Yoonchang Sung

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Research Interests

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

Employment

Nanyang Technological University Jun 2025 - Present
College of Computing and Data Science Singapore
Assistant Professor

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

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

Education

Ph.D. in Electrical and Computer Engineering Sep 2019
Virginia Tech Blacksburg, VA, USA
Advisor: Pratap Tokekar
Thesis: Multi-robot coordination for hazardous environmental monitoring

M.S. in Mechanical Engineering Aug 2013
Korea University Seoul, Korea
Advisor: Woojin Chung
Thesis: Novel tracking method for following human legs using a mobile robot in a cluttered environment

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

Yoonchang Sung*, Shahaf Shperberg*, Qi Wang*, Peter Stone (*indicates equal contribution). "Effort allocation for deadline-aware task and motion planning: a metareasoning approach." Under Review.

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

Mingyo Seo*, Yoonyoung Cho*, **Yoonchang Sung**, Peter Stone, Yuke Zhu, Beomjoon Kim. "PRESTO: fast motion planning using diffusion models based on key-configuration environment representation." Under Review.

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 Task and Motion Planning, KAIST AI. Seoul, Korea, Dec 2024
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
Yeseung Kim (Ph.D. advisor: Daehyung Park), KAIST, 2024-Present
Ming Liu (Ph.D. advisor: Peter Stone), UT Austin, 2024-Present
Yoonwoo Kim (Ph.D. advisor: Peter Stone), UT Austin, 2023-Present
Yoonyoung Cho (Ph.D. advisor: Beomjoon Kim), KAIST, 2023-2024
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
Ajith Kemisetti (M.S. advisor: Peter Stone), UT Austin, 2024-Present
Raghav Arora (M.S. advisor: Peter Stone), UT Austin, 2024-Present
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, 2023-2024
Arjun Kumar, UT Austin, 2024-Present
Aaroh Gokhale, UT Austin, 2024
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)

Graduate Admission Committee
- UT Austin CS. Fall 2024 admission
- MIT CSAIL. Fall 2021 admission

Invited Talks

Extending Current Capabilities of Task and Motion Planning
Department of Computer Science Engineering, Kyung Hee University, Korea, Dec 2024
Kavraki Lab, Rice University, TX, USA, Dec 2024

Towards Long-Horizon Robot Decision Making
Computer Science and Engineering, UNSW Sydney, Australia, Oct 2024
College of Computing and Data Science, Nanyang Technological University, Singapore, Sep 2024
AIIS, Seoul National University, Korea, Aug 2024
Department of Artificial Intelligence, Yonsei University, Korea, Aug 2024
Department of Electronic Engineering, Sogang University, Korea, Aug 2024
Department of Computer Science and Engineering, POSTECH, Korea, Aug 2024
School of Computing, KAIST, Korea, Aug 2024
Department of Artificial Intelligence, Korea University, Korea, Aug 2024
AIR Group, Binghamton University, NY, USA, Jul 2024
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
IM Λ 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
