Jungwon Kang, Ph.D.

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Personal Summary

I am an automotive and robotic vision developer with a primary focus on perception, localization, and mapping for autonomous systems, including mobile robots, drones, cars, and trains. With strong expertise in computer vision, machine learning, deep learning, SLAM, and multi-sensor technologies (camera, LiDAR, radar, IMU, UWB), I have successfully led and delivered numerous robotics projects over the past decade, including the following featured recent works:

- **Jungwon Kang**, Mohammadjavad Ghorbanalivakili, et al., "TPE-Net: Track Point Extraction and Association Network for Rail Path Proposal Generation", **IEEE CASE**, 2023.
- **Jungwon Kang**, et al., "RPV-SLAM: Range-augmented Panoramic Visual SLAM for Mobile Mapping System with Panoramic Camera and Tilted LiDAR," ICAR, 2021.
- **Jungwon Kang**, et al., "Ultra-Wideband Aided UAV Positioning Using Incremental Smoothing with Ranges and Multilateration," **IEEE/RSJ IROS**, 2020.
- Kang Zhao, **Jungwon Kang**, et al., "Building Extraction from Satellite Images Using Mask R-CNN with Building Boundary Regularization," **IEEE CVPR Workshops**, DeepGlobe Satellite Challenge, 2018. (Ranked 4th)

Moreover, for the project 'Visual AI for Autonomous Train: Ontario Train Autonomy Collaboration (OnTRAC)', our team (including me) won the PEO York 2020 Engineering Research Project Award of the Year.

For the development, I have used the following programming languages and tools:

- C++
  - Modern C++ (C++ 11, 14 and subsequent versions), including multi-threaded programming
  - Library: OpenCV, PCL, Eigen, GTSAM, g2o, OpenGL, Qt
  - Framework: ROS
- Python
  - Deep learning library: Pytorch, Tensorflow
- Matlab
- Git, Docker, Profiling tools (pyinstrument, scalene, py-spy)
- JIRA

Work Experience

• **Qualcomm Inc. Canada** — Markham, Canada
Engineer, Staff — Jan. 2023 – Present

• **Thales Canada, Transportation Solutions** — Toronto, Canada
Autonomous Navigation Researcher — Sept. 2021 – Dec. 2022

- Vehicle Situational Awareness (VSA) Path Extraction (PE) development for Train Autonomy Platform (TAP) 2
  - Python implementation/development of VSA-PE camera pipeline using a deep multi-task neural network
  - Integration of VSA-PE into VSA system
  - Preparation of demonstration for proof-of-concept project (OnTRAC project)
- Odometry (Train speed estimation) Error Model Development for Train Autonomy Platform (TAP) 1
  - Development of odometry error models Ver2(timing), Ver3(installation), Ver4(infrastructure), Ver5(environment)
- Field Data Acquisition Support
  - C++ implementation of Livox Horizon lidar data acquisition node
  - Operation of a total station
  - Generation of geo-referenced train position using GNSS and total station data
- Preliminary Design of LiDAR-based Scene-Based Position Correction (SBPC) function for TAP 2
  - Preliminary design of onboard scene-feature extraction, onboard-to-database scene-feature matching, and database

generation modules in SBPC function
- Patent Preparation for VSA-PE

• **Augmented Urban Space Modeling Lab, York University** Toronto, Canada
Research Associate & Deputy director Mar. 2021 – Sept. 2021
Postdoctoral Researcher & Deputy director Mar. 2019 – Mar. 2021
Postdoctoral Researcher Mar. 2017 – Feb. 2019
- Director: Prof. Gunho Sohn
- I have primarily worked on the projects of
  - OCE AVIN "Ontario Train Autonomy Collaboration" for developing path extraction algorithm using deep neural network
  - NSERC CRD "3D Mobile Mapping AI" for developing SLAM algorithm using panoramic images and tilted LiDAR points
  - Development of autonomous UAV system using UWB and IMU sensors

  In addition, I have also led and collaborated with MSc and PhD students to carry out research projects. Moreover, I have worked as a deputy director to provide a supplementary administrative and supervisory role.

