Joaquim Ortiz-Haro

quimortiz21@gmail.com quimortiz.github.io
267 Kosciuszko St, Brooklyn, NY 11221 (US)
Citizenship: Spanish

I am a postdoctoral robotics researcher at New York University (NYU), working in the Machines in Motion Laboratory under the direction of Prof. Ludovic Righetti. My research interests include task and motion planning, control, and deep learning for robotics. I hold a PhD in Robotics from TU Berlin, supervised by Prof. Marc Toussaint.

EDUCATION

– **Postdoctoral Researcher, Robotics, NYU** Feb. 2024 - Ongoing
Machines in Motion Laboratory, New York University (NYU), under the direction of Professor Ludovic Righetti. Conducting research in task and motion planning, control, and deep learning for robotics. Leading research projects, supervising PhD and Master's students, and collaborating with team members on various research projects.

– **PhD in Robotics** Sep. 2019 - Jan. 2024
TU Berlin (Germany) and IMPRS-IS (Max Planck Research School). Focus on task and motion planning, nonlinear optimization, and deep learning for robotics. Advisor: Marc Toussaint.

– **Master of Mathematics** 2017 - 2019
UPC (Polytechnic University of Catalonia, Barcelona), Faculty FME. Average qualification: 9.38/10. Exchange student at LAAS-CNRS (French National Research Center).

– **Bachelor of Mechanical Engineering** 2013 - 2017
UPC (Polytechnic University of Catalonia, Barcelona), Faculty ETSEIB. Top Class Honours. Ranked 2nd out of 350 graduate students. Average qualification: 8.84/10. Exchange student at ETH Zurich (Switzerland).

– **High School** 2014 - 2017
Honour Mention in the Spanish University Entrance Exam (13.36/14). Scholarship to study the first year at university. Gold Medal in the XXVI Chemistry Spanish National Olympiad.

SELECTED PUBLICATIONS

Google Scholar Profile: Joaquim Ortiz-Haro. Check also my personal website. Complete list of publications at the end of the CV.

1. Factored Task and Motion Planning with Combined Optimization, Sampling, and Learning.
   Joaquim Ortiz-Haro. PhD Thesis, TU-Berlin, 2024.

2. iDb-A*: Iterative Search and Optimization for Optimal Kinodynamic Motion Planning.
   Under review. Submitted to IEEE Transactions on Robotics (T-RO), 2023.

3. Conflict-driven Interface between Symbolic Planning and Nonlinear Constraint Solving.
   J. Ortiz-Haro, E. Karpas, M. Katz, and M. Toussaint. IEEE Robotics and Automation Letters (RA-L), 2022.

4. Structured Deep Generative Models for Sampling on Constraint Manifolds in Sequential Manipulation.
   Joaquim Ortiz-Haro, Jung-Su Ha, Danny Driess, and Marc Toussaint. 5th Annual Conference on Robot Learning (CoRL), 2021.

EXPERIENCE

– **Postdoctoral Researcher, Robotics, NYU** Feb. 2024 - Ongoing
See section Education.

– **PhD Student, Robotics** Sep. 2019 - Jan. 2024
See section Education.

– **Research Intern, Machine Learning** 2019
Worked on optimal transport and theoretical machine learning. Artificial Intelligence and Machine Learning Group at UPF (University Pompeu Fabra, Barcelona). Supervisor: Gergely Neu.

– **Research Intern, Robotics** 2018
Conducted research on contact and trajectory optimization using an augmented Lagrangian algorithm. Humanoid Robotics at LAAS-CNRS (French National Research Center). Supervisor: Nicolas Mansard.

– **Intern, Robotics Engineer** 2018
Performed geometric and semantic analysis of 3D point clouds. Scaled Robotics (start-up, Barcelona).

– **Seat Autonomous Car Competition** 2017
Member of the IRI (Robotics Institute, Barcelona) team for an autonomous driving competition, scale 1:10.

– **Research Assistant, SLAM** 2017
Developed parallel tracking and mapping algorithms for an event-based camera. IRI (Robotics Institute, Barcelona). Supervisor: Joan Solà.

– **Teaching Assistant** 2015 - 2017
Taught mathematics to first-year engineering students at ETSEIB, UPC.

– **Private Academy Teacher** 2014
Taught university-level engineering lessons at a private academy.

PROGRAMMING

– **C++**: Main tool for robotics research during PhD and Postdoc. Utilized in internships at robotics companies and robotics competitions. Proficient with BOOST, ROS, PCL, OpenCV, EIGEN, OMPL, and developed custom C++ libraries with Python bindings.

