

# Yoonchang Sung

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## EDUCATION

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- Virginia Tech**, Blacksburg, VA, USA *Sep. 2019*  
Ph.D. in Electrical & Computer Engineering  
Advisor: Pratap Tokekar
- Korea University**, Seoul, Korea *Aug. 2013*  
M.S. in Mechanical Engineering  
Advisor: Woojin Chung
- Korea University**, Seoul, Korea *Feb. 2011*  
B.S. in Mechanical Engineering

## EMPLOYMENT

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- Postdoctoral Fellow** *Oct. 2021–*  
Department of Computer Science, The University of Texas at Austin, Austin, TX, USA  
Host: Peter Stone
- Postdoctoral Associate** *Oct. 2019–Sep. 2021*  
Computer Science and Artificial Intelligence Laboratory, MIT, Cambridge, MA, USA  
Hosts: Leslie Pack Kaelbling & Tomás Lozano-Pérez
- Research Assistant** *Sep. 2016–Sep. 2019*  
Dept. of Electrical & Computer Engineering, Virginia Tech, Blacksburg, VA, USA  
Advisor: Pratap Tokekar
- Research Assistant** *Sep. 2014–Aug. 2016*  
Dept. of Mechanical Engineering, Virginia Tech, Blacksburg, VA, USA  
Advisor: Brian Lattimer
- Research Intern** *Aug. 2013–Jun. 2014*  
Center for Bionics, Korea Institute of Science and Technology, Seoul, Korea  
Supervisor: JongSuk Choi
- Research Assistant** *Mar. 2011–Aug. 2013*  
Dept. of Mechanical Engineering, Korea University, Seoul, Korea  
Advisor: Woojin Chung

## TEACHING

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### Guest Lecturer

Dept. of Electrical & Computer Engineering, Virginia Tech, Blacksburg, VA, USA  
ECE 4984: SS:Robot Motion Planning, Introduction to ROS

Aug. 2018

### Teaching Assistant

Dept. of Mechanical Engineering, Korea University, Seoul, Korea  
MECH 210: Computer Aided Mechanical Drawing  
MECH 328: Machine Component Design

Spring 2012

Fall 2011

## PUBLICATIONS

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### Journal Articles

#### *In Preparation*

- [J7] **Robotic environmental monitoring—a survey**  
**Y. Sung**, S. Bearman, Z. Chen, J. Das, and P. Tokekar  
Note: in preparation.

#### *Under Review*

- [J6] **Online multi-robot exploration of a translating plume: competitive algorithm and experiments**  
**Y. Sung**, D. Dixit, and P. Tokekar  
*Autonomous Robots (AURO)*, Note: revision under review.

#### *Published*

- [J5] **GM-PHD filter for searching and tracking an unknown number of targets with a mobile sensor with limited FOV**  
**Y. Sung**, and P. Tokekar  
*IEEE Transactions on Automation Science and Engineering (T-ASE)*, pp. 1-13, 2021.
- [J4] **Game tree search for minimizing detectability and maximizing visibility**  
Z. Zhang, J. Lee, J. M. Smereka, L. Zhou, **Y. Sung**, and P. Tokekar  
*Autonomous Robots (AURO)*, 45(2), pp. 283-297, 2021.
- [J3] **Distributed assignment with limited communication for multi-robot multi-target tracking**  
**Y. Sung**, A. K. Budhiraja, R. K. Williams, and P. Tokekar  
*Autonomous Robots (AURO), Special Issue on Robot Communication Challenges*, 44(1), pp. 57-73, 2020.
- [J2] **Team VALORs ESCHER: A novel electromechanical biped for the DARPA Robotics Challenge**  
C. Knabe, R. Griffin, J. Burton, G. Cantor-Cooke, L. Dantanarayana, G. Day, O. Ebeling-Koning, E. Hahn, M. Hopkins, J. Neal, J. Newton, C. Nogales, V. Orekhov, J. Peterson, M. Rouleau, J. Seminatore, **Y. Sung**, J. Webb, N. Wittenstein, J. Ziglar, A. Leonessa, B. Lattimer, and T. Furukawa  
*Journal of Field Robotics (JFR)*, 34(5), pp. 912-939, 2017.
- [J1] **Hierarchical sample-based joint probabilistic data association filter for following human legs using a mobile robot in a cluttered environment**  
**Y. Sung**, and W. Chung

*IEEE Transactions on Human-Machine Systems (T-HMS)*, 46(3), pp. 340-349, 2016.