• **KAIST Institute for Robotics** Daejeon, South Korea
Postdoctoral Researcher Apr. 2016 – Jan. 2017
- Directors: Prof. Junho Oh and Prof. David Hyunchul Shim
- I worked on the project "Vision-based autonomous car navigation" supported by Hyundai Motor Company.

• **Center for Robot Vision and Perception**, **KAIST** Daejeon, South Korea
Researcher Nov. 2009 – Apr. 2014
- Director: Prof. Myung Jin Chung
- I worked on the project "Traversable region detection for intelligent vehicle navigation".

• **Institute of Automation**, **Universität Bremen** Bremen, Germany
Visiting Scholar July 5 ~ 31, 2010
- Advisor: Prof. Axel Gräser
- I shared knowledge and ideas with students in the institute of automation for improving the rehabilitation robot "FRIEND".

• **Robotics Institute**, **Carnegie Mellon University** Pittsburgh, PA, USA
Intern Scholar Jan. 2009 – Sept. 2009
- Advisors: Dr. Seok Won Bang (major advisor) and Prof. Christopher G. Atkeson
- I worked on the project "Visual SLAM & navigation using ceiling images for a hospital service robot".

• **Unmanned Technology Research Center**, **KAIST** Daejeon, South Korea
Researcher June 2007 – Dec. 2008, Mar. 2010 – Oct. 2014
- Director: Prof. Soo-Hyun Kim
- I worked on the project "3D world modeling using stereo vision and LIDARs".

• **Human-friendly Welfare Robot System Engineering Research Center**, **KAIST** Daejeon, South Korea
Researcher Mar. 2004 – Feb. 2008
- Director: Prof. Z. Zenn Bien
- I worked on the project "Development of assistive mobile robots in a factory environment".

Projects

• **OnTRAC: Safe and Robust Obstacle Detection for Autonomous Train** Feb. 2019 – Dec. 2021
- Supporting organization: Thales, OCE
- I have developed AI-based path extraction algorithms for single vision, dual vision and a LiDAR.

• **3D Mobile Mapping Using Artificial Intelligence - SLAM for Mobile Mapping System** Apr. 2020 – Sept. 2021
- Supporting organization: Teledyne Optech, NSERC
- I have built a LiDAR-augmented panoramic visual SLAM system for a mobile mapping system.

• **Development of Quality-driven Autonomous UAV for Metric Infrastructure Inspection** Mar. 2017 – Mar. 2019
- Supporting organization: Industrial SkyWorks, Centre de Géomatique du Québec, Mitacs
- I developed ultra-wideband aided UAV positioning algorithm. Specifically, I built hardware systems using DJI M100 and TimeDomain PulsON 440 UWB modules and software systems using ROS kinetics on Ubuntu 16.04.

• **Vision-based Autonomous Car Navigation** Apr. 2016 – Jan. 2017
- Supporting organization: Hyundai Motor Company
- I developed algorithms for (i) monocular vision-based real-time drivable region detection, (ii) a lane keeping system using around view monitor (AVM) images, and (iii) vehicle localization using AVM images.

- **Traversable Region Detection for Intelligent Vehicle Navigation** Nov. 2009 – Apr. 2014
  - Supporting organization: Korea Institute for Robot Industry Advancement (KIRIA)
  - I developed algorithms for traversable region detection using stereo cameras and LiDAR.
- **Visual SLAM & Navigation Using Ceiling Images for a Hospital Service Robot** Jan. 2009 – Sept. 2009
  - Supporting organization: Korea Institute of Robots and Convergence (KIRO)
  - I developed a ceiling vision-based localization and mapping algorithm for autonomous navigation of a hospital service robot in a large indoor environment, where the ceiling is almost textureless, making it hard to detect features in visible-ray domain.
- **3D World Modeling Using Stereo Vision and LIDARs** June 2007 – Dec. 2008, Mar. 2010 – Oct. 2014
  - Supporting organization: Agency for Defense Development (ADD)
  - I developed algorithms for (i) real-time dense stereo matching, (ii) stereo vision-based visual odometry, and (iii) 3D world modeling using stereo vision and camera-combined LiDARs.
- **Coverage Path Planning for a Cleaning Robot** Mar. 2006 – Sept. 2006
  - Supporting organization: Samsung Advanced Institute of Technology (SAIT)
  - I developed a path planning algorithm for a cleaning robot to explore all locations in a given region.
- **Trajectory Generation for a Tool Center Point of a Robot Arm** June 2004 – Dec. 2004
  - Supporting organization: Samsung Heavy Industries
  - I implemented a software library on RTLinux (Pro v1.0, FSM Labs) for trajectory generation for a tool center point.
- **Development of Assistive Mobile Robots in a Factory Environment** Mar. 2004 – Feb. 2008
  - Supporting organization: National Research Foundation of Korea (NRF)
  - I built wheelchair-type mobile robots. Specifically, I developed electronic systems using Atmel AT90CAN128 and CPLD Altera EPM3128ATC100-5 for controlling motors and ultrasonic sensors in the mobile robots.

