

SEUNGKOOK YUN

Senior Software Engineer
SRI International
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EDUCATION

Massachusetts Institute of Technology

PhD, Computer Science and Artificial Intelligence Laboratory, EECS

Cambridge, MA
June 2010

Massachusetts Institute of Technology

M.S., Computer Science and Artificial Intelligence Laboratory, EECS

Cambridge, MA
February 2009

Korea Advanced Institute of Science and Technology (KAIST)

M.S., Mechanical Engineering

Taejon, Korea
February 2000

Korea Advanced Institute of Science and Technology (KAIST)

B.S., Mechanical Engineering

Taejon, Korea
February 1998

RESEARCH EXPERIENCE

SRI International

Senior Software Engineer

Menlo Park, CA
2013-current

- Designing the control system of a humanoid with energy efficient walking for the DARPA challenge.
- Working on surgical robotics including user input devices and control architecture.

Honda Research Institute U.S.

Scientist

Mountain View, CA
2010-current

- Working on algorithms for emergency plans of humanoid robots such as reactive stepping and fall control.
- Evaluating the algorithms on ASIMO and NAO.

Distributed Robotics Lab, Massachusetts Institute of Technology

Research Assistant

Cambridge, MA
2006-2010

- Led the coordinated construction project in which a team of robots with assembly and delivery tasks cooperate to build a target structure. Designed the algorithms for dividing the total workload equally to each robot and for robust construction regardless of number of robots and amount of source components. Implement the algorithms on the mobile manipulators.
- Proposed the algorithm to optimally cover a graph in a distributed way. Proved convergence and stability of the algorithm.
- Devised the distributed matching algorithm between two set of nodes on a graph. Extended the algorithm to assemble the multiple robots with bars into a chained structure that can reconfigure itself. Successfully implemented the self-assembly by the truss climbing robots.

Honda Research Institute U.S.

Researcher (Internship)

Mountain View, CA
2008

- Created the world first algorithm for safe fall of a humanoid. Tested on the dynamic model of ASIMO.

Intelligent Robotics Research Center, Korea Institute of Science and Technology

Research Scientist

Seoul, Korea
2003-2006

- Implemented a virtual tour of Korean heritages by wearing a tactile glove and a haptic device in the 3D display.
- Developed a manipulator system of a silver mate robot. Successfully demonstrated drink service to the several presidents of the world in the Asia Pacific Economic Cooperation (APEC) 2005.
- Designed a remote controlled mobile robot for hazardous environment application. Demonstrated bomb disposal from the cabinet and the car.

R&D Center, KIA Motors

Research Engineer

Kwangju, Korea
2000-2002

- Modeled 3D components for the power-train system. Trained professionally for mechanical design by CAD.

TEACHING EXPERIENCE

Robotics: Science and System I, EECS, Massachusetts Institute of Technology, Spring 2010

SKILLS

Software: C/C++, JAVA, MFC, MATLAB, CATIA (certificated with professional education), SolidWorks

Languages: fluent in English, fluent in Korean, familiar with Japanese

PRIMARY INTEREST

robotics; distributed algorithms; optimal control; multi-agent systems; machine learning;

AWARDS AND HONORS

2nd Place for 1st Planetary Contingency Challenge, 2008 IEEE International Conference on Robotics and Automation, Pasadena, CA, USA 2008

The Samsung Scholarship for PhD 2005

The championship award in Rescue session, ROBOCUP American Open 2004

Graduation with *Magna cum Laude*, KAIST, Korea 1998

Merit-based Scholarship, KAIST, Korea 1994-1997

Full Tuition Scholarship, KAIST, Korea 1994-1997

The bronze award in Korea Olympiad in Computer programming 1993

The gold award in Kyunggi state Olympiad in Computer programming 1993

The gold award in Kyunggi state Olympiad in Physics 1993

INVITED TALK

Coordinating Construction of Truss Structures by Multi-robot Systems, Korean Institute of Science and Technology, Taejon, South Korea, Jan 2010

