

# Debadeepta Dey

Principal Researcher, Microsoft Research AI

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## Research Interests

**AI, Machine Learning:** Decision-making under constraints of uncertainty and computation, Reinforcement Learning, Optimization, Deep Learning, Graphical Models, Structured Prediction

**Robotics:** Perception for autonomous aerial and ground robots, 3D reconstruction, Path Planning, Mapping and Navigation

## Education

**PhD in Robotics**, The Robotics Institute, Carnegie Mellon University (July, 2015)

**MS in Robotics**, The Robotics Institute, Carnegie Mellon University (July, 2012)

**BS in Electrical Engineering**, Delhi College of Engineering, Delhi, India, 2007

## Research Experience

Position	Place	Duration	References
Principal Researcher	Microsoft Research, Redmond	Sept 2019 onwards	Dr. Eric Horvitz
Senior Researcher	Microsoft Research, Redmond	Aug 2015-July 2019	Dr. Eric Horvitz
PhD Student	The Robotics Institute, Pittsburgh	Aug 2010-July 2015	Prof. J. Andrew Bagnell
Research Intern	Microsoft Research, Redmond	July-Sept 2013	Dr. Rich Caruana Dr. Eric Horvitz
Research Intern	Intel Research Labs, Pittsburgh	June-Aug 2010	Dr. Lily Mummert Dr. Rahul Sukthankar
Research Technology Associate	The Robotics Institute, Carnegie Mellon University	2007-2010	Prof. Sanjiv Singh

## Programming Skills

Programming Languages: C++ (proficient), Python (proficient), C#

Extensive experience developing with Linux, ROS, OpenCV (C++ and Python)

Deep Learning Frameworks: PyTorch, Tensorflow

## Publications

### Preprints

### Thesis

**Predicting Sets and Lists: Theory and Practice**, Debadeepta Dey, *The Robotics Institute, Carnegie Mellon University*, 2015

### Journals

**A cascaded method to detect aircraft in video imagery**, Debadeepta Dey, Christopher Geyer, Sanjiv Singh, Matt Digioia, *International Journal of Robotics Research*, 2011

**Data-driven Planning via Imitation Learning**, Sanjiban Choudhury, Mohak Bhardwaj, Sankalp Arora, Ashish Kapoor, Gireeja Ranade, Sebastian Scherer, Debadeepta Dey, *International Journal of Robotics Research*, 2018

### Conference Proceedings

**Metareasoning in Modular Software Systems: On-the-Fly Configuration using Reinforcement Learning with Rich Contextual Representations** Aditya Modi, Debadeepta Dey, Alekh Agarwal, Adith Swaminathan, Besmira Nushi, Sean Andrist, Eric Horvitz, *Association for Advancement of Artificial Intelligence (AAAI)*, 2019

**Efficient Forward Architecture Search** Hanzhang Hu, John Langford, Rich Caruana, Eric Horvitz, Debadeepta Dey, *Neural Information Processing Systems, (NeurIPS)*, 2019

**Vision-based Navigation with Language-based Assistance via Imitation Learning with Indirect Interventions** Khanh Nguyen, Debadeepta Dey, Chris Brockett, Bill Dolan, *Computer Vision and Pattern Recognition, (CVPR)*, 2019

**Anytime Neural Networks via Joint Optimization of Auxiliary Losses** Hanzhang Hu, Debadeepta Dey, J. Andrew Bagnell, Martial Hebert, *Association for Advancement of Artificial Intelligence (AAAI)*, 2019

**Overcoming Blind Spots in the Real World: Leveraging Complementary Abilities for Joint Execution** Ramya Ramakrishnan, Ece Kamar, Besmira Nushi, Debadeepta Dey, Julie Shah, Eric Horvitz, *Association for Advancement of Artificial Intelligence (AAAI)*, 2019

**Learn-to-Score: Efficient 3D Scene Exploration by Predicting View Utility** Benjamin Hepp, Debadeepta Dey, Sudipta Sinha, Ashish Kapoor, Neel Joshi, Otmar Hilliges, *European Conference on Computer Vision (ECCV)*, 2018

**Discovering Blind Spots in Reinforcement Learning** Ramya Ramakrishnan, Ece Kamar, Debadeepta Dey, Julie Shah, Eric Horvitz, *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2018