## Refereed Conference Publications

### *Under Review*

- [C15] **Towards optimal object search in context**  
K. Zheng, R. Chitnis, **Y. Sung**, G. Konidaris, and S. Tellex  
Note: under review.

### *Published*

- [C14] **Learning when to quit: meta-reasoning for motion planning**  
**Y. Sung**, L. P. Kaelbling, and T. 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**  
K. Zheng, **Y. Sung**, G. Konidaris, and S. Tellex  
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021.  
**Winner of Best Robocup Paper Award.**
- [C12] **Environmental hotspot identification in limited time with a UAV equipped with a downward-facing camera**  
**Y. Sung**, D. Dixit, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2021.
- [C11] **Dynamically reconfigurable planning under temporal logic specifications**  
S. Li\*, D. Park\*, **Y. Sung\***, J. Shah, and N. Roy  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2021.
- [C10] **A competitive algorithm for online multi-robot exploration of a translating plume**  
**Y. Sung**, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2019.
- [C9] **Tree search techniques for minimizing detectability and maximizing visibility**  
Z. Zhang, J. Lee, J. M. Smereka, **Y. Sung**, L. Zhou, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2019.
- [C8] **Distributed simultaneous action and target assignment for multi-robot multi-target tracking**  
**Y. Sung**, A. K. Budhiraja, R. K. Williams, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2018.
- [C7] **Hierarchical GM-PHD filter for false alarm reduction in search and tracking task**  
**Y. Sung**, and P. Tokekar  
*US-KOREA Conference on Science, Technology and Entrepreneurship (UKC)*, 2017.
- [C6] **Algorithms for searching and tracking an unknown and varying number of mobile targets using a limited FoV sensor**  
**Y. Sung**, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2017.
- [C5] **Bayesian estimation based real-time fire-heading in smoke-filled indoor environments using thermal imagery**  
J. H. Kim, **Y. Sung**, and B. Lattimer  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2017.

- [C4] **Information measure for the optimal control of target searching via the grid-based method**  
**Y. Sung**, and T. Furukawa  
*International Conference on Information Fusion (Fusion)*, 2016.
- [C3] **Humanoid firefighting robot for structure fires**  
 B. Lattimer, J. Starr, J. McNeil, C. Nogales, J. Peterson, J. Ziglar, J. Burton, C. Knabe, **Y. Sung**, J. Seminatore, R. Griffin, J. Newton, V. Orekhov, M. Rouleau, M. Hopkins, D. Hong, and D. Lee  
*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**  
 D. Cha, H. Cho, J. Jin, H. Kwon, J. Kim, H. Lee, J. Seong, C. Moon, H. Kim, **Y. Sung**, and W. Chung  
*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**  
**Y. Sung**, and W. Chung  
*International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, 2011.

#### Refereed Workshop Publications

- [W3] **Multi-robot coordination for hazardous environmental monitoring**  
**Y. Sung**  
*Robotics: Science and Systems (RSS) Pioneers*, 2020.
- [W2] **Detecting and mapping hazardous plumes with aerial and surface robots**  
**Y. Sung**, S. Buebel, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA) Workshop on Robot Team-mates Operating in Dynamic, Unstructured Environment*, 2018.
- [W1] **Distributed simultaneous action and target assignment for multi-robot multi-target tracking**  
**Y. Sung**, AK Budhiraja, RK Williams, and P. Tokekar  
*IEEE International Conference on Robotics and Automation (ICRA) Workshop on Multi-robot Perception-driven Control and Planning*, 2017.

