

Yoonchang Sung

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Research Interests

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

Employment

The University of Texas at Austin **Department of Computer Science**

Postdoctoral Fellow

Host: Peter Stone

Oct 2021 - Present
Austin, TX, USA

Massachusetts Institute of Technology **Computer Science and Artificial Intelligence Laboratory (CSAIL)**

Postdoctoral Associate

Hosts: Leslie Pack Kaelbling and Tomás Lozano-Pérez

Oct 2019 - Sep 2021
Cambridge, MA, USA

Education

Ph.D. in Electrical and Computer Engineering **Virginia Tech**

Advisor: Pratap Tokekar

Thesis: Multi-robot coordination for hazardous environmental monitoring

Sep 2019
Blacksburg, VA, USA

M.S. in Mechanical Engineering **Korea University**

Advisor: Woojin Chung

Thesis: Novel tracking method for following human legs using a mobile robot in a cluttered environment

Aug 2013
Seoul, Korea

B.S. in Mechanical Engineering **Korea University**

Feb 2011
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

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

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

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

Yoonchang Sung, Ashish K. Budhiraja, Ryan K. Williams, Pratap Tokekar. "Distributed assignment with limited communication for multi-robot multitarget tracking." *Autonomous Robots (AURO)*, 2020.

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

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

Selected Conference Papers

Yoonchang Sung, Rahul Shome, Peter Stone. "Asynchronous task plan refinement for multi-robot task and motion planning." *IEEE International Conference on Robotics and Automation (ICRA)*, 2024.

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

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

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

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

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

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

Yoonchang Sung, Deeksha Dixit, Pratap Tokekar. "Environmental hotspot identification in limited time with a UAV equipped with a downward-facing camera." *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

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

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

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

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

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

Teaching Experience

Guest Lecturer for Intelligent Robotic Systems, Sogang University. Seoul, Korea, May 2024

Guest Lecturer for Robot Learning and Interaction, KAIST. Daejeon, Korea, Apr 2022

Guest Lecturer for Robot Motion Planning, Virginia Tech. Blacksburg, VA, USA 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

Yoonwoo Kim (Ph.D. advisor: Peter Stone), UT Austin, 2023-Present

Mingyo Seo (Ph.D. advisors: Luis Sentis and Yuke Zhu), UT Austin, 2022-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, 2022-2023

Shiloh Curtis (MEng advisor: Leslie Pack Kaelbling), MIT, 2020-2021

Deeksha Dixit (M.S. advisor: Pratap Tokekar), Virginia Tech, 2018-2019

Undergraduate Students

Qi Wang, UT Austin, 2023-Present

Arjun Kumar, UT Austin, 2024-Present

Aaroh Gokhale, UT Austin, 2024-Present

Jay Shim, UT Austin, 2024-Present

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

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)

Reviewer

- Journals: International Journal of Robotics Research (IJRR), IEEE Transactions on Robotics (T-RO), Autonomous Robots (AURO), IEEE Transactions on Automation Science and Engineering (T-ASE), IEEE Robotics and Automation Letters (RA-L), Artificial Intelligence (AI)

- Conferences: IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Robotics: Science and Systems (RSS), Conference on Robot Learning (CoRL), Workshop on the Algorithmic Foundations of Robotics (WAFR), AAAI Conference on Artificial Intelligence (AAAI), IEEE International Symposium on Multi-Robot & Multi-Agent Systems (MRS), International Conference on Autonomous Agents and Multiagent Systems (AAMAS), American Control Conference (ACC)

Invited Talks

Towards Long-Horizon Robot Decision Making

Computer Science Department, University of Texas at Dallas, TX, USA, Apr 2024

Department of Computer Science, NC State University, NC, USA, Feb 2024

Exploring Long-Horizon Dependency in Task and Motion Planning

IM² 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