– **Python**: Used for deep learning research during PhD (PyTorch). Applied in master's thesis for robotics and numerical optimization (SciPy, NumPy, etc.) and various programming courses.

– **Matlab**: Utilized in bachelor thesis (robotics and computer vision) and university courses.

– **Other**: Experienced with Arduino, PlatformIO, ANSYS, SolidWorks, Minitab, and Autodesk Fusion.

LANGUAGES

– **Spanish and Catalan**: Native.

– **English**: Professional proficiency. Scientific publications, bachelor's and master's theses written in English. Advanced Certificate (CAE) from Cambridge University, C1.2 (2013).

– **French**: Official certificate DELF B2 (2019). Six-month exchange in Toulouse.

– **German**: Official certificate B2.2 from Goethe Institute (2017). Engineering courses conducted in German at ETH. Attended two summer language courses in Germany.

PERSONAL SKILLS

Passionate about research, problem-solving, and learning. Experienced in interdisciplinary and international teams. Dedicated, honest, and hardworking. I love teaching and sharing my knowledge. In my free time, I enjoy climbing, cycling, and reading books. I also play the guitar and am learning the piano.

STUDENT SUPERVISION

1. **Real-time Task and Motion Planning and Control**. Alexandre Gllr. Master's Thesis in Aerospace Engineering (NYU).
2. **Efficient Kinodynamic Motion Planning with Reinforcement Learning Policies**. Alexander Weingart. Co-supervised with Wolfgang Hoenig. Master's Thesis in Computer Science (TU Berlin).
3. **Neural Scene Representations for Sequential Reasoning**. Phillip Groete. Co-supervised with Ozgur Oguz. Master's Thesis in Computer Science (TU Berlin).
4. **SCP and k-Order Motion Optimization for Cooperative Multirotor Teams**. Welf Rehberg. Co-supervised with Wolfgang Hoenig. Master's Thesis in Computer Science (TU Berlin).
5. **Combining Sampling and Optimization for Optimal Motion Planning**. Jay Kamat. Co-supervised with Andreas Orthey. Master's Thesis in Mathematics (BITS and TU Berlin).
6. **Constrained Sampling - A Study on Methods for Sampling from Constraint Manifolds**. Philip Oedi. Co-supervised with Jung-Su Ha. Master's Thesis in Computer Science (TU Berlin).

TEACHING

– **AI & Robotics: Lab Course**. M.Sc. Computer Science, TU-Berlin. Teaching Assistant, Summer Semester 2022.

– **Optimization Algorithms**. M.Sc. Computer Science, TU-Berlin. Teaching Assistant, Winter Semesters 2020, 2021, 2022, 2023.

– **Calculus II**. B.Sc. Industrial (Mechanical) Engineering, UPC Barcelona (ETSEIB). Teacher in Aula LLiure, Summer Semesters 2015, 2016, and 2017.

– **Calculus I**. B.Sc. Industrial (Mechanical) Engineering, UPC Barcelona (ETSEIB). Teacher in Aula LLiure, Winter Semester 2015.

INVITED TALKS

– **A Bidirectional Interface between Nonlinear Optimization and Symbolic Planning for Task and Motion Planning**
  – Seminar, NYU Robotics. Host: Ludovic Righetti. 2023.
  – INRIA Paris. Host: Justin Carpentier. 2023.
  – IRI (Robotics Institute, Barcelona). Host: Joan Sola. 2023.
  – University Pompeu Fabra (UPF). Host: Gergely Neu. 2023.
  – Robotics Seminar, Technion (Israel). Host: Erez Karpas. 2022.

– **Structured Deep Generative Models for Sampling on Constraint Manifolds in Sequential Manipulation**
  – Seminar of Group Gepetto, LAAS-CNRS (France). Host: Nicolas Mansard. 2021.

COMPLETE LIST OF PUBLICATIONS

Preprints

1. iDb-A*: Iterative Search and Optimization for Optimal Kinodynamic Motion Planning Under review. Submitted to IEEE Transactions on Robotics (T-RO), 2023.
2. Neural Field Representations of Articulated Objects for Robotic Manipulation Planning Phillip Grote, Joaquim Ortiz-Haro, Marc Toussaint, and Ozgur S. Oguz. Under review, 2024.
3. Kinodynamic Motion Planning for a Team of Multirotors Transporting a Cable-Suspended Payload in Cluttered Environments Khaled Wahba, Joaquim Ortiz-Haro, Marc Toussaint, and Wolfgang Hönig. Under review, 2024.
4. iDb-RRT: Sampling-based Kinodynamic Motion Planning with Motion Primitives and Trajectory Optimization Joaquim Ortiz-Haro, Wolfgang Hönig, Valentin N. Hartmann, Marc Toussaint, and Ludovic Righetti. 2024.