**Adaptive Information Gathering via Imitation Learning**, Sanjiban Choudhury, Ashish Kapoor, Gireeja Ranade, Sebastian Scherer, Debadeepta Dey, *Robotics Science and Systems (RSS)*, 2017

**Submodular Trajectory Optimization for Aerial 3D Scanning**, Mike Roberts, Debadeepta Dey, Anh Truong, Sudipta Sinha, Ashish Kapoor, Pat Hanrahan, Neel Joshi, *International Conference on Computer Vision (ICCV)*, 2017

**Flight Dynamics-based Recovery of a UAV Trajectory using Ground Cameras**, Artem Rozantsev, Sudipta Sinha, Debadeepta Dey, Pascal Fua, *Computer Vision and Pattern Recognition (CVPR)*, 2017

**Learning to Gather Information via Imitation**, Sanjiban Choudhury, Ashish Kapoor, Gireeja Ranade, Debadeepta Dey, *International Conference on Robotics and Automation (ICRA)*, 2017

**Risk-Aware Algorithms for Adversarial Contextual Bandits**, Wen Sun, Debadeepta Dey, Ashish Kapoor, *International Conference on Machine Learning (ICML)*, 2017

**No-regret Replanning Under Uncertainty**, Wen Sun, Nitesh Sood, Debadeepta Dey, Gireeja Ranade, Siddharth Prakash, Ashish Kapoor, *International Conference on Robotics and Automation (ICRA)*, 2017

**AirSim: High-fidelity Visual and Physical Simulation for Autonomous Vehicles**, Shital Shah, Debadeepta Dey, Chris Lovett, Ashish Kapoor, *Field and Service Robotics (FSR)*, 2017

**Predicting Multiple Visual Structured Prediction**, Debadeepta Dey, Varun Ramakrishna, Martial Hebert, J. Andrew Bagnell, *International Conference on Computer Vision (ICCV)*, 2015

**Vision and Learning for Deliberative Monocular Cluttered Flight**, Debadeepta Dey, Kumar Shaurya Shankar, Sam Zeng, M. Talha Agcayazi, Christopher Eriksen, Shreyansh Daftry, Martial Hebert, J. Andrew Bagnell, *Field and Service Robotics (FSR)*, 2015

**Gauss Meets Canadian Traveler: Shortest-Path Problems with Correlated Natural Dynamics**, Debadeepta Dey, Andrey Kolobov, Rich Caruana, Ece Kamar, Eric Horvitz, Ashish Kapoor, *Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2014

**Learning Policies for Contextual Submodular Prediction**, Stephane Ross, Jiaji Zhou, Yisong Yue, Debadeepta Dey, J. Andrew Bagnell, *International Conference on Machine Learning (ICML)*, 2013

**Learning Monocular Reactive UAV Control in Cluttered Natural Environments**, Stephane Ross, Narek Melik-Barkhudarov, Kumar Shaurya Shankar, Andreas Wendel, Debadeepta Dey, J. Andrew Bagnell, Martial Hebert, *International Conference on Robotics and Automation (ICRA)*, 2013

**Contextual Sequence Optimization with Application to Control Library Optimization**, Debadeepta Dey, Tommy Liu, Martial Hebert, J. Andrew Bagnell, *Robotics Science and Systems (RSS)*, 2012

**Efficient Optimization of Control Libraries**, Debadeepta Dey, Tommy Liu, Boris Sofman, J. Andrew Bagnell, *Association for Advancement of Artificial Intelligence (AAAI)*, 2012

**Classification of Plant Structures from Uncalibrated Image Sequences**, Debadeepta Dey, Lily Mummert, Rahul Sukthankar, *Workshop on Applications of Computer Vision (WACV)*, 2012

**Passive long-range detection of Aircraft: Towards a field deploy-able Sense and Avoid System**, Debadeepta Dey, Christopher Geyer, Sanjiv Singh, Matthew Digioia, *Field and Service Robotics (FSR)*, 2009

### *Technical Reports and Workshops*

**Metareasoning in Modular Software Systems: On-the-Fly Configuration using Reinforcement Learning with Rich Contextual Representations** Aditya Modi, Debadeepta Dey, Alekh Agarwal, Adith Swaminathan, Besmira Nushi, Sean Andrist, Eric Horvitz, *Reinforcement Learning for Real Life Workshop at ICML 2019*

