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Ayoung Kim

EDUCATION

University of Michigan *Dec. 2012*
Ph.D. in Mechanical Engineering
Dissertation: "Visual SLAM with Exploration for Autonomous Underwater Navigation"
Advised by Dr. Ryan M. Eustice

University of Michigan *Dec. 2011*
M.S. in Electrical Engineering (Systems)

Seoul National University (SNU) *Feb. 2007*
M.S. in Mechanical and Aerospace Engineering (MAE)
Dissertation: "Stiffness Analysis and Hybrid Control for Parallel Manipulator"
Advised by Dr. Frank C. Park

Seoul National University (SNU) *Feb. 2005*
B.S. in Mechanical and Aerospace Engineering (MAE)
Graduated *Summa cum laude*

RESEARCH EXPERIENCE

Autonomous Ship Hull Inspection 2007 - present
Graduate Student Research Assistant / Post-doctoral Research Fellow *PeRL Lab*

- Implemented real-time visual SLAM front-end and demonstrated on several different real-world ship hulls using Hovering AUV (HAUV).
- In collaboration with Massachusetts Institute of Technology (MIT) and Bluefin Robotics.
- Currently working on real-time vision-based multisession SLAM and high-resolution photomosaic of underwater images.

Multi-AUV Testbed for SLAM and Navigation research 2007 - 2012
Graduate Student Research Assistant *PeRL Lab*

- Modified stock Ocean-server's Iver2 into a multi-AUV testbed for robotic navigation research.
- Mapped National Oceanic and Atmospheric Administration (NOAA) Thunder Bay National Marine Sanctuary using two modified autonomous underwater vehicle (AUV) equipped with sidescan sonar and optical cameras.

Sensor Data Based Motion Planner project 2006 - 2007
Graduate Student Research Assistant *SNU Robotics Lab*

- Participated in the Mobile Manipulation and Movement Coordination subproject.
- Researched control algorithm for a mobile manipulator with holonomic/nonholonomic constraint under consideration of mobile robot dynamics.

Modular Robot System Design and Motion Generation Simulator Project 2005 - 2006
Graduate Student Research Assistant *SNU Robotics Lab*

- Developed robot hardware interface module for a Lie group dynamics-based simulator.

PUBLICATIONS

International Journal

- Hyunchul Roh, Jinyong Jeong, Younggun Cho, and Ayoung Kim. Accurate mobile urban mapping via digital map-based SLAM. *MDPI Sensors*, 16(8):1315, Aug. 2016

- Stephen M. Chaves, Ayoung Kim, Enric Galceran, and Ryan M. Eustice. Opportunistic sampling-based active visual SLAM for underwater inspection. *Autonomous Robots*, 40(7):1245–1265, Jul. 2016
- Paul Ozog, Nicholas Carlevaris-Bianco, Ayoung Kim, and Ryan M. Eustice. Long-term mapping techniques for ship hull inspection and surveillance using an autonomous underwater vehicle. *Journal of Field Robotics, Special Issue on Safety, Security and Rescue Robotics*, 33(3):265–289, May. 2016
- Ayoung Kim and Ryan M. Eustice. Active visual SLAM for robotic area coverage: Theory and experiment. *International Journal of Robotics Research, Special Issue on Robot Vision*, 34(4-5):457–475, Apr. 2015
- Ayoung Kim and Ryan M. Eustice. Real-time visual SLAM for autonomous underwater hull inspection using visual saliency. *IEEE Transactions on Robotics*, 29(3):719–733, Jun. 2013
- Franz S. Hover, Ryan M. Eustice, Ayoung Kim, Brendan Englot, Hordur Johannsson, Michael Kaess, and John J. Leonard. Advanced perception, navigation and planning for autonomous in-water ship hull inspection. *International Journal of Robotics Research, Special Issue on 3D Exploration, Mapping, and Surveillance*, 31(12):1445–1464, Oct. 2012
- Hunter C. Brown, Ayoung Kim, and Ryan M. Eustice. An overview of autonomous underwater vehicle research and testbed at PeRL. *Marine Technology Society Journal*, 43(2):33–47, 2009

