

Soonkyum Kim, Ph.D.

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| Education | PhD. in Mechanical Engineering and Applied Mechanics | 2013 |
| | <ul style="list-style-type: none">• University of Pennsylvania, USA• GRASP Laboratory• Dissertation Title: <i>Robot Motion Planning Under Topological Constraints</i>• Supervisor: Prof. Vijay Kumar | |
| | Master, Mechanical and Aerospace Engineering | 2006 |
| | <ul style="list-style-type: none">• Seoul National University, Republic of Korea• Robotics Laboratory• Dissertation Title: <i>Efficient Motion Generation for Robots</i>• Supervisor: Prof. Frank C. Park• Graduated with Summa Cum Laude GPA 4.12/4.3 | |
| Professional Experience | B.S., Mechanical and Aerospace Engineering | 2002 |
| | <ul style="list-style-type: none">• Seoul National University, Republic of Korea• Graduated with Summa Cum Laude GPA 4.02/4.3 Ranked 4th | |
| | Seoul Science High School, Korea | 1998 |
| Professional Experience | Senior Research Scientist at Korea Institute of Science and Technology | 2018- |
| | <ul style="list-style-type: none">• Center for Medical Robotics• Robot-Media Institute | |
| | Senior Researcher at Samsung Electronic | 2015-2018 |
| | <ul style="list-style-type: none">• Mechatronics R&D Center• Motion planning for industrial manipulators• Autonomous driving mobile robots | |
| | Postdoctoral Fellow at Robotics Institute | 2013-2015 |
| | <ul style="list-style-type: none">• Carnegie Mellon University, Pittsburgh, PA, USA• Search-based Planning Laboratory• Supervisor: Prof. Maxim Likhachev | |
| Professional Experience | Software Engineer at National Robotics Engineering Center | 2013-2014 |
| | <ul style="list-style-type: none">• Advanced Laser Coating Removal for Aircraft Project | |
| Professional Experience | Researcher at Robotics Laboratory | 2006-2007 |
| | <ul style="list-style-type: none">• Motion planning and control of mobile manipulator | |

Research Interests Robot dynamics/kinematics, dynamic simulation, motion planning with learning, motion planning for multi-agent system, real-time planning, graph search-based planning, optimization, machine learning.

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| Research Experience | Advanced Laser Coating Removal for Aircraft | 2013-2014 |
| | <ul style="list-style-type: none">• Optimal path planning | |
| | DRC | 2012-2013 |
| | <ul style="list-style-type: none">• Dynamics analysis and simulation of Humanoid robot• Balancing control | |
| | RCTA, | 2011-2013 |
| | <ul style="list-style-type: none">• Generate optimal trajectories under homotopy/homology constraints | |
| | ARM-S, | 2009-2011 |
| | <ul style="list-style-type: none">• Manipulation with robot arm and hand• Solve kinematic/dynamic problem of WAM Arm | |
| | Planning/control of Multiple Robots, | 2007 - 2009 |
| | <ul style="list-style-type: none">• Manipulate a heavy object with multiple mobile robot via pulling• Carrying a payload with multiple quadrotors | |
| Teaching Experience | Korea Institute of Science and Technology Project, | 2005 - 2007 |
| | <ul style="list-style-type: none">• Motion planning for mobile manipulators• Path generation algorithm for differential drive mobile robots• Time-optimal path generation based on graph search | |
| | Hyundai Heavy Industry Project, | 2004 - 2005 |
| | <ul style="list-style-type: none">• Evaluation tool to support designing industrial manipulator• Develop evaluation algorithm for motion trajectories | |
| | TA of MEAM | 2008 - 2010 |
| | <ul style="list-style-type: none">• Undergraduate Dynamics• Advanced Dynamics• Mechanical Engineering Design Laboratory | |
| | Introduction to Robotics | 2005 |
| | <ul style="list-style-type: none">• Head TA | |
| | Senior Thesis, | 2005 |
| | <ul style="list-style-type: none">• Guide senior thesis for undergraduate student | |
| Publications | Journal/Magazine Articles | |
| | <ul style="list-style-type: none">• Subhrajit Bhattacharya, Soonkyum Kim, Hordur Heidarsson, Gaurav S. Sukhatme and Vijay Kumar. <i>A topological approach to using cables to separate and manipulate sets of objects</i>. International Journal of Robotics Research, vol. 34, issue: 6, pp. 799-815, Feb, 2015. | |

- Jonathan Fink, Nathan Michael, Soonkyum Kim, and Vijay Kumar. *Planning and control for cooperative manipulation and transportation with aerial robots*. International Journal of Robotics Research, vol. 30, no. 3, pp. 324-334, Mar, 2011.
- Soonkyum Kim and Frank C. Park. *Real-time robot motion generation using principal components: framework and algorithms*. IEEE Transactions On Industrial Electronics, vol. 55, no. 6, pp. 2506-2516, Jun, 2008.

