

# Felipe Felix Arias

felipecfelixarias.github.io

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

## EDUCATION

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**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

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- **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

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**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

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### 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

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### Workshops

- **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 @ RSS 2022

- **Pedestrian Motion Pattern Prediction from Traversability Maps**

**F. F. Arias**, M. Morales, N. M. Amato

Scaling Robot Learning Workshop @ ICRA 2022

### Conferences

- **Avoidance Critical Probabilistic Roadmaps for Motion Planning in Dynamic Environments**

**F. F. Arias**, B. Ichter\*, A. Faust\*, N. M. Amato — \* Google Brain

International Conference on Robotics and Automation (ICRA) 2021

## SKILLS

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- **Programming:** Python, C++, C, Tensorflow, Pytorch, ROS, iGibson, Gazebo, L<sup>A</sup>T<sub>E</sub>X
- **Version Control:** Git      **Operating Systems:** Linux, OS X, Windows 10
- **Languages:** English (fluent), Spanish (fluent)

## PROFESSIONAL ACTIVITIES

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### 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)