Education

- **Korea Advanced Institute of Science and Technology (KAIST)** Daejeon, South Korea
  - Ph.D., Electrical Engineering, Feb. 2016
  - Thesis: Online Motion Segmentation through Multi-Temporal Section Motion Analysis in Dynamic Scenes
  - Advisors: Prof. Myung Jin Chung and Prof. Dong-Jo Park
- **Korea Advanced Institute of Science and Technology (KAIST)** Daejeon, South Korea
  - M.S., Electrical Engineering, Feb. 2006
  - Thesis: SLAM for a Mobile Robot Using Sensor Fusion of Laser Range Finder and Omni-Directional Vision Sensor
  - Advisor: Prof. Myung Jin Chung
  - GPA: 3.97/4.3
- **Korea University** Seoul, South Korea
  - B.E., Electrical Engineering, Feb. 2004
  - GPA: 4.27/4.5

Honors and Awards

- PEO York 2020 Engineering Research Project Award of the Year
  - Project title: Visual AI for Autonomous Train: Ontario Train Autonomy Collaboration (OnTRAC)
- Samsung Heavy Industries Scholarship, 2012
- Annual Research Award, Department of Electrical Engineering, KAIST, 2009
- Annual Research Award, Department of Electrical Engineering, KAIST, 2008
- Annual Research Award, Department of Electrical Engineering, KAIST, 2007
- Best Poster Paper Award, The 4th International Conference on Ubiquitous Robots and Ambient Intelligence, 2007
  - Paper title: Efficient Area Coverage Method for a Mobile Robot in Indoor Environments

Publications

- ***Journals***

1. Yujia Zhang, SeyedMostafa Ahmadi, **Jungwon Kang**, Zahra Arjmandi and Gunho Sohn, “YUTO MMS: A comprehensive SLAM dataset for urban mobile mapping with tilted LiDAR and panoramic camera integration”, The International Journal of Robotics Research, vol. 44, no. 1, 2025.
2. Yujia Zhang, **Jungwon Kang** and Gunho Sohn, “PVL-Cartographer: Panoramic Vision-Aided LiDAR Cartographer-Based SLAM for Maverick Mobile Mapping System,” Remote Sensing, vol. 15, issue 13, 2023.

