

# Pyojin Kim

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## CONTACT INFORMATION

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## RESEARCH INTERESTS

Visual Odometry, Visual Simultaneous Localization and Mapping, Computer Vision, Mobile Robot

## EDUCATION

**Seoul National University**, Seoul, South Korea

M.S./Ph.D. Student, Mechanical and Aerospace Engineering, March 2013 to February 2019.

- Ph.D. Thesis: *Low-Drift Visual Odometry and SLAM for Indoor Robotics*
- Advisor: H. Jin Kim

**Yonsei University**, Seoul, South Korea

Bachelor, Magna Cum Laude, Mechanical Engineering, March 2009 to February 2013.

- Thesis: *2D CFD for Determining Optimal Location of Wind Turbine on Korean Mountain.*
- Advisor: Changhoon Lee

## ACADEMIC EXPERIENCE

**Seoul National University**, Seoul, South Korea

*Graduate Student, Intelligent Control Systems Laboratory (ICSL)* **March, 2013 - present**  
Includes current M.S./Ph.D. research, Ph.D. and Masters level coursework.  
Research projects related National Space Laboratory (NSL) are doing.

**Google**, Mountain View, CA

*Graduate Student Researcher, ARCore 6-DoF Tracking Team* **October, 2018 - present**  
Work with Chao Guo, Ryan Dutoit, and Leon Wong, in ARCore 6-DoF Tracking Team at Google.

**NASA Ames Research Center**, Mountain View, CA

*Graduate Student Researcher, Intelligent Robotics Group (IRG)* **June, 2016 - September, 2016**  
Work with Brian Coltin, Oleg Alexandrov, and Terry Fong, in Intelligent Robotics Group of NASA Ames Research Center, I performed research about robust visual localization in changing lighting condition. The result is published to ICRA 2017.

## HONORS, AWARDS, SCHOLARSHIPS

- Teaching Assistant, Introductory Engineering Probability, 2013.
- Teaching Assistant, Flight Dynamics and Control, 2013.
- 24-th HumanTech Paper Award, Samsung Electronics, 2018.
- Best Paper Award, The Korea Navigation Institute Conference, 2015.
- Magna Cum Laude, Yonsei University, 2013.
- Kwanjeong Educational Foundation (KEF) Domestic Scholarship, 2013 ~ 2015.
- Academic Excellence Scholarship, 2009 ~ 2012.

## PUBLICATIONS

**International Journals**

**Pyojin Kim**, Hyeonbeom Lee, H. Jin Kim, “Autonomous Flight with Robust Visual Odometry under Dynamic Lighting Conditions.”, Autonomous Robots (AURO), 2018.

**Pyojin Kim**, Hyon Lim, H. Jin Kim, “Visual Inertial Odometry with Pentafoveal Geometric Constraints.”, International Journal of Control Automation and Systems (IJCAS), 2018.

### International Conferences

**Pyojin Kim**, Brian Coltin, H. Jin Kim, “Linear RGB-D SLAM for Planar Environments.”, European Conference on Computer Vision (ECCV), 2018. (Acceptance Rate = 776/2439  $\sim$  **31.8%**)

Changhyeon Kim, **Pyojin Kim**, Sangil Lee, H. Jin Kim, “Edge-based Robust RGB-D Visual Odometry Using 2-D Edge Divergence Minimization.”, IEEE International Conference on Intelligent Robots and Systems (IROS), 2018. (Acceptance Rate = 1257/2693  $\sim$  46.7%)

**Pyojin Kim**, Brian Coltin, H. Jin Kim, “Indoor RGB-D Compass from a Single Line and Plane.”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018. (Acceptance Rate = 979/3309  $\sim$  **29.6%**)

**Pyojin Kim**, Brian Coltin, H. Jin Kim, “Low-Drift Visual Odometry in Structured Environments by Decoupling Rotational and Translational Motion.”, IEEE International Conference on Robotics and Automation (ICRA), 2018. (Acceptance Rate = 1030/2539  $\sim$  40.6%)

**Pyojin Kim**, Brian Coltin, H. Jin Kim, “Visual Odometry with Drift-Free Rotation Estimation Using Indoor Scene Regularities.”, British Machine Vision Conference (BMVC), 2017. (Acceptance Rate = 188/635  $\sim$  **29.6%**)

Changhyeon Kim, Sangil Lee, **Pyojin Kim**, H. Jin Kim, “Time-Efficient Dense Visual 12-DoF State Estimator Using RGB-D Camera.”, International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2017.

**Pyojin Kim**, Brian Coltin, Oleg Alexandrov, H. Jin Kim, “Robust Visual Localization in Changing Lighting Conditions.”, IEEE International Conference on Robotics and Automation (ICRA), 2017. (Acceptance Rate = 933/2278  $\sim$  41%)

Sangil Lee, **Pyojin Kim**, Changhyeon Kim, H. Jin Kim, “Depth-based Direct Visual Odometry for Stereo Camera.”, Asia-Pacific International Symposium on Aerospace Technology (APISAT), 2016.

**Pyojin Kim**, Hyon Lim, H. Jin Kim, “Robust Visual Odometry to Irregular Illumination Changes with RGB-D Camera.”, IEEE International Conference on Intelligent Robots and Systems (IROS), 2015. (Acceptance Rate = 981/2134  $\sim$  46%)

**Pyojin Kim**, Hyon Lim, H. Jin Kim, “6-DoF Velocity Estimation Using RGB-D Camera Based on Optical Flow.”, IEEE International Conference on Systems, Man and Cybernetics (SMC), 2014.

### Domestic Journals

Sangil Lee, **Pyojin Kim**, Changhyeon Kim, Hyeonbeom Lee, H. Jin Kim, “Survey on Visual Odometry Technology for Unmanned Systems.”, The Journal of Institute of Control, Robotics and Systems, 2017 Domestic Journal on v.23 no 6.

H. Jin Kim, Hoseong Seo, **Pyojin Kim**, Chung-keun Lee, “Survey on Visual Navigation Technology for Unmanned Systems.”, The Journal of Korea Navigation Institute, 2015 Domestic Journal on v.19 no 2. pp.133-139.

### Domestic Conferences

**Pyojin Kim**, Hyeonbeom Lee, H. Jin Kim, “Autonomous Flight of a Micro Aerial Vehicle Using Hybrid Stereo Visual Odometry.”, The Institute of Control, Robotics and Systems (ICROS), 2017 ICROS Domestic Conference.

**Pyojin Kim**, H. Jin Kim, “Performance Analysis of Dense Visual Odometry under Irregular Illumination Changes.”, The Korea Navigation Institute Conference (KONI), 2015 KONI Domestic Conference.

**Pyojin Kim**, H. Jin Kim, “Design of an Image-Based Quadrotor Controller for Automatic Landing on Shipboard.”, The Korean Society For Aeronautical and Space Sciences (KSAS), 2013 KSAS Domestic Conference on pp.442-446.

PATENT

**Pyojin Kim**, Hyon Lim, H. Jin Kim, “Visual Odometry System and Method.”, KR 10-2016-0108416.

**Pyojin Kim**, Hyon Lim, H. Jin Kim, “Robust Visual Odometry System and Method to Irregular Illumination Changes.”, KR 10-2015-0138558.

COMPUTER SKILLS

- Languages: MATLAB, ROS, C/C++, Simulink, LabVIEW.
- Computer-Aided Design: SolidWorks, AutoCAD.
- Operating Systems: Linux (Ubuntu), Windows, OS X.