PUBLICATION

Refereed Journal/Magazine Papers

1. Ambarish Goswami, **Seung-kook Yun**, Umashankar Nagarajan, Sung-Hee Lee, KangKang Yin and Shivaram Kalyanakrishnan, " Direction-Changing Fall Control in Humanoid Robots: Theory and Experiments ," March 2014, Volume 36, Issue 3, pp 199-223
2. **Seung-kook Yun**, Daniela Rus, "Distributed Coverage with Mobile Robots on a Graph: Locational Optimization and Equal-mass Partitioning," *Robotica*, pp 1-21, 2013
3. **Seung-kook Yun**, Daniela Rus, "Adaptive Coordinating Construction of Truss Structures using Distributed Equal-mass Partitioning," *IEEE Transactions on Robotics*, Feb 2014, Volume 30, Issue 1, pp 188-202
4. **Seung-kookYun**, Daniela Rus, "Optimal Self Assembly of Modular Manipulators with Active and Passive Modules," *Autonomous Robots*, Volume 31, Issue 2-3 , pp 183-207 , 2011
5. **Seung-kook Yun**, Seong-Sik Yoon, Sungchul Kang, Munsang Kim, "Design and Vibration Control of Safe Robot Arm with MR-based Passive Compliant Joint," *Journal of System Design and Dynamics*, Vol. 2, No. 2, pp 475-484, 2008
6. Carrick Detweiler, Marsette Vona, Yeoreum Yoon, **Seung-kook Yun**, Daniela Rus, "Self-assembling Mobile Linkages with Passive and Active Modules," *IEEE Robotics and Automation Magazine*, Vol 14, Issue 4, pp 45-55, 2007 (*equal contribution*)
7. Seong-Sik Yoon, Sungchul Kang, **Seung-kook Yun**, Seung-Jong Kim, Young-Hwan Kim, Munsang Kim, "Safe Arm Design with MR-based Passive Compliant Joints and Visco-elastic Covering for Service Robot Applications," *Journal of Mechanical Science and Technology*, Vol.19, No.10, 2005
8. **Seung-kook Yun**, Pyung Hun Chang, Juyi Park "Development of Negative Input Shaping Technique for MIMO System," *Journal of Control, Automation and Systems Engineering*, Vol. 6, No. 12, pp1045-1052, 2000
9. **Seung-kook Yun**, Woosub Lee, Dongseok Ryu, Sungchul Kang, "Development of Remote Controlled Mobile Robot for Hazardous Environment Application: ROBHAZ", *Magazine of Control, Automation and Systems Engineering*, Vol.10, No.4, pp35-42, 2004

Book Chapter

1. **Seung-kook Yun**, Mac Schwager, Daniela Rus , "Coordinating Construction of Truss Structures using Distributed Equal-mass Partitioning," *Springer Tracts in Advanced Robotics*, Volume 70/2011, pp607-623, 2011

