Felipe Felix Arias

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felipefelixarias.github.io

Research Interests: Robotics, Computer Vision, Self-Supervision, Reinforcement Learning

Education

University of Illinois at Urbana-Champaign May 2024

Doctor of Philosophy (Ph.D.) in Computer Science ***GPA: 4.0/4.0***

Advisor: *Nancy M. Amato*

University of Illinois at Urbana-Champaign May 2019

Bachelor of Science in Computer Science (with Honors) ***GPA: 3.8/4.0***

Awards

- **Fellowships/Scholarships**: NSF Graduate Research Fellowship (2021), GEM Fellowship (2020), Saburo Muroga Endowed Fellowship (2019), Engineering Pathways Scholarship (2016-2019), Hispanic Scholarship Fund (2018-2020), Carol Stream Community College Scholarship (2016), S.C. Reed Scholarship (2016), H.J. Kleemann Scholarship (2015), Rotary Club of Naperville Scholarship (2015)
- **Recognitions**: Ford Fellowship (Honorable Mention) (2021), Phi Kappa Phi (2021), C. S. Larson Transfer Student Award and Scholarship (2019), Tau Beta Pi (2018), College of DuPage Student Spotlight (2016)

Experience

University of Illinois at Urbana-Champaign - Parasol Lab Urbana, IL

Graduate Research Assistant - Advisor: Nancy M. Amato *June 2019 - Present*

- Leverage self-supervised learning and spatial/contextual/semantic cues to improve the performance of social navigation in constrained environments (RL-based and otherwise) and multi-agent motion planning
- Led a collaboration with Google Brain researchers from conception to publication (ICRA 2021) based on the intuition that agents should learn to recognize topology relevant to dynamic environment navigation
- Developed a self-supervised model for predicting pedestrian motion patterns from topology that may be used to generate cost-maps or extract features by extending graph-theory and image segmentation concepts
- Achieved 5X runtime improvement over a grid-based multi-agent motion planning baseline in constrained environments by leveraging a neural network trained to identify regions critical to obstacle avoidance

Stanford University - Hazy Research Lab Stanford, CA

Undergraduate Research Assistant - Advisor: Christopher Ré *June 2018 - March 2019*

- Worked on enabling multi-sentence weak supervision for NLP applications of Snorkel, a system for rapidly creating, modeling, and managing training data with now CEO Alex Ratner (Snorkel AI)
- Implemented a baseline and adapted the system to use the same heuristics as single-sentence relation extraction, then improved F1 scores by 12% with a novel multi-sentence heuristic and multi-task learning

University of Illinois at Urbana-Champaign - IL Geometry Lab Urbana, IL

Undergraduate Research Assistant - Advisor: Richard Sowers *January 2018 - December 2018*

- Added scene detection, object tracking, and weak supervision capabilities to Video As a Sensor, a system that tracks human behavior in the roadways and assesses risk, alongside a team of students
- Implemented an object tracking model and used weak supervision to improve the performance, and expedite the creation of, novel classifiers with computer vision, object-specific, pose, and cross-temporal heuristics

University of California Berkeley - BETS Lab Berkeley, CA

Undergraduate Research Assistant - Advisor: David Culler *June 2017 - August 2017*

- Worked alongside a Ph.D. candidate on the incident reporting system of E-mission, the first open-source mobilityscope platform that tracks multi-modal transportation patterns
- Implemented a shake gesture detection baseline (imbalanced binary classification) using signal processing, and improved F1 scores 7% by adding a support vector machine to the classification pipeline

Experience

College of DuPage Wheaton, IL

Tutor *January 2015 - August 2016*

– Tutored students with diverse backgrounds and abilities in computer science, chemistry, and math courses

Publications

– **Pedestrian Motion Pattern Prediction for Social Navigation via Self-Supervision**
F. F. Arias, M. Morales, N. M. Amato
Social Intelligence in Humans and Robots Workshop, Robotics: Science and Systems (RSS), New York City, June 2022.

– **Pedestrian Motion Pattern Prediction from Traversability Maps**
F. F. Arias, M. Morales, N. M. Amato
Scaling Robot Learning Workshop, IEEE International Conference on Robotics and Automation, Philadelphia, May 2022.

– **Avoidance Critical Probabilistic Roadmaps for Motion Planning in Dynamic Environments**
F. F. Arias, B. Ichter, A. Faust, and N. M. Amato, "Avoidance critical probabilistic roadmaps for motion planning in dynamic environments," in Proc. IEEE Int. Conf. Robot. Automat., 2021, pp. 10264–10270

Skills

– **Programming**: Python, C++, C, Tensorflow, Pytorch, ROS, iGibson, Gazebo, LaTeX
– **Version Control**: Git **Operating Systems**: Linux, OS X, Windows 10
– **Languages**: English (fluent), Spanish (fluent)

Professional Activities

Marovi Foundation Chicago, IL

Co-founder *November 2020 - Present*

– Provide resources and opportunities for aspiring programmers, immigrants, and Hispanics in Spanish and English by sharing the lessons learned through my immigration experience and journey to graduate school

Affiliations

– Google CS Research Mentorship Program (2021, Mentor: Jie Tan), GEM Consortium (2020-Present), Diversifying Future Leadership in the Professoriate Alliance (2020-Present), Society of Hispanic Professional Engineers (2018-Present), The Leadership Alliance (2018-Present), Tau Beta Pi (2018), Morrill Engineering Program (2016-2018)