#### Thesis Publications

- [T2] **Multi-robot coordination for hazardous environmental monitoring**  
**Y. Sung**  
 Ph.D. Dissertation, Virginia Tech, 2019.
- [T1] **Novel tracking method for following human legs using a mobile robot in a cluttered environment**  
**Y. Sung**  
 M.S. Dissertation, Korea University, 2013.

#### Book Chapters

- [B1] **Team VALORs ESCHER: A novel electromechanical biped for the DARPA Robotics Challenge**  
 C. Knabe, R. Griffin, J. Burton, G. Cantor-Cooke, L. Dantanarayana, G. Day, O. Ebeling-Koning, E. Hahn, M. Hopkins, J. Neal, J. Newton, C. Nogales, V. Orekhov, J. Peterson, M. Rouleau, J. Seminatore, **Y. Sung**, J. Webb, N. Wittenstein, J. Ziglar, A. Leonessa, B. Lattimer, and T.

Furukawa

*The DARPA Robotics Challenge Finals: Humanoid Robots To The Rescue*. Springer, Cham., pp. 583-629, 2018.

## Posters

[P1] **Implementation of JPDAFs to track humans for a mobile robot with a laser range finder**

**Y. Sung**, and W. Chung

*IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*, 2013.

## Patents

[P1] **Leg tracking method based on SJPDAF method**

**Y. Sung**, and W. Chung

KR (No. 10-1573620)

## THESIS SUPERVISION

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### MEng Students

- Shiloh Curtis, A hierarchical algorithm for probabilistically complete path planning in multi-floor environments, MIT 2021

## MENTORING EXPERIENCE

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### Ph.D. Students

- Kaiyu Zheng (Ph.D. advisor: Stefanie Tellex), Brown University 2019-2021

### M.S./MEng Students

- 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

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### 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 2020, Oregon, USA Jul. 2020  
- Full-day workshop, Robotics: Science and Systems (RSS), Freiburg, Germany Jun. 2019  
Workshop Title: Robots in the wild: challenges in deploying robust autonomy for robotic exploration  
(link to the workshop website)

### 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)

- *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), International Conference on Autonomous Agents and Multiagent Systems (AAMAS), American Control Conference (ACC)

## INVITED TALKS

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### **Robust Autonomy in the Wild**

- Workshop on Robots in the Wild: Challenges in Deploying Robust Autonomy for Robotic Exploration at RSS 2020 *July. 2020*
- Mechanical Engineering, Michigan Tech, MI, USA *Mar. 2020*
- Brown Robotics, Brown University, RI, USA *Nov. 2019*
- NAVER LABS, Seoul, Korea *Jul. 2019*
- Dept. of Aerospace Engineering, KAIST, Daejeon, Korea *Jun. 2019*

## HONORS

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### **Awards**

- Best Cognitive Robotics Paper Award Finalist, IROS *2021*
- Best Robocup Paper Award Winner, IROS *2021*
- RAS Travel Grants, ICRA *2017–2019*
- Robotics: Science and Systems (RSS) Pioneers *2019*
- DARPA Robotics Challenge (DRC) Finalist *2015*

### **Graduate Fellowship**

- Research Assistant Scholarships, Virginia Tech, Blacksburg, VA, USA *Fall 2014–Fall 2019*
- The Welfare Section Scholarship, Korea University, Seoul, Korea *Spring 2012, Fall 2012*
- Research Assistant Scholarships, Korea University, Seoul, Korea *Fall 2011*
- The Second Stage of BK21 Scholarship, Korea University, Seoul, Korea *Spring 2011*

### **Undergraduate Fellowship**

- Best Honors Scholarships, Korea University, Seoul, Korea *Spring 2010*
- Honors Scholarships, Korea University, Seoul, Korea *Fall 2008, Spring 2009, Fall 2010*
- National Science Scholarship, Korea University, Seoul, Korea *Fall 2009*

*References Available Upon Request*

*Last updated: Sep 30, 2021*