3. **Jungwon Kang** and Myung Jin Chung, “Fast Online Motion Segmentation through Multi-Temporal Interval Motion Analysis,” IEICE Transactions on Information and Systems, vol. E98-D, no. 2, pp. 479-484, Feb. 2015. (SCIE)
4. Sijong Kim, **Jungwon Kang** and Myung Jin Chung, “Probabilistic Voxel Mapping Using an Adaptive Confidence Measure of Stereo Matching,” Intelligent Service Robotics, vol. 6, no. 2, pp. 89-99, Apr. 2013. (SCIE)
5. **Jungwon Kang**, Seok Won Bang, Christopher G. Atkeson, Youngjin Hong, Jinho Suh, Jungwoo Lee and Myung Jin Chung, “Monocular Vision Based Localization System Using Hybrid Features from Ceiling Images for Robot Navigation in an Indoor Environment,” Journal of Korea Robotics Society, vol. 6, no. 3, pp. 197-209, Sept. 2011.
6. Sijong Kim, **Jungwon Kang**, Yungeun Choe, Sang Un Park, Inwook Shim, Seunguk Ahn and Myung Jin Chung, “The Development of Sensor System and 3D World Modeling for Autonomous Vehicle,” Journal of Institute of Control, Robotics and Systems, vol. 17, no. 6, pp. 531-538, 2011. (Written in Korean)
7. Ji Hoon Joung, Kwang Ho An, **Jung Won Kang**, Woo Hyun Kim and Myung Jin Chung, “3D Terrain Reconstruction Using 2D Laser Range Finder and Camera Based on Cubic Grid for UGV Navigation,” Journal of the Institute of Electronics Engineers of Korea, vol. 45-SC, no. 6, pp. 26-34, Nov. 2008. (Written in Korean)
8. **Jung Won Kang**, Hyun Seok Hong, Bong Sung Kim and Myung Jin Chung, “Assistive Mobile Robot Systems helping the Disabled Workers in a Factory Environment,” International Journal of Assistive Robotics and Mechatronics, vol. 9, no. 2, pp. 42-52, June 2008.
9. Si-Jong Kim, **Jung Won Kang** and Myung Jin Chung, “Efficient Coverage Path Planning and Path Following in Dynamic Environments,” Journal of Korea Robotics Society, vol. 2, no. 4, pp. 304-309, Dec. 2007. (Written in Korean)
10. **Jung Won Kang**, Hyun Seok Hong, Bong Sung Kim and Myung Jin Chung, “Work Assistive Mobile Robots Assisting the Disabled in a Real Manufacturing Environment,” International Journal of Assistive Robotics and Mechatronics, vol. 8, no. 3, pp. 11-18, Sept. 2007.

• ***Conferences***

1. Zahra Arjmandi, **Jungwon Kang**, Gunho Sohn, Costas Armenakis, Mozhdeh Shahbazi, “DeepCovPG: Deep-Learning-based Dynamic Covariance Prediction in Pose Graphs for Ultra-Wideband-Aided UAV Positioning,” IEEE CASE, 2024.
2. Mohammadjavad Ghorbanalivakili*, **Jungwon Kang***, Gunho Sohn, David Beach and Veronica Marin, “TPE-Net: Track Point Extraction and Association Network for Rail Path Proposal Generation,” IEEE CASE, 2023. (*: equal contribution)
3. **Jungwon Kang**, Yujia Zhang, Zhen Liu, Andrew Sit and Gunho Sohn, “RPV-SLAM: Range-augmented Panoramic Visual SLAM for Mobile Mapping System with Panoramic Camera and Tilted LiDAR,” ICAR, 2021.
4. **Jungwon Kang**, Kunwoo Park, Zahra Arjmandi, Gunho Sohn, Mozhdeh Shahbazi and Patrick Ménard, “Ultra-Wideband Aided UAV Positioning Using Incremental Smoothing with Ranges and Multilateration,” **IEEE/RSJ IROS**, 2020.
5. Zahra Arjmandi, **Jungwon Kang**, Kunwoo Park and Gunho Sohn, “Benchmark Dataset of Ultra-wideband Radio based UAV Positioning,” **IEEE ITSC**, 2020.
6. Kunwoo Park, **Jungwon Kang**, Zahra Arjmandi, Mozhdeh Shahbazi and Gunho Sohn, “Multilateration under Flip Ambiguity for UAV Positioning Using Ultrawide-band,” ISPRS Congress, 2020.
7. Kang Zhao, **Jungwon Kang**, Jaewook Jung and Gunho Sohn, “Building Extraction from Satellite Images Using Mask R-CNN with Building Boundary Regularization,” **IEEE CVPR Workshops**, DeepGlobe Satellite Challenge, 2018. (**Ranked 4th**).
8. Ali Baligh Jahromi, Gunho Sohn, Jaewook Jung, **Jungwon Kang** and Mozhdeh Shahbazi, “Layout SLAM with Model based Loop Closure for 3D Indoor Corridor Reconstruction,” ISPRS Technical Commission II Symposium, 2018.
9. Connie Ko, **Jungwon Kang** and Gunho Sohn, “Deep Multi-task Learning for Tree Genera Classification,” ISPRS Technical Commission II Symposium, 2018.
10. Ali Baligh Jahromi, Gunho Sohn, Mozhdeh Shahbazi and **Jungwon Kang**, “A Preliminary Work on Layout SLAM for Reconstruction of Indoor Corridor Environments,” ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences, 2017.
11. **Jungwon Kang**, Si Jong Kim and Myung Jin Chung, “Robust Clustering of Multi-Structure Data with Enhanced Sampling,” International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2013.
12. **Jungwon Kang**, Sang Un Park and Myung Jin Chung, “Online Motion Segmentation using Spatially-constrained J-linkage in Dynamic Scene,” **IEEE ROBIO**, Dec. 2012.
13. Taek Jun Oh, **Jungwon Kang**, Sijong Kim and Myung Jin Chung, “A Practical 6D Robot Pose Estimation Using GPS and IMU in Outdoor,” International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2012.
14. **Jungwon Kang**, Bo Gil Seo and Myung Jin Chung, “Online 3D World Reconstruction with Independently Moving Point Detection Using Stereo Vision,” International Conference on Control, Automation and Systems, Oct. 2012.
15. **Jungwon Kang**, Sijong Kim, Taek Jun Oh and Myung Jin Chung, “Moving Region Segmentation using Sparse Motion Cue from a Moving Camera,” International Conference on Intelligent Autonomous Systems, June 2012.
16. **Jungwon Kang** and Myung Jin Chung, “Stereo-Vision Based Free Space and Obstacle Detection with Structural and Traversability Analysis Using Probabilistic Volume Polar Grid Map,” **IEEE RAM**, Sept. 2011.
17. **Jungwon Kang**, Sijong Kim, Yungeun Choe, Sangun Park, Inwook Shim, Seung Uk Ahn and Myung Jin Chung, “Building a Mobile Platform for Spatiotemporal Integration of 3D Outdoor World Models,” Korea-Japan Joint Workshop on Frontiers of