Phd Thesis

1. Factored Task and Motion Planning with Combined Optimization, Sampling and Learning Joaquim Ortiz-Haro. TU-Berlin, 2024.

Publications

1. Solving Sequential Manipulation Puzzles by Finding Easier Subproblems Levit Svetlana, Joaquim Ortiz-Haro, and Marc Toussaint. ICRA, 2024.
2. Effort Level Search in Infinite Completion Trees with Application to Task-and-Motion Planning Marc Toussaint, Joaquim Ortiz-Haro, Valentin Hartmann, Erez Karpas, and Wolfgang Hoenig. ICRA, 2024.
3. db-CBS: Discontinuity-Bounded Conflict-Based Search for Multi-Robot Kinodynamic Motion Planning Akmaral Moldagalieva, Joaquim Ortiz-Haro, Marc Toussaint, and Wolfgang Hönig. ICRA, 2024.
4. Efficient Path Planning In Manipulation Planning Problems by Actively Reusing Validation Effort Valentin N. Hartmann, Joaquim Ortiz-Haro, and Marc Toussaint. IEEE Int. Conf. on Intelligent Robots and Systems (IROS), 2023.
5. Learning Feasibility of Factored Nonlinear Programs in Robotic Manipulation Planning J. Ortiz-Haro, J.-S. Ha, D. Driess, E. Karpas, and M. Toussaint. IEEE Int. Conf. on Robotics and Automation (ICRA), 2023.

6. Conflict-driven Interface between Symbolic Planning and Nonlinear Constraint Solving J. Ortiz-Haro, E. Karpas, M. Katz, and M. Toussaint. IEEE Robotics and Automation Letters (RA-L), 2022.

7. db-A*: Discontinuity-bounded Search for Kinodynamic Mobile Robot Motion Planning Wolfgang Hönig, Joaquim Ortiz-Haro, and Marc Toussaint. Proc. of the IEEE Int. Conf. on Intelligent Robots and Systems (IROS), 2022.

8. RHH-LGP: Receding Horizon And Heuristics-Based Logic-Geometric Programming For Task And Motion Planning Cornelius V. Braun, Joaquim Ortiz-Haro, Marc Toussaint, and Ozgur S. Oguz. Proc. of the IEEE Int. Conf. on Intelligent Robots and Systems (IROS), 2022.

9. BITKOMO: Combining Sampling and Optimization for Fast Convergence in Optimal Motion Planning Jay Kamat, Joaquim Ortiz-Haro, Marc Toussaint, Florian T. Pokorny, and Andreas Orthey. Proc. of the IEEE Int. Conf. on Intelligent Robots and Systems (IROS), 2022.

10. Conflict-Directed Diverse Planning for Logic-Geometric Programming Joaquim Ortiz-Haro, Erez Karpas, Michael Katz, and Marc Toussaint. International Conference on Automated Planning and Scheduling (ICAPS), 2022.

11. Structured deep generative models for sampling on constraint manifolds in sequential manipulation. Joaquim Ortiz-Haro, Jung-Su Ha, Danny Driess, and Marc Toussaint. 5th Annual Conference on Robot Learning (CoRL), 2021.

12. Learning Efficient Constraint Graph Sampling for Robotic Sequential Manipulation Joaquim Ortiz-Haro, Valentin N. Hartmann, Ozgur S. Oguz, and Marc Toussaint. Proc. of the IEEE Int. Conf. on Robotics and Automation (ICRA), 2021.

Research Reports

1. A proximal formulation of regularized optimal transport Joaquim Ortiz-Haro. Research Report. Supervisor: Gergely Neu. University Pompeu Fabra (UPF), Barcelona, 2019.

Bachelor and Master Thesis

1. Simultaneous trajectory and contact optimization with an augmented Lagrangian algorithm Joaquim Ortiz-Haro. Master Thesis. Supervisors: Nicolas Mansard and Justin Carpentier. LAAS-CNRS, Toulouse, 2019.

2. Parallel tracking and mapping algorithms for an event based camera Joaquim Ortiz-Haro. Bachelor Thesis. Supervisor: Joan Sola. IRI (Robotics Institute) and UPC, Barcelona, 2017.

SERVICE

Reviewer: ICRA, IROS, RAL, CoRL, JAIR.

Last updated: June 2024.