

Masahiro Ono

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CITIZENSHIP STATUS

Japanese citizen; U.S. permanent resident.

EDUCATION

Massachusetts Institute of Technology

Cambridge, MA

Ph.D. in Aeronautics and Astronautics, September 2011 (expected)

GPA 5.0/5.0

- Major in Autonomous Systems; minor in Economics
- Advisor: Prof. Brian Williams
- Thesis: “Risk-Sensitive Plan Execution using Chance-Constrained Optimal Control”
- Coursework includes: Optimal Control, Autonomy and Decision Making, Machine Learning, Computational Cognitive Science, Game Theory, Microeconomics, Macroeconomics, Satellite Engineering, Space Policy

M.S. in Technology and Policy, September 2011 (expected)

GPA 4.7/5.0

- Thesis: “Chance-Constrained Optimal Control for Smart Residential Buildings”

M.S. in Aeronautics and Astronautics, August 2007

GPA 4.9/5.0

- Advisor: Prof. Steven Dubowsky
- Thesis: “Experimental Validation of the Efficient Robotic Transportation Algorithm for Large-scale Flexible Space Structures”

The University of Tokyo

Tokyo, Japan

B.S. in Aeronautics and Astronautics, March 2005

GPA 3.88/4.0

- Thesis: “Analysis and Suppression of High-frequency Oscillation on Flexible Nano-class Satellites”

EXPERIENCE

Risk-Sensitive Plan Execution for Personal Aerial Vehicles

Sep 2007 - Present

Computer Science and Artificial Intelligence Lab, MIT, Cambridge, MA

- Developed a chance-constrained optimal control algorithm that operates under stochastic uncertainty with an upper bound on the probability of constraint violations
- Extended the control algorithm to a non-convex state space for robust path planning with obstacles
- Decentralized the control algorithm for multi-agent systems using dual decomposition
- Developing the receding-horizon chance-constrained optimal control for real-time operations
- Demonstrated the algorithms on the path planning and scheduling for Personal Aerial Vehicles

Sustainable Connected Home Project

Sep 2009 - Present

Computer Science and Artificial Intelligence Lab and Mobile Experience Lab, MIT, Cambridge, MA

- Designing and building a full-scale prototype of a smart, energy efficient residential building
- Developing a robust controller for electrochromic windows that minimizes the energy usage for heating

The Planning and Control of Space Robotic Systems

Feb 2006 - Aug 2007

Field and Space Robotics Laboratory, MIT, Cambridge, MA

- Constructed a free-floating space robot test bed with manipulators and cold gas thrusters
- Implemented and demonstrated an LQG-based vibration control algorithm for large flexible space structures

Nano-JASMINE Project — The University of Tokyo, Tokyo, Japan

Apr 2004 - Jul 2005

- Designed a nano-class astrometry satellite that measures a stellar parallax with 1.8 milliarcsecond precision, in collaboration with the National Astronomical Observatory of Japan; scheduled to be launched in 2011
- Analyzed the attitude stability of the satellite by modeling its flexible body dynamics

PRISM Project — The University of Tokyo, Tokyo, Japan

Jan 2003 - Jul 2005

- Developed a hand-made remote-sensing satellite; launched into orbit and became operational in 2009
- Programmed a software for the satellite’s communication system

CanSat Project — The University of Tokyo, Tokyo, Japan

Apr 2004 - Oct 2004

- Led a team of 10 students as the Project Manager
- Fabricated a can-size sub-orbiter with GPS and inertial navigation system, and launched it to 12,000 ft

SKILLS

Programming Languages : C/C++, Java, Matlab, Simulink, Python, MySQL, PHP, L^AT_EX
Hardware: Circuit design, programming of microcontrollers

JOURNAL PUBLICATIONS

- L. Blackmore, **M. Ono**, and B. Williams. "Chance-Constrained Optimal Path Planning with Obstacles." Accepted for publication in *IEEE Transactions on Robotics*.
- L. Blackmore, **M. Ono**, A. Bektassov, and B. Williams, "A Probabilistic Particle Control Approximation of Chance Constrained Stochastic Predictive Control," in *IEEE Transactions on Robotics*, 2010
- L. Blackmore, A. Bektassov, **M. Ono** and B. Williams, "Robust, Optimal Predictive Control of Jump Markov Linear Systems using Particles." in *Hybrid Systems: Computation and Control*, 2007 (Editors A. Bemporad, A. Bicchi and G. Buttazzo).