Computer Vision, Feb. 2011.

18. Sijong Kim, **Jungwon Kang**, Inwook Shim, Sangun Park and Myung Jin Chung, "Stereo Vision based 3D World Modeling for Intelligent Vehicle Navigation," International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2010.
19. **Jungwon Kang**, Myung Jin Chung, Seok Won Bang, Christopher G. Atkeson, Youngjin Hong, Jinho Suh and Jungwoo Lee, "Ceiling Vision Based Autonomous Navigation of a Mobile Robot using Hybrid Visual Features in a Large Indoor Environment," International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2010.
20. **Jungwon Kang** and Myung Jin Chung, "Real-Time Dense Stereo Matching using Adaptive Support Window for Robot Navigation in an Environment with Large Depth Variation," International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2010.
21. Woo Hyun Kim, **Jung Won Kang** and Myung Jin Chung, "Dense Stereo Matching using Texture-less Region Extraction in the Urban Environment," International Conference on Ubiquitous Robots and Ambient Intelligence, Oct. 2009.
22. Ji Hoon Joung, Kwang Ho An, **Jung Won Kang**, Myung Jin Chung and Wonpil Yu, "3D Environment Reconstruction Using Modified Color ICP Algorithm by Fusion of a Camera and a 3D Laser Range Finder," **IEEE/RSJ IROS**, Oct. 2009.
23. Ji Hoon Joung, Kwang Ho An, **Jung Won Kang**, Woo Hyun Kim and Myung Jin Chung, "3D Terrain Reconstruction Using 2D Laser Range Finder and Camera Based on Cubic Grid," International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2008.
24. **Jung Won Kang**, Bong Sung Kim and Myung Jin Chung, "Development of Omni-Directional Mobile Robots with Mecanum Wheels Assisting the Disabled in a Factory Environment," International Conference on Control, Automation and Systems, Oct. 2008.
25. **Jung Won Kang**, Bong Sung Kim and Myung Jin Chung, "Development of Assistive Mobile Robots Helping the Disabled Work in a Factory Environment," **IEEE/ASME MESA**, Oct. 2008.
26. Si Jong Kim, **Jung Won Kang** and Myung Jin Chung, "Efficient Area Coverage Method for a Mobile Robot in Indoor Environments," International Conference on Ubiquitous Robots and Ambient Intelligence, Nov. 2007.
27. **Jung Won Kang**, Hyun Seok Hong, Bong Sung Kim and Myung Jin Chung, "Development of Assistive Mobile Robots for a Manufacturing Environment," International Workshop on Human-friendly Welfare Robotics Systems, Oct. 2007.
28. Myung Jin Chung, **Jung Won Kang** and Hyun Seok Hong, "Application of Assistive Mobile Robots to a Manufacturing Environment," International Symposium on Humanized Systems, Sept. 2007.
29. **Jung Won Kang**, Si Jong Kim, Myung Jin Chung, Hyun Myung, Jun Ho Park and Seok Won Bang, "Path Planning for Complete and Efficient Coverage Operation of Mobile Robots," **IEEE ICMA**, Aug. 2007.
30. **Jung Won Kang**, Hyun Seok Hong and Myung Jin Chung, "Designing Work Assistant Mobile Robot Type III for the Handicapped in a Real Manufacturing Environment," International Workshop on Human-friendly Welfare Robotics Systems, Oct. 2006.
31. Hyun Seok Hong, **Jung Won Kang** and Myung Jin Chung, "Work Assistant Mobile Robot Type I and II for the Handicapped in a Real Manufacturing Environment," International Workshop on Human-friendly Welfare Robotic Systems, Nov. 2005.
32. Hyun Seok Hong, Sung-Yoon Jung, Jik-Han Jung, Byung-Gu Lee, **Jung Won Kang**, Dong-Jo Park and Myung Jin Chung, "Development of Work Assistant Mobile Robot System for the Handicapped in a Real Manufacturing Environment," **IEEE ICORR**, June 2005.