International Conference

- Younggun Cho and Ayoung Kim. Visibility enhancement for underwater visual SLAM based on underwater light scattering model. In *Proceedings of the IEEE International Conference on Robotics and Automation*, Singapore, May. 2017. Accepted. To appear
- Youngji Kim and Ayoung Kim. Comparison of point feature matching and graph matching for underwater scene matching. In *Proceedings of the International Conference on Control, Automation and Systems*, Gyeongju, S. Korea, Oct. 2016
- Youngji Kim, Hwasup Lim, Sang Chul Ahn, and Ayoung Kim. Simultaneous segmentation, estimation and analysis of articulated motion from dense point cloud sequence. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 1085–1092, Daejeon, S. Korea, Sep. 2016
- Dae-Hyeon Gwon, Young-Sik Shin, Youngji Kim, Yeongjun Lee, Hyun-Taek Choi, and Ayoung Kim. Nontemporal relative pose estimation for opti-acoustic bundle adjustment. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–5, Monterey, CA, Sep. 2016
- Younggun Cho, Young-Sik Shin, and Ayoung Kim. Online depth estimation and application to underwater image dehazing. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–7, Monterey, CA, Sep. 2016
- Young-Sik Shin, Younggun Cho, Gaurav Pandey, and Ayoung Kim. Estimation of ambient light and transmission map with common convolutional architecture. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–7, Monterey, CA, Sep. 2016
- Jinyong Jeong and Ayoung Kim. Adaptive inverse perspective mapping for lane map generation with SLAM. In *Proceedings of the IEEE Ubiquitous Robots and Ambient Intelligence (URAI)*, pages 38–41, Xian, China, Aug. 2016
- Young-Sik Shin, Yeongjun Lee, Hyun-Taek Choi, and Ayoung Kim. Bundle adjustment from sonar images and SLAM application for seafloor mapping. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–6, Washington, DC, Oct. 2015
- Stephen M. Chaves, Ayoung Kim, and Ryan M. Eustice. Opportunistic sampling-based planning for active visual SLAM. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 3073–3080, Chicago, IL, USA, Sep. 2014
- Ayoung Kim and Ryan M. Eustice. Perception-driven navigation: Active visual SLAM for robotic area coverage. In *Proceedings of the IEEE International Conference on Robotics and Automation*, pages 3181–3188, Karlsruhe, Germany, May. 2013
- Ayoung Kim and Ryan M. Eustice. Next-best-view visual SLAM for bounded-error area coverage. In *IROS Workshop on Active Semantic Perception*, Vilamoura, Portugal, Oct. 2012
- Ayoung Kim and Ryan M. Eustice. Combined visually and geometrically informative link hypothesis for pose-graph visual SLAM using bag-of-words. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 1647–1654, San Francisco, CA, USA, Sep. 2011
- Ayoung Kim and Ryan M. Eustice. Toward AUV survey design for optimal coverage and localization using the cramer rao lower bound. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–7, Biloxi, MS, USA, Oct. 2009
- Ayoung Kim and Ryan M. Eustice. Pose-graph visual SLAM with geometric model selection for autonomous underwater ship hull inspection. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 1559–1565, St. Louis, MO, USA, Oct. 2009

- Hunter Brown, Ayoung Kim, and Ryan Eustice. Development of a multi-AUV SLAM testbed at the University of Michigan. In *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, pages 1–6, Quebec City, Quebec, Canada, Sep. 2008
- Ryan M. Eustice, Hunter C. Brown, and Ayoung Kim. An overview of AUV algorithms research and testbed at the University of Michigan. In *Proceedings of the IEEE/OES Autonomous Underwater Vehicles Conference*, pages 1–9, Woods Hole, MA, USA, Oct. 2008
- A-Young Kim, Sitae Kim, Jay-Il Jeong, Jongwon Kim, and F.C. Park. Exploiting redundant actuation to enhance the static stiffness of parallel mechanisms. In *The 13th International Conference on Advanced Robotics*, Jeju, Korea, Aug. 2007

Domestic Journal

[1] , , , , , 23(1):22–25, 2017.
[2] , , , , 3 , , 11(2):52–59, 2016.
[3] , , , , , , , 30(3):214–220, 2016.

Dissertations

- Ayoung Kim. *Active visual SLAM with exploration for autonomous underwater navigation*. PhD thesis, University of Michigan, Ann Arbor, MI, Aug. 2012
- Ayoung Kim. Stiffness analysis and hybrid control for parallel manipulator. Master's thesis, Seoul National University, Seoul, Korea, Dec. 2007

FIELD OF INTEREST

Visual simultaneous localization and mapping (SLAM), Navigation, Path planning, Computer vision, Autonomous vehicles, Mobile robotics, Robotic perception

AWARDS AND HONORS

2016	"Excellent Reviewer", The Institute of Control, Robotics and Systems (ICROS)
2016	"Young Scientist at Summer Davos Forum", The World Economic Forum (WEF)
2015	"Excellence Award", Ministry of Science, ICT and Future Planning (MSIP)
2015	"Young Researchers Award", ICROS
2009, 2011	Rackham Travel Grant Award
2005 - 2007	Funding from Samsung Electronics, Inc.
2005	Graduated *Summa cum laude*, MAE, SNU.
2004	"Best Presentation Award of Bachelor Thesis", MAE, SNU.