Yoonchang Sung

Contact Information	2317 Speedway E-mail: yooncs8@cs.utexas.edu Austin, TX, USA https://yoonchangsung.com/ 78712

Research Interests

Robotics algorithms, Embodied AI, Task and motion planning, Multi-robot systems

Employment

Postdoctoral Fellow
Oct 2021 - Present (Host: Peter Stone)
The University of Texas at Austin, Department of Computer Science, Austin, USA

Postdoctoral Associate
Oct 2019 - Sept 2021 (Hosts: Leslie Pack Kaelbling and Tomás Lozano-Pérez)
Massachusetts Institute of Technology, Computer Science and Artificial Intelligence Laboratory, Cambridge, USA

Education

Ph.D. in Electrical and Computer Engineering
Sept 2019 (Advisor: Pratap Tokekar)
Virginia Tech, Blacksburg, USA

M.S. in Mechanical Engineering
Aug 2013 (Advisor: Woojin Chung)
Korea University, Seoul, Korea

B.S. in Mechanical Engineering
Feb 2011
Korea University, Seoul, Korea

Honors

IROS Best Cognitive Robotics Paper Award Finalist, 2021
IROS Best Robocup Paper Award Winner, 2021
Robotics: Science and Systems (RSS) Pioneers, 2019
DARPA Robotics Challenge (DRC) Finalist, 2015
Korea University Best Honors Scholarships, Spring 2010
Korea University Honors Scholarships, Fall 2008, Spring 2009, Fall 2010
Korea National Science Scholarship (merit-based), Fall 2009

Journal Articles

[J6] **A Survey of decision-theoretic approaches for robotic environmental monitoring**
Yoonchang Sung, Zhiang Chen, Jnaneshwar Das, Pratap Tokekar
Foundations and Trends in Robotics, 2023.

[J5] **GM-PHD filter for searching and tracking an unknown number of targets with a mobile sensor with limited FOV**
Yoonchang Sung, Pratap Tokekar
IEEE Transactions on Automation Science and Engineering (T-ASE), 2021.

[J4] **Game tree search for minimizing detectability and maximizing visibility**
Zhongshun Zhang, Jonathon M. Smereka, Joseph Lee, Lifeng Zhou, Yoonchang Sung, Pratap Tokekar
Autonomous Robots (AURO), 2021.

[J3] Distributed assignment with limited communication for multi-robot multi-target tracking
Yoonchang Sung, Ashish K. Budhiraja, Ryan K. Williams, Pratap Tokekar
Autonomous Robots (AURO), 2020.

[J2] Team VALOR's ESCHER: A novel electromechanical biped for the DARPA Robotics Challenge
Yoonchang Sung is one of 23 co-authors
Journal of Field Robotics (JFR), 2017.

[J1] Hierarchical sample-based joint probabilistic data association filter for following human legs using a mobile robot in a cluttered environment
Yoonchang Sung, Woojin Chung
IEEE Transactions on Human-Machine Systems (T-HMS), 2016.

Conference Papers

[C18] Asynchronous task plan refinement for multi-robot task and motion planning
Yoonchang Sung, Rahul Shome, Peter Stone
IEEE International Conference on Robotics and Automation (ICRA), Under Review.

[C17] Motion planning (in)feasibility detection using a prior roadmap via path and cut search
Yoonchang Sung, Peter Stone
Robotics: Science and Systems (RSS), 2023.

[C16] Learning to correct mistakes: backjumping in long-horizon task and motion planning
Yoonchang Sung*, Zizhao Wang*, Peter Stone (* indicates equal contribution)
Conference on Robot Learning (CoRL), 2022.

[C15] Towards optimal correlational object search
Kaiyu Zheng*, Rohan Chitnis, Yoonchang Sung, George Konidaris, Stefanie Tellex (* indicates the student I mentored)
IEEE International Conference on Robotics and Automation (ICRA), 2022.

[C14] Learning when to quit: meta-reasoning for motion planning
Yoonchang Sung, Leslie P. Kaelbling and Tomás Lozano-Pérez
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
(Finalist for Best Cognitive Robotics Paper Award)

[C13] Multi-resolution POMDP planning for multi-object search in 3D
Kaiyu Zheng*, Yoonchang Sung, George Konidaris, Stefanie Tellex (* indicates the student I mentored)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
(Winner of Best Robocup Paper Award)

[C12] Reactive task and motion planning under temporal logic specifications
Shen Li*, Daehyung Park*, Yoonchang Sung*, Julie Shah, Nicholas Roy (* indicates equal contribution)
IEEE International Conference on Robotics and Automation (ICRA), 2021.

[C11] Environmental hotspot identification in limited time with a UAV equipped with a downward-facing camera
Yoonchang Sung, Deeksha Dixit, Pratap Tokekar

IEEE International Conference on Robotics and Automation (ICRA), 2021.

[C10] **Tree search techniques for minimizing detectability and maximizing visibility**
Zhongshun Zhang, Jonathon M. Smereka, Joseph Lee, Yoonchang Sung, Lifeng Zhou, Pratap Tokekar
IEEE International Conference on Robotics and Automation (ICRA), 2019.

[C9] **A competitive algorithm for online multi-robot exploration of a translating plume**
Yoonchang Sung, Pratap Tokekar
IEEE International Conference on Robotics and Automation (ICRA), 2019.

[C8] **Distributed simultaneous action and target assignment for multi-robot multi-target tracking**
Yoonchang Sung, Ashish K. Budhiraja, Ryan K. Williams, Pratap Tokekar
IEEE International Conference on Robotics and Automation (ICRA), 2018.

