INGRID NAVARRO-ANAYA

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PhD Student in Robotics at The Robotics Institute, Carnegie Mellon University

EDUCATION

Ph.D. in Robotics — *Carnegie Mellon University* — Aug 2022 – Present

M.S. in Robotics — *Carnegie Mellon University* — Aug 2020 – Aug 2022

B.S. in Computer Engineering — *Tecnológico de Monterrey (ITESM)* — Aug 2014 – May 2019

Computer Engineering Exchange Student — *École Polytechnique de Montréal* — Aug 2017 – Dec 2017

RESEARCH INTERESTS

Robotics | Machine Learning | Motion Prediction | Social Navigation | Human-Robot Interaction | Robustness | Safety | AI for Aviation | Autonomous Driving

RESEARCH EXPERIENCE

Graduate Researcher — *Bot Intelligence Group (BIG) at Carnegie Mellon University* — Aug 2020 – Present

Advised by: Jean Oh and Sebastian Scherer

- Design of algorithms, real-world datasets, and evaluation methods for motion prediction and social navigation in aviation and autonomous driving, with a focus on safety and robustness.
- Worked on hierarchical learning-based models for multimodal embodied navigation tasks, such as Vision-and-Language Navigation and Audio-Visual Navigation.

Robotics Institute Summer Scholar (RISS) — *Navlab at Carnegie Mellon University* — Summer 2017 and 2018

Advised by: Luis Ernesto Navarro-Serment

- Learning-based algorithms for semantic segmentation of sparse 3D point clouds from low-end LiDAR sensors (2018).
- Design of a dataset and deep learning algorithms for wheelchair detection in cluttered environments (2017).

Undergraduate Researcher — *Vanttec at Tecnológico de Monterrey* — Jan 2017 – May 2019

Advised by: Leonardo Garrido-Luna

- Learning-based algorithms for obstacle detection and navigation on aquatic surfaces.

WORK EXPERIENCE

Robotics Software Engineer — *Medical Robotics Startup in Stealth Mode* — Jan 2020 – Aug 2020

Advised by: Kamran Shamaei and Alfonso Paltán

Project: Built and integrated algorithms for collision detection and avoidance for a surgical implant robot manipulator.

- Used computer vision algorithms to capture and process 3D point clouds of the robot's surroundings.
- Leveraged plane fitting and geometry-based techniques to build algorithms for fast self and environment collision detection.
- Designed visualization and simulation tools to showcase collision detection and avoidance.

Computer Vision Engineer — *X-LAB Protexa R&D* — Nov 2019 – Jul 2020

Projects: Design of a prototype visual inspection system for detecting and categorizing vehicle paint defects.

Computer Vision Intern — *Carbon Robotics* — Jul 2019 – Sep 2019

Advised by: Kamran Shamaei and Alfonso Paltán

Project: Design of a camera calibration evaluation scheme using a motion capture system and plane fitting methods.

SERVICE

- **Chair of Finances for the Latino Graduate Student Association (LGSA)** — ***CMU*** — 2023
- **Committee member for the Learn-to-Race workshop at IJCAI** — ***CMU*** — 2022
- **Robotics Institute Summer Scholars (RISS) program mentor** — ***CMU*** — 2021, 2023
- **Admissions committee member for the (RISS) program** — ***CMU*** — 2021, 2022

PEER REVIEWING

Human Robot Interaction (HRI) | International Conference on Robotics and Automation (ICRA) | International Conference on Intelligent Robots and Systems (IROS)

TEACHING

- **Teaching Assistant, 16-720 Computer Vision** — ***Carnegie Mellon University*** — Spring 2023

  Instructor: Deva Ramanan

MENTORING

- **Pablo Ortega-Kral** — ***RISS Scholar, ECE Student at Tecnologico de Monterrey*** — Summer 2023 - Present

  Topic: Motion prediction for aviation

- **Samuel Park** — ***M.S. Student in Mechanical Engineering at Carnegie Mellon University*** — Summer 2023

  Topic: Motion prediction for aviation

- **Shaunak Halbe** — ***RISS Scholar, CS Student at College of Engineering Pune*** — Summer 2021

  Topic: Vision-and-Language Navigation

PUBLICATIONS

Journal Articles

- Francis*, Jonathan, Nariaki Kitamura*, Felix Labelle*, Xiaopeng Lu*, Ingrid Navarro*, and Jean Oh (2022). "Core Challenges in Embodied Vision-Language Planning". In: *Journal of Artificial Intelligence Research* 74.
  *Denotes Equal Contribution.