Conference/Symposium/Workshop Proceedings

- Soonkyum Kim and Maxim Likhachev. *Path planning for a tethered robot using Multi-Heuristic A* with topology-based heuristics*. In Proceedings of IEEE International Conference on Intelligent Robots and Systems, 2015.
- Soonkyum Kim, Subhrajit Bhattacharya and Vijay Kumar. *Path Planning for a Tethered Mobile Robot*. In Proceedings of IEEE International Conference on Robotics and Automation, 2014.
- Soonkyum Kim, Subhrajit Bhattacharya, Robert Ghrist and Vijay Kumar. *Topological Exploration of Unknown and Partially Known Environments*. In Proceedings of IEEE International Conference on Intelligent Robots and Systems, 2013.
- Soonkyum Kim, Subhrajit Bhattacharya and Vijay Kumar. *Simulation of Autonomous Boats for Cooperative Skimming and Cleanup*. In Proceedings of ASME IDETC, 2013.
- Soonkyum Kim, Subhrajit Bhattacharya, Hordur Heidarsson, Gaurav Sukhatme and Vijay Kumar. *A Topological Approach to Using Cables to Separate and Manipulate Sets of Objects*. In Proceedings of Robotics: Science and Systems Conference, 2013.
- Soonkyum Kim, Koushil Sreenath, Subhrajit Bhattacharya and Vijay Kumar. *Optimal Trajectory Generation Under Homology Class Constraints*. In Proceedings of IEEE Conference on Decision and Control, Maui, HA, USA, Dec, 2012.
- Jungwon Seo, Soonkyum Kim, and Vijay Kumar. *Planar, bimanual, whole-arm grasping*. In Proceedings of IEEE International Conference on Robotics and Automation, Saint Paul, MN, USA, May, 2012.
- Soonkyum Kim, Koushil Sreenath, Subhrajit Bhattacharya, and Vijay Kumar. *Trajectory Planning for Systems with Homotopy Class Constraints*. In Proceedings of International Symposium on Advances in Robot Kinematics, Innsbruck, Austria, Jun, 2012.
- Steven R. Gray, Joseph M. Romano, Jordan Brindza, Soonkyum Kim, Katherine J. Kuchenbecker, and Vijay Kumar. *Planning manipulation and grasping tasks with a redundant arm*. ASME 2011 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Washington, DC, USA, Aug, 2011.
- Nathan Michael, Soonkyum Kim, Jonathan Fink, and Vijay Kumar. *Kinematics and statics of cooperative multi-robot aerial manipulation with cables*. In Proceedings of the ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conf., San Diego, CA, Aug, 2009.
- Jonathan Fink, Nathan Michael, Soonkyum Kim, and Vijay Kumar. *Planning and control for cooperative manipulation and transportation with aerial robots*. In Proceedings of the International Symposium of Robotics Research, Lucerne, Switzerland, Aug, 2009.

- Peng Chang, Jonathan Fink, Soonkyum Kim, and Vijay Kumar. *Cooperative Towing With Multiple Robots*. WAFR, 2008.
- Soonkyum Kim, and Frank C. Park. *Fast Generation Of Efficient Motions For Differential Drive Robots*. In Proceedings of 8th International IFAC Symposium on Robot Control, Santa Cristina Convent, University of Bologna, Italy, 2006.
- Frank C. Park, Jinhyeok Choi, and Soonkyum Kim. *Real-Time Generation of Fast, Torque-Efficient Motions*. In Proceedings of IEEE International Conference on Advanced Robotics, Seattle, WA, Jul, 2005.

Awards and Scholarships

- Korean National Scholarship for Foreign Study 2007
- Mechanical Engineering
- SNU Scholarship for Academic Excellence 2000-2001

Invited Talks and Seminars

- Invited Talk “Robot Motion Planning Under Topological Constraints” at Carnegie Mellon University, May, 2013.
- MEAM Summer Seminar “A Topological Approach to Using Cables to Separate and Manipulate Sets of Objects” at University of Pennsylvania, June, 2013.
- Invited Talk “Robot Motion Planning Under Topological Constraints” at Ulsan National Institute of Science and Technology, November, 2013.
- Invited Talk “Robot Motion Planning Under Topological Constraints” at Sungkyunkwan University, November, 2013.
- Invited Talk “Robot Motion Planning Under Topological Constraints” at Kookmin University, November, 2013.
- Invited Talk “Robot Motion Planning Under Topological Constraints” at Hanyang University, August, 2014.

Programming Skills

- Certificate of Engineering Information Processing (1st Grade) of skills Human Resources Development Service of Korea. 2001
- C/C++, Matlab
- ROS (Robot Operating System)