• ***Conferences (Presentation/Poster only)***

1. **Jungwon Kang**, Kunwoo Park, Gunho Sohn, Mozhdeh Shahbazi and Patrick Ménard, "EKF and Smoothing-based UAV Positioning Using UWB and IMU Fusion," Canadian Symposium on Remote Sensing, 2018.
2. Kang Zhao, **Jungwon Kang** and Gunho Sohn, "Automatic Building Segmentation from Aerial Images based on Deep Learning," Canadian Symposium on Remote Sensing, 2018.
3. Connie Ko, **Jungwon Kang** and Gunho Sohn, "Classification of Tree Genera with Deep Multi-task Learning Network," Canadian Symposium on Remote Sensing, 2018.
4. Kang Zhao, **Jungwon Kang** and Gunho Sohn, "Automatic Building Segmentation from Aerial Images based on Deep Neural Network," AOLS-AGM 2018.
5. Kunwoo Park, **Jungwon Kang** and Gunho Sohn, "Ultra-Wideband-Based Range-Only SLAM for UAV Localization in Outdoor Environment," AOLS-AGM 2018.

• ***Conferences (Written in Korean)***

1. Jongyong Do, **Jungwon Kang**, Seokwoo Jung, Jiwon Jung and David Hyunchul Shim, "Lane-Level Vehicle Localization Using Segmented AVM Images," KSME Conference, December 2016.
2. Jeong Hyo Ha, **Jungwon Kang**, Sijong Kim, Seunguk Ahn and Myung Jin Chung, "3D Reconstruction in Urban Environments Using Stereo Matching Algorithm for a Mobile Robot," KIEE Conference, July 2011.
3. Seunguk Ahn, **Jungwon Kang**, Inwook Shim and Myung Jin Chung, "Analysis of GPU Performance on Implementation of Dense Stereo Matching," ICROS Conference, Dec. 2010.

