

# Dong Ki Kim

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## Education

### Massachusetts Institute of Technology

S.M. in Aeronautics and Astronautics

- Focus: Reinforcement Learning
- Advisor: Professor Jonathan P. How
- Cumulative GPA: 5.0 / 5.0

Cambridge, MA

Expected Jan. 2020

### Cornell University

B.S. in Electrical and Computer Engineering

- Focus: Robot Perception
- Advisor: Professor Tsuhan Chen
- Highest Honors: *Summa Cum Laude*

Ithaca, NY

Graduated Jan. 2016

## Experience

### Laboratory for Information and Decision Systems, MIT

Graduate Researcher, Advisor: Professor Jonathan P. How

- Derived new meta-multiagent policy gradient theorem that provides most all-encompassing approach for agents to meta-learn about different sources of non-stationarity and enable fast adaptation with respect to simultaneously learning fellow agents [1].
- Developed peer-to-peer teaching frameworks for enabling agents to learn to teach or share knowledge in cooperative multiagent reinforcement learning settings [2, 3, 4, 11, 12].
- Built attention-based hierarchical reinforcement learning framework that identifies useful latent features across multiple sensory inputs and accelerates in transfer learning tasks [5, 13].
- Led demo preparation of package delivery using multiple drones for annual Boeing visit at MIT. Contributed to collision avoidance algorithm, on-board perception system for classification, and projection system for visualization. [\[Video\]](#)

Cambridge, MA

Sep. 2017 - Present

### Air Lab, CMU-Robotics Institute

Research Intern, Advisor: Professor Sebastian Scherer

- Developed deep multimodal network that improves segmentation robustness to appearance variations (e.g., Summer vs Winter) by combining image and LiDAR sensor data [6, 14].
- Built ROS-based system that estimates terrain roughness from 3D LiDAR sensor data in real-time. [\[Video\]](#)

Pittsburgh, PA

Aug. 2016 - Jul. 2017

### Robot Intelligence through Perception Lab, TTIC

Research Intern, Advisor: Professor Matthew R. Walter

- Developed cross-view localization system that estimates vehicle's pose on georeferenced satellite map given sequence of ground-level images [7].
- Improved LSD-SLAM's pose estimation by incorporating ORB-SLAM's pose-graph keyframe constraints.

Chicago, IL

Jan. 2016 - Jul. 2016

### Advanced Multimedia Processing Lab, Cornell University

Undergraduate Researcher, Advisor: Professor Tsuhan Chen

- Developed indoor localization algorithm based on floor plan and camera [8].
- Built vision-based system that enables drone to navigate indoors autonomously and find specific target [15].

Ithaca, NY

May. 2014 - Jan. 2016

## Honor & Award

### Outstanding Student Paper Award Honorable Mention for AAAI

Jan. 2019

### Kwanjeong Education Foundation Scholarship

- Receiving \$30,000 / year for 4-5 years for graduate studies at MIT

Sep. 2017 - Present

### Merrill Presidential Scholar

- Nominated for Cornell University's prestigious award given to top 1% graduating seniors

Sep. 2015

## Skill

**Programming Language:** Python, C/C++, Matlab

**Tools/Library/Software:** PyTorch, TensorFlow, Theano, Caffe, Keras, OpenCV, ROS, Point Cloud Library

# Publication

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## Preprint

- [1] **A Policy Gradient Theorem for Learning to Learn in Multiagent Reinforcement Learning**  
**Dong-Ki Kim**, Miao Liu, Matthew Riemer, Golnaz Habibi, Sebastian Lopez-Cot, Samir Wadhwan, Gerald Tesauro, Jonathan P. How  
*Association for the Advancement of Artificial Intelligence (AAAI) Symposium*, 2020 (To Appear) [Paper]
- [2] **Learning Hierarchical Teaching Policies for Cooperative Agents**  
**Dong-Ki Kim**, Miao Liu, Shayegan Omidshafiei, Sebastian Lopez-Cot, Matthew Riemer, Golnaz Habibi, Gerald Tesauro, Sami Mourad, Murray Campbell, Jonathan P. How  
*International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2020 (Under Review) [Paper] [WIRED News]

