actuation for Soft Robots Enabled by an Inflated Rotational Joint," Submitted.
3. **E. Frias-Miranda**, H. A. Nguyen, J. Hampton, T. Jones, B. Spotts, M. Cochran, D. Chan, and L. H. Blumenschein, "Adaptation and Training Effects from a Passive, Wearable Resistance Device During Exercise," in IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), 2024.
4. **E. Frias-Miranda**, A. Srivastava, S Wang, and L. H. Blumenschein, "Vine Robot Localization Via Collision", in IEEE International Conference on Intelligent Robots and Systems (IROS), 2023.
5. S. Wang, **E. Frias-Miranda** and L. H. Blumenschein, "The Folded Pneumatic Artificial Muscle (foldPAM): Towards Programmability and Control via End Geometry," in IEEE Robotics and Automation Letters, vol. 8, no. 3, pp. 1383-1390, March 2023, doi: 10.1109/LRA.2023.3238160.

Presentations

- **E. Frias-Miranda**, H. A. Nguyen, J. Hampton, T. Jones, B. Spotts, M. Cochran, D. Chan, and L. H. Blumenschein, "Adaptation and Training Effects from a Passive, Wearable Resistance Device During Exercise," in IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), 2024. Poster Presentation.
- **E. Frias-Miranda**, H. A. Nguyen, J. Hampton, T. Jones, B. Spotts, M. Cochran, D. Chan, and L. H. Blumenschein, "A Wearable Resistance Device's Motor Learning Effects in Exercise" in Dynamic Walking Conference 2024. Poster Presentation.
- **E. Frias-Miranda**, A. Srivastava, S Wang, and L. H. Blumenschein, "Vine Robot Localization Via Collision", in IEEE International Conference on Intelligent Robots and Systems (IROS), 2023. Oral and Poster Presentation.
- **E. Frias-Miranda**, A. Srivastava, L.H. Blumenschein. "Localization of Vine Robot Through Obstacle Collision" (2022). Purdue Engineering Virtual Graduate Showcase. Poster Presentation.
- **E. Frias-Miranda**, A. Srivastava, L.H. Blumenschein. "Localization of Vine Robot Through Obstacle Collision" (2022). Purdue BRIDGE Competition. Poster Presentation.
- A. Boyina*, **E. Frias-Miranda***, Z. Siefker, J. Hodul, B. Boudouris, G. Chiu, J. Braun, J.F. Rhoads. "Exploring the Influence of Temperature and Humidity on a Resonant Mass CO₂ Sensor for Buildings" (2021). IDETC-CIE Conference. Oral Presentation.

Teaching

Teaching Assistant | Systems, Measurements, and Controls II

Jan - May 2023

- Led a laboratory section of 20 undergraduates where they designed and built a control system for a differential drive robot

Honors and Awards

- Society of Hispanic Professional Engineers Scholarship May 2023
- Honorable Mention, Purdue Engineering Virtual Graduate Showcase Oct 2022
- 3rd place, Purdue BRIDGE Poster Competition Aug 2022
- Purdue Graduate BRIDGE Program Fellow Jun 2022
- 2nd place, Mallot Innovation Competition, Purdue Mechanical Engineering May 2022
- Purdue Mechanical Engineering Scholarship Dec 2021