4. Inwook Shim, Yungeun Choe, Sangun Park, **Jungwon Kang** and Myung Jin Chung, “Enhanced Sensor Architecture with Fusion of LIDAR and Camera for a Robotic Vehicle in Urban Environments,” IEEK Conference, Nov. 2010.
5. Sijong Kim, **Jungwon Kang**, Inwook Shim, Sangun Park and Myung Jin Chung, “Stereo Vision Based 3D World Modeling for Unmanned Ground Vehicle Navigation,” IEEK Conference, Nov. 2010.
6. **Jungwon Kang**, Myung Jin Chung, “Robust Real-Time Stereo Camera 6D Pose Estimation for Robot Navigation,” IEEK Conference, Nov. 2010.
7. Inwook Shim, Sangun Park, **Jungwon Kang**, Si Jong Kim, Yeon Geol Ryu and Myung Jin Chung, “Introduction to Parallel Processing Techniques for Computer Vision,” Workshop on Image Processing and Image Understanding, Jan. 2010.
8. Sangun Park, Inwook Shim, **Jungwon Kang**, Si Jong Kim, Yeon Geol Ryu, M. J. Chung, “Implementation of Dense Stereo Matching Using GPU,” Workshop on Image Processing and Image Understanding, Jan. 2010.
9. Woo Hyun Kim, Kwang Ho An, **Jungwon Kang**, Ji Hoon Joung and Myung Jin Chung, “Real-Time 3D Terrain Reconstruction Based on Stereo Vision with GPS/IMU,” The Workshop of Military Robots, Oct. 2008.
10. Ji Hoon Joung, Kwang Ho An, **Jung Won Kang**, Woo Hyun Kim and Myung Jin Chung, “3D Terrain Reconstruction Using CCD Camera and Laser Range Finder Based on Cubic Grid for UGV Navigation,” The National Defence Information and Control Technology Conference, July 2008.
11. **Jung Won Kang**, Kwang Ho An, Ji Hoon Joung, Woo Hyun Kim and Myung Jin Chung, “Real Time 3D Terrain Reconstruction Using Stereo Vision for UGV Navigation,” KRS Conference on Advanced Intelligent Robot, June 2008.
12. **Jung Won Kang**, Si Jong Kim, Myung Jin Chung and Farrokh J. Sharifi, “A Person Following for a Mobile Robot Using a Vision and Sonar Sensors,” KRS Conference on Advanced Intelligent Robot, June 2008.
13. Si Jong Kim, **Jung Won Kang** and Myung Jin Chung, “Efficient Coverage Path Planning in Dynamic Environments,” The Summer Conference on Korean Intelligent Robot, June 2007.
14. **Jung Wong Kang**, Jae-Hean Kim and Myung Jin Chung, “Simultaneous Localization and Map Building for a Mobile Robot Using Sensor Fusion of Laser Range Finder and Omni-Directional Vision Sensor,” Control Automation and Systems Symposium, June 2006.

- ***Book Chapter***

1. Hyun Seok Hong, **Jung Won Kang** and Myung Jin Chung, “Work Assistive Mobile Robot for the Disabled in a Real Work Environment,” in Rehabilitation Robotics, ISBN: 978-3-902613-01-1, Edited by Sashi S Kommu, pp.65-80, I-Tech Education and Publishing, ARS (Advanced Robotic Systems) International, 2007.

Patents

- ***US Patent***

1. Jaewook Jung, Veronica Marin, Mohamed Helwa, **Jungwon Kang**, David Beach, “High integrity path extraction in rail using autonomy sensors,” US Patent App. 18/355,874, 2024.
2. Hyeon Myeong, Seok-won Bang, **Jungwon Kang**, Si-jong Kim, Myung-Jin Chung and Su-jinn Lee, “Method of Dividing Coverage Area for Robot and Device Thereof,” Patent No. 7933686, Publication date: 2011-04-26, United States.

- ***Korea Patent***

1. Bo Gil Seo, **Jungwon Kang**, Sijong Kim, Yungeun Choe, Taek Jun Oh and Myung Jin Chung, “Multiple Sensor System and Method for 3D World Modeling”, Application No. 10-2012-0115517, Date of Filing: 2012-10-17, Republic of Korea.
2. Seunguk Ahn, **Jungwon Kang**, Sijong Kim, Yungeun Choe, Taek Jun Oh and Myung Jin Chung, “Fast Scene Understanding Method in Urban Environment Using Laser Scanner,” Application No. 10-2012-0027835, Date of Filing: 2012-03-19, Republic of Korea.
3. Myung Jin Chung, Inwook Shim, **Jungwon Kang**, Yungeun Choe, Sijong Kim, Sang Un Park and Seunguk Ahn, “Sensor System and Method for 3D Terrain Reconstruction,” Application No. 10-2011-0018502, Date of Filing: 2011-03-02, Republic of Korea.
4. Sijong Kim, Kwang Ho An, Chang Hun Sung, **Jungwon Kang**, Myung Jin Chung and Joon Kim, “Device and Method for 3D World Modeling Using Multi-Sensor Fusion”, Application No. 10-2010-0126391, Date of Filing: 2010-12-10, Republic of Korea.