## Conference Proceeding

- [3] **Policy Distillation and Value Matching in Multiagent Reinforcement Learning**  
Samir Wadhwan, **Dong-Ki Kim**, Shayegan Omidshafiei, Jonathan P. How  
*International Conference on Intelligent Robots and Systems (IROS)*, 2019 [Paper] [Video]
- [4] **Learning to Teach in Cooperative Multiagent Reinforcement Learning**  
Shayegan Omidshafiei, **Dong-Ki Kim**, Miao Liu, Gerald Tesauro, Matthew Riemer, Christopher Amato, Murray Campbell, Jonathan P. How  
*Association for the Advancement of Artificial Intelligence (AAAI)*, 2019 [Outstanding Student Paper Honorable Mention] [Paper] [MIT News]
- [5] **Crossmodal Attentive Skill Learner**  
Shayegan Omidshafiei, **Dong-Ki Kim**, Jazon Pazis, Jonathan P. How  
*International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2018 [Paper] [Video]
- [6] **Season-Invariant Semantic Segmentation with A Deep Multimodal Network**  
**Dong-Ki Kim**, Daniel Maturana, Masashi Uenoyama, Sebastian Scherer  
*Field and Service Robotics (FSR)*, 2017 [Paper]
- [7] **Satellite Image-based Localization via Learned Embeddings**  
**Dong-Ki Kim**, Matthew R. Walter  
*International Conference on Robotics and Automation (ICRA)*, 2017 [Paper] [Video] [NVIDIA News]
- [8] **You Are Here: Mimicking the Human Thinking Process in Reading Floor-Plans**  
Hang Chu, **Dong-Ki Kim**, Tsuhan Chen  
*International Conference on Computer Vision (ICCV)*, 2015 [Paper] [Video]

## Book Chapter

- [9] **Multiagent RL**  
Jonathan P. How, **Dong-Ki Kim**, Samir Wadhwan  
*Encyclopedia of Systems and Control*, 2nd Ed. (To Appear)

## Journal Article

- [10] **Crossmodal Attentive Skill Learner**  
**Dong-Ki Kim**, Shayegan Omidshafiei, Jazon Pazis, Jonathan P. How  
*Journal of Autonomous Agents and Multiagent Systems (JAAMAS)*, (Invited Submission; Under Review)

## Workshop and Symposium Paper

- [11] **Heterogeneous Knowledge Transfer via Hierarchical Teaching in Cooperative Multiagent Reinforcement Learning**  
**Dong-Ki Kim**, Miao Liu, Shayegan Omidshafiei, Sebastian Lopez-Cot, Matthew Riemer, Gerald Tesauro, Murray Campbell, Golnaz Habibi, Jonathan P. How  
*Association for the Advancement of Artificial Intelligence (AAAI) Workshop*, 2019 (Oral Presentation)
- [12] **Learning to Teach in Cooperative Multiagent Reinforcement Learning**  
Shayegan Omidshafiei, **Dong-Ki Kim**, Miao Liu, Gerald Tesauro, Matthew Riemer, Christopher Amato, Murray Campbell, Jonathan P. How  
*International Conference on Machine Learning (ICML) Workshop*, 2018

[13] **Crossmodal Attentive Skill Learner**

Shayegan Omidshafiei, **Dong-Ki Kim**, Jazon Pazis, Jonathan P. How

*Neural Information Processing Systems (NeurIPS) Symposium*, 2017

[14] **Online Semantic Mapping for Autonomous Navigation and Scouting**

Daniel Maturana, Sankalp Arora, Po-Wei Chou, **Dong-Ki Kim**, Masashi Uenoyama, Sebastian Scherer

*Robotics: Science and Systems (RSS) Workshop*, 2017 [Paper]

## Technical Report

[15] **Deep Neural Network for Real-Time Autonomous Indoor Navigation**

**Dong-Ki Kim**, Tsuhan Chen

*arXiv preprint arXiv:1511.04668*, 2015 [Paper] [Video]