Alejandro Perez   atp@csail.mit.edu

EDUCATION

Massachusetts Institute of Technology
Ph.D. Candidate, Computer Science
Advisors: Tomas Lozano-Perez, Leslie Kaelbling
Cornell University
M.Eng., Computer Science
Massachusetts Institute of Technology
Computer Science, Advisor: Seth Teller

AWARDS

· National Defense Science and Engineering Graduate Fellowship, 2013
· National Science Foundation Graduate Research Fellowship, 2012
· MIT Lemelson Engineering Presidential Fellowship, 2012
· MIT EECS Great Educators Fellowship, 2012
· Outstanding Accomplishments and Contributions as a Teaching Assistant,
  Cornell University, Department of Computer Science, 2012
· MIT Global Challenge 2011, IDEAS Competition, Top Juried Prize, Assistive Technology Group
· White House Fellowship, Nominated, 2010
· Google Scholarship, 2010
· National Science Foundation S-Stem Scholarship, 2009, 2010
· Outstanding Participant Award: Best Overall Demonstrated Excellence in Leadership
  and Technical Achievements, NASA GSFC, 2009

PROFESSIONAL
EXPERIENCE

Themis AI   2023 - Present
Chief Executive Officer

Working with Prof. Daniela Rus and MIT CSAIL researchers on the development of a software framework that automatically provides uncertainty estimates for arbitrary machine learning models.

Agility Robotics   2022
Manipulation Lead

Created and managed a team to develop autonomous whole-body manipulation behaviors for the Digit humanoid robot. Delivered and demonstrated warehouse manipulation at customer sites and the ProMat conference.

Self   2015 - Present
Consultant/Contractor

Specialize in real-time manipulation and machine learning. Managed the product development process and deployment of several mobile manipulation and Mizusumashi systems that meet ISO 13849, ISO 10218 and IEC 61508 standards. Managed the development and deployment of several machine learning models.

Stealth Company   2018 - 2020
Founder

Established a self-funded, employee-owned consultancy specializing in robotics, manipulation, and machine learning. Successfully serviced clients across the US, UK, France, and Japan, achieving positive cash flow within the first six months of operation.

Stealth Project   2017
Algorithms Lead

Led the development of motion planning, VSLAM, coverage, and autonomous docking algorithms for a robotic product. Worked with hardware and manufacturing teams on sensor design. The product has been successfully shipped and has become a market leader in its category.

Capsen Robotics   2016
Manipulation Lead

Worked on the development of Capsen PiC, a software solution that provides real-time motion planning, perception, and control for integrated manipulation platforms.

Stealth Company   New York, NY
Research Lead   2015

Developed a real-time depth mapping and camera pose estimation algorithm that used single camera
video stream data as input. Wrote and optimized the software implementation to reliably process
30 frames per second on mobile devices.

Mujin Inc.   Tokyo, Japan
Motion Planning Lead   2014

Worked on the software and product development of the Mujin Controller PickWorker, a
general-purpose bin-picking system capable of real-time motion planning for the grasping and
placing of arbitrary manufacturing parts loaded in disorganized bins.

RESEARCH   **MIT Computer Science and Artificial Intelligence Laboratory**,   Cambridge, MA
EXPERIENCE Ph.D. Candidate   2012 - 2015

Worked with Prof. Tomas Lozano-Perez and Prof. Leslie Kaelbling on bimanual mobile manipulation
of deformable objects in cluttered environments. Integrated force/torque/tactile sensing, perception,
and impedance control to manipulate objects like plastic bags, cardboard boxes, and household items
that require real-time bimanual manipulation.

MIT Computer Science and Artificial Intelligence Laboratory   Cambridge, MA
Visiting Student   May 2011 - August 2011

Worked with Prof. Tomas Lozano-Perez and Prof. Leslie Kaelbling on optimal sampling-based
planning for belief-spaces and underactuated systems. The resulting algorithm is currently being
tested at the International Space Station as part of the ReSWARM experiments.

MIT Computer Science and Artificial Intelligence Laboratory   Cambridge, MA
Visiting Student   January 2011 - May 2011

Worked with Prof. Seth Teller and Prof. Emilio Frazzoli on the development of a high-dimensional
optimal motion planning algorithm for bimanual manipulation. Wrote the ROS/OMPL open-source
implementation of the RRT* algorithm as part of the PR2 Beta Program.

MIT Computer Science and Artificial Intelligence Laboratory   Cambridge, MA
Undergraduate Researcher, MSRP   2010

Worked with Prof. Seth Teller and Prof. Emilio Frazzoli on the Agile Robotics for Logistics project.
Developed a real-time optimal motion planning algorithm for mobile manipulation tasks. Wrote the
first implementation of an anytime asymptotically-optimal planner for a physical robot and tested
it on an autonomous rear-wheel steered robotic forklift.

NASA Goddard Space Flight Center   Greenbelt, MD
Undergraduate Researcher   2009

Worked with Tom Flatley on the development of real-time path planning and coverage algorithms
for future lunar robotic missions. Carried out simulated missions at the Multipurpose Exo-terrain
for Robotic Studies (MERS) field.

REFEREED   Gustavo Goretkin, Alejandro Perez, Robert Platt Jr., George Konidaris. *Optimal Sampling-Based*
CONFERENCE *Planning for Linear-Quadratic Kinodynamic Systems*. Proceedings of the IEEE International
PUBLICATIONS Conference on Robotics and Automation. Karlsruhe, Germany 2013.