**Efficient Forward Architecture Search** Hanzhang Hu, John Langford, Rich Caruana, Eric Horvitz, Debadeepta Dey *AutoML Workshop at ICML 2019*

**Macro Neural Architecture Search Revisited** Hanzhang Hu, John Langford, Rich Caruana, Eric Horvitz, Debadeepta Dey, *Metalearning Workshop at NeurIPS 2018*

**Robust Monocular Flight in Cluttered Outdoor Environments** Shreyansh Daftry, Sam Zeng, Arbaaz Khan, Debadeepta Dey, Narek Melik-Barkhudarov, J. Andrew Bagnell, Martial Hebert, *Workshop on Vision-based High Speed Autonomous Navigation of UAVs, International Conference on Intelligent Robots and Systems*, 2016

**Towards Fast Safe Motion Planning** Debadeepta Dey, Dorsa Sadigh, Ashish Kapoor, *Robotics Science and System Workshop on Task and Motion Planning*, 2016

**Probabilistic Safety Programs**, Ashish Kapoor, Debadeepta Dey, Shital Shah, *ArXiv*, 2016

**Predicting Contextual Sequences via Submodular Function Maximization**, Debadeepta Dey, Tian Yu Liu, Martial Hebert, J. Andrew Bagnell, CMU-RI-TR-12-05, *The Robotics Institute, Carnegie Mellon University*, 2012.

**Efficient Optimization of Control Libraries**, Debadeepta Dey, Tian Yu Liu, Boris Sofman, J. Andrew Bagnell, CMU-RI-TR-11-20, *The Robotics Institute, Carnegie Mellon University*, 2011.

**Prototype Sense-and-Avoid System for UAVs**, 2009, Christopher Geyer, Debadeepta Dey, Sanjiv Singh, *Technical Report, Robotics Institute, Carnegie Mellon University*

*Academic Service*

**Teaching Experience:** Co-taught Reinforcement Learning for Robotics section of University of Washington's graduate course Robotics: Algorithms and Applications, Winter 2019.

**Area Chair:** ICML 2020

**Regular Reviewer:** NIPS, ICML, ICLR

**Occasional Reviewer:** AAAI, IJCAI, JFR, JMLR, ICRA, IROS, ICCV, CVPR, ECCV

**Reviewer award:** NeurIPS 2018, ICLR 2019, NeurIPS 2019 (top 50% of reviewers)

**Sponsorship and Publicity Chair** 1st Conference on Robot Learning (CoRL) 2017

*Selected Invited Talks*

**Imitation Learning with Indirect Oracles, Robotics Colloquium** *University of Washington, November 2019*

**Learning via Interaction for Machine Perception and Control** *University of Maryland, September 2018*

**Imitating the Clairvoyant Oracle: Information Gathering, Planning and Grounded Visual Navigation** *New York University, August 2018*

**Trends in Learning and Robotics** *UW-MSR Summer Institute on Social Robotics, August, 2018*

**Data-driven Information Gathering via Imitation Learning** *The Robotics Institute, Carnegie Mellon University, January 2018*

**Is ML Ready for Robotics?, High Performance Computing Conference, December 2018**

**Adaptive Information Gathering via Imitation Learning** *Symposium on Aerial Robotics, University of Pennsylvania, June 2017*

**Learning via Interaction for Machine Perception and Control** *Robotics Colloquium, University of Washington, April 2017*

**Vision, Learning and Control for UAV Flight in Dense Clutter** *Workshop on Vision-based High Speed Autonomous Navigation of UAVs, IROS 2016*

**Fast, Safe Perception Planning and Control** *Workshop on Safe Cyber-Physical Systems, Faculty Summit, Microsoft Research, 2016*

**Improving Agent Behavior via Submodular Sequence Optimization** *Microsoft Research, 2015*

**Vision and Learning for UAVs** *National Robotics Engineering Consortium, 2015*

**Multiple Prediction Learning: Improving Robot Behavior via Submodular Sequence Optimization** *Jet Propulsion Laboratories, NASA, 2014*

**Shortest-Path Problems with Correlated Natural Dynamics** *Social Intelligence: Learning, Aggregation and Applications, INFORMS 2014*