Thesis

- Ingrid Navarro (2022). *Socially-Aware Trajectory Prediction Guided by Motion Patterns*. Pittsburgh, PA.

Conference Papers

- Ingrid Navarro and Jean Oh (2022). "Social-PatteRNN: Socially-Aware Trajectory Prediction Guided by Motion Patterns". In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 9859–9864.
- Ingrid Navarro, Alberto Herrera, Itzel Hernandez, and Leonardo Garrido (2018). "Data Augmentation in Deep Learning-based Obstacle Detection for Autonomous Navigation on Aquatic Surfaces". In: *Advances in Computational Intelligence. 17th Mexican International Conference on Artificial Intelligence, MICAI 2018, Guadalajara, Mexico, Proceedings, Part II*. vol. 11289. Springer International Publishing, pp. 342–353.

Pre-prints / Under Review

- Ingrid Navarro*, Jay Patrikar*, Joao P. A. Dantas, Rohan Baijal, Ian Higgins, Sebastian Scherer, and Jean Oh (2023). " SoRTS: Learned Tree Search for Long-Horizon Social Robot Navigation".
  Under review for *Robotics and Automation Letters* (RA-L) 2024. *Denotes equal contribution.
- Stoler*, Benjamin, Ingrid Navarro*, Meghdeep Jana, Soonmin Hwang, Jonathan Francis, and Jean Oh (2023). "SafeShift: Safety-Informed Distribution Shifts for Robust Trajectory".
  Under review for *International Conference on Robotics and Automation* (ICRA) 2024. *Denotes equal contribution.

- Tatiya, Gyan, Jonathan Francis, Luca Bondi, Ingrid Navarro, Eric Nyberg, Jivko Sinapov, and Jean Oh (2022). " Knowledge-driven Scene Priors for Semantic Audio-Visual Embodied Navigation".

Workshop Papers, Extended Abstracts & RISS Publications

- Francis*, Jonathan, Nariaki Kitamura*, Felix Labelle*, Xiaopeng Lu*, Ingrid Navarro*, and Jean Oh (2023). *Core Challenges in Embodied Vision-Language Planning (Extended Abstract)*.
  *Denotes Equal Contribution.
- Patrikar, Jay, Joao Dantas, Sourish Ghosh, Parv Kapoor, Ian Higgins, Jasmine J Aloor, Ingrid Navarro, Jimin Sun, Ben Stoler, Milad Hamidi, Brady Moon Rohan Baijal, Jean Oh, and Sebastian Scherer (2022). *Challenges in Close-Proximity Safe and Seamless Operation of Manned and Unmanned Aircraft in Shared Airspace*.
- Halbe, Shaunak, Ingrid Navarro, and Jean Oh (2021). *Reason & Act: A Modular Approach to Explanation-Driven Agents for Vision-and-Language Navigation*. RISS Working Papers Journal. Vol. 9, pp. 105-111.
- Ingrid Navarro and Luis Ernesto Navarro-Serment (2018). *Real-Time Semantic Segmentation System of Sparse LiDAR Point Clouds using Lightweight CNNs and Recurrent CRF*. RISS Working Papers Journal. Vol. 6, pp. 105-111.
- Ingrid Navarro and Luis E. Navarro-Serment (2017). *A Faster RCNN-Based Wheelchair Recognition System*. RISS Working Papers Journal. Vol. 5, pp. 125–132.

HONORS / AWARDS

- Top student of the Department of Engineering — *Tecnológico de Monterrey* — Apr 2018
- RoboCup Platform Soccer League Competition, 1st place. — *Mexican Robotics Tournament* — May 2018
- Emerging Leaders in the Americas Program (ELAP) Scholarship Recipient — *Government of Canada* — Aug 2017
- Scholarship recipient — *Santander - Tecnológico de Monterrey* — May 2017
- Hackathon MTY, Junior Category, 1st Place — *Major League Hacking* — Mar 2016

SKILLS AND FRAMEWORKS

Python | C/C++ | Pytorch | Pytorch Lightning | AI Habitat | ROS | OpenCV | VTK | Protobuf | OpenRAVE | Git | Bitbucket | Jira | Ubuntu

LANGUAGES

Spanish (Native) | French (Fluent) | English (Fluent)