Refereed Conference Papers

1. **Seung-kook Yun**, Ambarish Goswami , “Tripod Fall: Concept and Experiments of A Novel Approach to Humanoid Fall Damage Reduction,” Proceedings of IEEE International Conference on Robotics and Automation, 2014
2. **Seung-kook Yun**, Daniela Rus, “Distributed Coverage with Mobile Robots on a Graph: Locational Optimization,” Proceedings of IEEE International Conference on Robotics and Automation, 2012
3. **Seung-kook Yun**, Ambarish Goswami , “Humanoid Robot Safe Fall using Aldebaran NAO,” Proceedings of IEEE International Conference on Robotics and Automation, 2012
4. **Seung-kook Yun**, Ambarish Goswami , “Momentum-based Reactive Stepping Controller on Level and Non-level Ground for Humanoid Robot Push Recovery,” IEEE/RSJ International Conference on Intelligent Robots and Systems, 2011
5. Adrienne Bolger, Matthew Faulkner, David Stein, Lauren White, **Seung-kook Yun**, Daniela Rus, “ Experiments in Decentralized Robot Construction with Tool Delivery and Assembly Robots,” IEEE/RSJ International Conference on Intelligent Robots and Systems, 2010
6. **Seung-kook Yun**, Daniela Rus, “ Adaptation to robot failures and shape change indecentralized construction,” Proceedings of IEEE International Conference on Robotics and Automation, 2010 (to appear)
7. **Seung-kook Yun**, Mac Schwager, Daniela Rus , "Coordinating Construction of Truss Structures using Distributed Equal-mass Partitioning," Proc. of the 14th International Symposium on Robotics Research, 2009
8. **Seung-kook Yun**, David Alan Hjelle, Hod Lipson, Daniela Rus, “Planning the Reconfiguration of Grounded Truss Structures with Truss Climbing Robots that Carry Truss Elements,” Proc. of IEEE/RSJ IEEE International Conference on Robotics and Automation, 2009
9. **Seung-kook Yun**, Ambarish Goswami , “Safe Fall: Humanoid robot fall direction change through support base geometry modification,” Proc. of IEEE/RSJ IEEE International Conference on Robotics and Automation, 2009
10. **Seung-kook Yun**, Daniela Rus, “Optimal Distributed Planning for Self Assembly of Modular Manipulators,” IEEE/RSJ International Conference on Intelligent Robots and Systems, 2008
11. **Seung-kook Yun**, Daniela Rus, “Self Assembly of Modular Manipulators with Active and Passive Modules,” Proc. of IEEE/RSJ IEEE International Conference on Robotics and Automation, 2008
12. **Seung-kook Yun**, “Compliant Manipulation for Peg-in-Hole: is Passive Compliance a Key to Learn Contact Motion?” Proc. of IEEE/RSJ IEEE International Conference on Robotics and Automation, 2008
13. **Seung-kook Yun**, Daniela Rus, “Optimal Distributed Planning of Multi-Robot Placement on a 3D Truss,” Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, 2007
14. **Seung-kook Yun**, Sungchul Kang, Dong-Soo Kwon, Hyoukreol Choi, “Tactile Sensing to Display for Tangible Interface,” Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp3593-3598, Beijing, China, October 9-15, 2006
15. **Seung-kook Yun**, Sungchul Kang, Munsang Kim, Seong-Sik Yoon, "Input Preshaping Control of the safe arm with MR-based Passive Compliant Joints," Proceedings of the 2004 IEEE International Conference on Robotics & Automation, pp 2788-2793, New Orleans, LA, USA, April 26-May 1, 2004
16. Seung-Sik Yoon, **Seung-kook Yun**, Sungchul Kang, Hyeokreol Choi and Yoji Yamada, "Dynamic tactile restoration by time domain nonlinear filtering without forward modeling", Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp3589-3594, Sendai, Japan, September 28 - October 2, 2004

Unrefereed Conference Papers

1. Gi-Hong Kim, Sungsoo Rhim, **Seung-kook Yun**, Sun-Ho Bum, Sungchul Kang, Soon-Geul Lee, “Adaptive trajectory shaping for liquid container manipulation,” International Conference on Mechatronics and Information Technologys, December 5-6, Gifu, Japan, 2007
2. **Seung-kook Yun**, Sungchul Kang, Gi-Hun Yang, Dong-Soo Kwon, “Tactile feedback in tangible space,” Proceedings of the 2005 International Conference on Control, Automation, and Systems, pp1802-1807, KINTEX, Gyeonggi-Do, Korea, June 2-5, 2005
3. Bong-Seok Kim, **Seung-Kook Yun**, Sung-Chul Kang, Chang-soon Hwang, Mun-Sang Kim , and Jae-Bok Song, "Development of a Joint torque sensor fully integrated with an actuator," Proceedings of the 2005 International Conference on Control, Automation, and Systems, pp1679-1683, KINTEX, Gyeonggi-Do, Korea, June 2-5, 2005
4. Woosub Lee, Sungha Lee, **Seung-kook Yun**, Sungchul Kang, Munsang Kim, “ROBHAZ-DT3 : Teleoperated Mobile Platform with Passively Adaptive double track for Hazardous Environment Applications,” Proceedings of the 2004 Korean Military Science and Technology, Taejon, Korea, Aug 26, 2004
5. Munsang Kim, **Seung kook Yun**, Sungchul Kang, “Safe design and vibration control of a manipulator with passive compliant joints,” 2nd International Conference on Autonomous Robots and Agents, pp180-185, Palmerston North, New