[C7] **Algorithms for searching and tracking an unknown and varying number of mobile targets using a limited FoV sensor**
Yoonchang Sung, Pratap Tokekar
IEEE International Conference on Robotics and Automation (ICRA), 2017.

[C6] **Bayesian estimation based real-time fire-heading in smoke-filled indoor environments using thermal imagery**
Jong-Hwan Kim, Yoonchang Sung, Brian Lattimer
IEEE International Conference on Robotics and Automation (ICRA), 2017.

[C5] **Hierarchical GM-PHD filter for false alarm reduction in search and tracking task**
Yoonchang Sung, Pratap Tokekar
US-KOREA Conference on Science, Technology and Entrepreneurship (UKC), 2017.

[C4] **Information measure for the optimal control of target searching via the grid-based method**
Yoonchang Sung, Tomonari Furukawa
International Conference on Information Fusion (Fusion), 2016.

[C3] **Humanoid firefighting robot for structure fires**
Yoonchang Sung is one of 17 co-authors
International Conference and Exhibition on Fire Science and Engineering (Interflam), 2016.

[C2] **Tracking human legs for an indoor mobile robot with a single laser range finder**
Yoonchang Sung is one of 11 co-authors
International Conference on Engineering and Applied Sciences (ICEAS), 2015.

[C1] **Human tracking of a mobile robot with an onboard LRF(Laser Range Finder) using human walking motion analysis**
Yoonchang Sung, Woojin Chung
International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2011.

Workshop Papers	[W3] **Multi-robot coordination for hazardous environmental monitoring** Yoonchang Sung *Robotics: Science and Systems (RSS) Pioneers*, 2020. [W2] **Detecting and mapping hazardous plumes with aerial and surface robots** Yoonchang Sung, Spencer Buebel, Pratap Tokekar *IEEE International Conference on Robotics and Automation (ICRA)*, 2018. *Workshop on Robot Teammates Operating in Dynamic, Unstructured Environment* [W1] **Distributed simultaneous action and target assignment for multi-robot multi-target tracking** Yoonchang Sung, Ashish K. Budhiraja, Ryan K. Williams, Pratap Tokekar *IEEE International Conference on Robotics and Automation (ICRA)*, 2017. *Workshop on Multi-robot Perception-driven Control and Planning*
Thesis Publications	[T2] **Multi-robot coordination for hazardous environmental monitoring** Yoonchang Sung *Ph.D. Dissertation, Virginia Tech*, 2019. [T1] **Novel tracking method for following human legs using a mobile robot in a cluttered environment** Yoonchang Sung *M.S. Dissertation, Korea University*, 2013.
Book Chapters	[B1] **Team VALORs ESCHER: A novel electromechanical biped for the DARPA Robotics Challenge** Yoonchang Sung is one of 23 co-authors *The DARPA Robotics Challenge Finals: Humanoid Robots To The Rescue. Springer*, 2018.
Posters	[P1] **Implementation of JPDAFs to track humans for a mobile robot with a laser range finder** Yoonchang Sung, Woojin Chung *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*, 2013.
Teaching Experience	*Guest Lecturer for Robot Learning and Interaction*, KAIST. Daejeon, Korea, Apr 2022 *Guest Lecturer for Robot Motion Planning*, Virginia Tech. Blacksburg, VA, Aug 2018 *Teaching Assistant for Computer Aided Mechanical Drawing*, Korea University. Seoul, Korea, Spring 2012 *Teaching Assistant for Machine Component Design*, Korea University. Seoul, Korea, Fall 2011
Mentoring Experience	**Ph.D. Students** Mingyo Seo (Ph.D. advisors: Luis Sentis and Yuke Zhu), UT Austin, 2022-Present Yoonwoo Kim (Ph.D. advisor: Peter Stone), UT Austin, 2023-Present Zizhao Wang (Ph.D. advisor: Peter Stone), UT Austin, 2022

Yuqian Jiang (Ph.D. advisor: Peter Stone), UT Austin, 2021-2022
Yifeng Zhu (Ph.D. advisors: Peter Stone and Yuke Zhu), UT Austin, 2021-2022
Kaiyu Zheng (Ph.D. advisor: Stefanie Tellex), Brown University, 2019-2021

M.S./MEng Students
Jasmeet Kaur (M.S. advisor: Peter Stone), UT Austin, 2022-Present
Shiloh Curtis (MEng advisor: Leslie Pack Kaelbling), MIT, 2020-2021
Deeksha Dixit (M.S. advisor: Pratap Tokekar), Virginia Tech, 2018-2019

Mentoring Programs
Inclusion@RSS, Freiburg, Germany, Jun 2019

Service	**Associate Editor** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Conference Editorial Board, 2021

Service

Associate Editor
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Conference Editorial Board, 2021

Workshop Co-organizer
Robotics: Science and Systems (RSS) Pioneers, Oregon, USA, Jul 2020

Full-day workshop, Robotics: Science and Systems (RSS), Freiburg, Germany, Jun 2019
(Title: Robots in the wild: challenges in deploying robust autonomy for robotic exploration)

Invited Talks

Exploring Long-Horizon Dependency in Task and Motion Planning
IM∧2 lab, KAIST AI, Korea, Oct 2022
School of Mechanical Engineering, Korea University, Korea, Oct 2022

Meta-Reasoning for Task and Motion Planning
School of Computing, KAIST, Korea, Apr 2022
SISL Lab, Stanford University, CA, USA, Nov 2021

Robust Autonomy in the Wild
Workshop on Robots in the Wild: Challenges in Deploying Robust Autonomy for Robotic Exploration at RSS 2020, July 2020
Brown Robotics, Brown University, RI, USA, Nov 2019
NAVER LABS, Korea, Jul 2019
Department of Aerospace Engineering, KAIST, Korea, Jun 2019