Alejandro Perez, Robert Platt Jr., George Konidaris, Leslie Kaelbling, Tomas Lozano-Perez.
LQR-RRT*: Automatically Deriving Extension Heuristics for Sampling-Based Optimal Motion
Planning. Proceedings of the IEEE International Conference on Robotics and Automation. St.
Paul, MN, 2012.

Alejandro Perez, Sertac Karaman, Matthew R. Walter, Alexander Shkolnik, Emilio Frazzoli, Seth
Teller. *Asymptotically-optimal Manipulation Planning using Incremental Sampling-based Algorithms.*
Proceedings of the IEEE/RSJ International Conference on Intelligent Robots, San Francisco, CA,
September 2011.

Sertac Karaman, Matthew R. Walter, Alejandro Perez, Emilio Frazzoli, Seth Teller. *Anytime Motion Planning using the RRT**. Proceedings of the IEEE International Conference on Robotics and Automation, Shanghai, China, May 2011.

REFEREED
WORKSHOP
PUBLICATIONS

Alejandro Perez, Iaroslav Elistratov, Fynn Schmitt-Ulms, Ege Demir, Sadhana Lolla, Elaheh Ahmadi, Daniela Rus, Alexander Amini. *Risk-Aware Image Generation by Estimating and Propagating Uncertainty*. ICML 2023, Challenges in Deployable Generative AI, Honolulu, HI, July 2023.

Sadhana Lolla, Iaroslav Elistratov, Alejandro Perez, Elaheh Ahmadi, Daniela Rus, Alexander Amini. *Capsa: A Unified Framework for Quantifying Risk in Deep Neural Networks*. NeurIPS 2022, 5th Robot Learning Workshop: Trustworthy Robotics, New Orleans, LA, December 2022.

Alejandro Perez, Sertac Karaman, Matthew R. Walter, Emilio Frazzoli, Seth Teller. *Asymptotically optimal Manipulation Planning using Incremental Sampling-based Algorithms*. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots, The PR2 Workshop, San Francisco, CA, September 2011.

REPORTS

Alejandro Perez. *RF-Based Material Detection*. Internal report, MIT Computer Science and Artificial Intelligence Laboratory, 2014.

Alejandro Perez. *Towards Active Reflectometry for Segmentation*. Internal report, MIT Computer Science and Artificial Intelligence Laboratory, 2013.

Alejandro Perez. *On Randomized Path Coverage of Configuration Spaces*. CSAIL Tech Report MIT-CSAIL-TR-2013-027. http://dspace.mit.edu/handle/1721.1/82462. Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, 2013.

Matthew Jordan, Alejandro Perez. *Optimal Bidirectional Rapidly-Exploring Random Trees*. CSAIL Tech Report MIT-CSAIL-TR-2013-021. http://dspace.mit.edu/handle/1721.1/79884. Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, 2013.

Alejandro Perez, Sertac Karaman. *Computationally-Efficient Asymptotically-Optimal Manipulation Planning using the RRT**. Internal report, MIT Computer Science and Artificial Intelligence Laboratory, 2011.

Alejandro Perez, Seth Teller. *Optimal Motion Planning for Agile Autonomous Vehicles using RRT**. Internal report, MIT Computer Science and Artificial Intelligence Laboratory, 2010.

Alejandro Perez. *Object Recognition and Learning for Planetary Rovers*. Internal report, NASA Goddard Space Flight Center, 2009.

ACADEMIC
SERVICE

Reviewer

Robotics and Autonomous Systems
Journal of Intelligent and Robotic Systems
IEEE Transactions on Robotics
IEEE Transactions on Aerospace and Electronic Systems
Annual Reviews in Control
IEEE International Conference on Robotics and Automation
IEEE/RSJ International Conference on Intelligent Robots and Systems

SOFTWARE
CONTRIBUTIONS

Robot Operating System (ROS)
Open Motion Planning Library (OMPL) RRT* and extensions
OpenRAVE: Open Robotics Automation Virtual Environment

MEDIA COVERAGE

Whole-body Manipulation at Agility Robotics:
Amazon News, IEEE Spectrum, Robotics247, CNET

LQR-RRT* / ReSWARM:
MIT News, ISS Research, NASA Status Report, NASA News, Wikipedia

Bimanual Manipulation:
MIT News, ABC News, New Scientist, Communications of the ACM, Gizmag

HOMEPAGE http://alum.mit.edu/www/atperez
http://atp.wiki

PUBLICATIONS Google Scholar Page

REFERENCES · **Daniela Rus**, Director, CSAIL; Andrew and Erna Viterbi Professor of EECS; MIT
· **Tomas Lozano-Perez**, School of Engineering Professor in Teaching Excellence; MIT
· **Leslie Kaelbling**, Panasonic Professor of Computer Science and Engineering; MIT
· **Sertac Karaman**, Director, LIDS; Associate Professor of Aeronautics and Astronautics; MIT
· **George Konidaris**, Chief Roboticist; Realtime Robotics
· **Adam Bry**, CEO; Skydio
· **Huan Liu**, President; Mujin China
· **Will Grathwohl**, Senior Research Scientist; Google DeepMind
· **Scott Kuindersma**, Sr. Director of Robotics Research; Boston Dynamics
· **Jared Glover**, CEO; Capsen Robotics
· **Tom Flatley**, Head, Science Data Processing Branch; NASA GSFC
· **Kohei Muto**, Private R&D Investment Advisor; Cabinet Office, Government of Japan