Zealand, December 13-15, 2004

6. Sungchul Kang, **Seung-kook Yun**, Chang-Soon Hwang, Laehyun Kim, Yoha Hwang, Munsang Kim, Sehyung Park, Sungdo Ha, "Wearable haptic-based multi-modal interaction for tangible interface," International Conference on Artificial Reality and Telexistence, Seoul, Korea, Nov. 30- Dec.2, 2004
7. **Seung-kook Yun**, Seong-Sik Yoon, Sungchul Kang, In-teak Yeo, Munsang Kim, and Chong-won Lee, "Compliance Analysis based on the Compliance Ellipsoid and Vibration Control of the Safe Arm with MR-based Passive Compliant Joints", Proceedings of the 2003 International Conference on Control, Automation, and Systems, pp.2010-2015, Gyeongju, Korea, October 22-25, 2003
8. **Seung-kook Yun**, Pyung Hun Chang "Development of Negative Input Shaping Technique for MIMO System," Joint Proceedings of the 1999 KSME Dynamics and Control & Manufacturing and Design Engineering division, 1999 (Korean)

Refereed Workshop Papers

1. **Seung-kook Yun**, Daniela Rus, "Self Assembly of Modular Manipulators with Active and Passive Modules," Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems Workshop on Self-Reconfigurable Robots, 2007
2. **Seung-kook Yun**, Sungchul Kang, Seung-Jong Kim, Munsang Kim, Chong-won Lee, "A Novel Design of High Responsive Variable Stiffness Joints for Dependable Manipulator," The 4th Workshop on Technical Challenges for Dependable Robots in Human Environments, Symposium (16th) & Venture Hall (17th), Nagoya University, June 16-18, 2005
3. **Seung kook Yun**, Sungchul Kang, Munsang Kim, "Design and vibration control of safe arm with passive compliant joints", The Third IARP - IEEE/RAS - EURON Joint Workshop on Technical Challenges for Dependable Robots in Human Environments, Manchester, England, Sept 7-9, 2004

PATENTS

1. **Seung-kook Yun**, KIA motors, "Safety device for vehicles using multi-channel audio system," Patent Number: 1319962 (European Patent Office), 2003-196799 (Japan), 20030108212 (USA)
2. **Seung-kook Yun**, and KIA motors, "The suspension system for vehicles," Publication Number: 2004-0022544 , Korea
3. **Seung-kook Yun**, and KIA motors, "Leaf Spring Fixing Structure of Suspension System for Vehicles," Publication Number: 2004-0007781 , Korea
4. **Seung-kook Yun**, and KIA motors, "Deflecting Preventive Structure of Car Seat In Turning," Publication Number: 2003-0082268 , Korea
5. **Seung-kook Yun**, and KIA motors, "Seat for vehicle," Publication Number: 2003-0080519 , Korea
6. **Seung-kook Yun**, and KIA motors, "Improved Safety Belt Apparatus and Method of Air Injection," Publication Number: 2003-0075010 , Korea
7. **Seung-kook Yun**, and KIA motors, "Automobile propeller shaft with a structure for absorbing a shock along with axial direction," Publication Number: 2003-0048877 , Korea
8. **Seung-kook Yun**, and KIA motors, "Vehicle Safety Device By Using Multi-channel Audio," Publication Number: 2003-0048285 , Korea
9. **Seung-kook Yun**, and KIA motors, "Shock absorber," Publication Number: 2002-0049528 , Korea
10. **Seung-kook Yun**, and KIA motors, "power steering apparatus and a method," Publication Number: 2002-0045976 , Korea
11. **Seung-kook Yun**, Sungchul Kang, Woosub Lee, and Seung-Sik Yoon, "Apparatus and method for contact surface examination using polyvinylidene fluoride sensor," application number: 2005-0018497 , Korea
12. **Seung-kook Yun**, Munsang Kim, Sungchul Kang, Bong-Seok Kim, and Changsoon Hwang, "joint torque sensor integrated with actuator for measuring joint torque," application number: 2005-0018497 , Korea
13. Sungchul Kang, Munsang Kim, Seung-Jong Kim, **Seung-kook Yun**, and Jeonghoon Yoo, "Device for generating stiffness and joint of robot manipulator comprising the same," application No. : 2006-005282 (Korea), WO/2008/029969 (US)
14. Ambarish Goswami, **Seung-kook Yun**, and Yoshiaki Sakagami, "Inertia Shaping For Humanoid Fall Direction Change," US Application No. 61/139442
15. Ambarish Goswami, **Seung-kook Yun**, and Yoshiaki Sakagami, "Intelligent Stepping For Humanoid Fall Direction Change," US Application No. 61/139442

REFERENCES

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