REFEREED CONFERENCE PUBLICATIONS

- A. Banerjee*, **M. Ono***, N. Roy, and B. Williams, "Regression-based LP Solver for Chance-Constrained Finite Horizon Optimal Control with Nonconvex Constraints," in *Proceedings of the IEEE American Control Conference*, 2011
*Both authors contributed equally to this work.
- **M. Ono**, B. Williams, "Decentralized Chance-Constrained Finite-Horizon Optimal Control for Multi-Agent Systems," **Finalist, Best Student Paper Award**, in *Proceedings of the IEEE Conference on Decision and Control*, 2010
- **M. Ono**, L. Blackmore, and B. Williams, "Chance Constrained Finite Horizon Optimal Control with Nonconvex Constraints," in *Proceedings of the IEEE American Control Conference*, 2010
- **M. Ono**, B. Williams, "Market-based Risk Allocation for Multi-agent Systems (Extended Abstract)," in *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems*, 2010
- L. Blackmore, **M. Ono**, "Convex Chance Constrained Predictive Control without Sampling," in *Proceedings of the AIAA Guidance, Navigation and Control Conference*, 2009
- **M. Ono**, B. Williams, "Iterative Risk Allocation: A New Approach to Robust Model Predictive Control with a Joint Chance Constraint," in *Proceedings of the IEEE Conference on Decision and Control*, 2008
- **M. Ono**, B. Williams, "An Efficient Motion Planning Algorithm for Stochastic Dynamic Systems with Constraints on Probability of Failure," in *Proceedings of the AAAI Conference on Artificial Intelligence*, 2008
- **M. Ono**, P. Boning, T. Nohara and S. Dubowsky, "Experimental Validation of a Fuel-Efficient Robotic Maneuver Control Algorithm for Very Large Flexible Space Structures," in *Proceedings of the IEEE International Conference on Robotics and Automation*, 2008
- N. Sako, Y. Hatsutori, **M. Ono**, T. Tanaka and S. Nakasuka, "About Nano-satellite for Infrared Astrometry (Nano-JASMINE) Project," in *Proceedings of Uchu Kagaku Gijutsu Rengo Koenkai Koenshu*, 2005

INVITED CONFERENCE PRESENTATIONS

- "Market-based Stochastic Optimization for Distributed Energy Management," invited talk at the 2nd International Conference on Computational Sustainability, 2010

AWARDS

- NASA Space Act Tech Brief Award, NPO 47305: "*Chance Constrained Guidance with Nonconvex Constraints*," 2011
- Finalist of the IEEE International Conference on Decision and Control Best Student Paper Award, "*Decentralized Chance-Constrained Finite-Horizon Optimal Control for Multi-Agent Systems*," 2010

REFEREE WORK

- Reviewer for IEEE American Control Conference, 2011
- Reviewer for IEEE International Conference on Robotics and Automation, 2011
- Reviewer for *Automatica*, 2010
- Reviewer for *Automatica*, 2009
- Reviewer for IEEE American Control Conference, 2009

LEADERSHIP

- Founder and president of Japanese Graduate Student Association in the U.S. (July 2010 - Present)
- Principal organizer of Boston Japanese Researchers Forum (March 2009 - Oct 2010)
- Elected president of Japanese Association of MIT (May 2008 - May 2009)
- Elected member of Ashdown House (MIT graduate dormitory) Executive Committee (May 2006 - May 2007)
- Founding member and organizer of Science and Technology Leadership Association (Dec 2005 - Aug 2009)

LANGUAGES

Japanese (native), English (fluent), Chinese (introductory), Spanish (introductory)