Dongha Chung

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EDUCATION

Korea Advanced Institute of Science and Technology, Yuseong-gu, Daejeon, Repubic of Korea

- Ph.D. in Mechanical Engineering — Aug 2017 – Aug 2024
  - Adviser: Prof. Jinwhan Kim
  - Thesis: Robust Feature Extraction and Registration for LiDAR SLAM in Feature Degenerate Environment
  - Focus: Marine Vehicles (AUV, ASV), Ground Vehicles, Computer Vision, LiDAR, SLAM
- M.S. in Mechanical Engineering — Aug 2015 – Aug 2017
  - Adviser: Prof. Jinwhan Kim
  - Thesis: Stereo Vision Based Pose Estimation Relative to Planar Surface towards Underwater Ship Hull Inspection
  - Focus: Marine Vehicles (AUV), Computer Vision, Stereo Vision
- B.S. in Mechanical Engineering — Feb 2009 – Aug 2015

PROFESSIONAL AFFILIATIONS & ACTIVITIES

STRADVISION, Gangnam-gu, Seoul, Republic of Korea — Sep 2024 –

- Algorithm Engineer in Visual Positioning Team

Seoul Robotics, Gangnam-gu, Seoul, Republic of Korea — Jan 2019 – Jan 2020

- Robotics Perception Software Engineer

RESEARCH EXPERIENCE

Mobile Robotics & Intelligence Laboratory, KAIST

- Autonomous Underwater Vehicle (2015-2018, 2020)
  - Autonomous ship-hull inspection system
  - Stereo-vision based relative pose estimation system for ship-hull inspection
  - Control system for ship-hull inspection
  - Path planning and control system for torpedo type AUVs
- Autonomus Surface Vehicle (2021)
  - Wall line detection for autonomous touring boat in canal environment
  - Multi-sensor calibration and pose estimation
- Autonomus Ground Vehicle (2022-2023)
  - LiDAR based mapping and map based navigation system for delivery robot
  - Path planning and control system for delivery robot

Seoul Robotics, Gangnam-gu, Seoul, Republic of Korea

- Autonomous Driving & Surveillance (2019)
  - LiDAR based ground & lane detection for autonomous driving
  - LiDAR based pedestrian classification & tracking

PUBLICATIONS

(* corresponding author)

INTERNATIONAL JOURNALS

[7] **D. Chung** and J. Kim*, ”NV-LIOM: LiDAR-Inertial Odometry and Mapping using Normal Vectors Towards Robust SLAM in Multifloor Environments,” *IEEE Robotics and Automation Letters*, vol. 9, no. 11, pp. 9375-9382, Nov. 2024, doi: 10.1109/LRA.2024.3457373.

[6] J. Kim, C. Lee, **D. Chung**, J. Kim*, W. Jang, and S. Park, ”Field experiment of autonomous ship navigation in canal and surrounding nearshore environments,” *Journal of Field Robotics*, in press, 2023. (Highlighted paper in Science Robotics)

[5] C. Lee, **D. Chung**, J. Kim, and J. Kim*, ”Nonlinear Model Predictive Control with Obstacle Avoidance Constraints for Autonomous Navigation in a Canal Environment,” *IEEE/ASME Transactions on Mechatronics*, in press, 2023.

[4] **D. Chung**, J. Kim, C. Lee, and J. Kim*, ”Pohang Canal Dataset: A Multimodal Maritime Dataset for Autonomous Navigation in Restricted Waters,” *International Journal of Robotics Research*, vol.42, no. 12, pp. 1104-1114, 2023.

[3] J. Kim, C. Lee, **D. Chung**, and J. Kim*, ”Navigable Area Detection and Perception-guided Model Predictive Control for Autonomous Navigation in Narrow Waterways,” *IEEE Robotics and Automation Letters*, vol. 8, no. 9, pp. 5456-5463, 2023.

[2] **D. Chung** and J. Kim*, ”Underwater visual mapping of curved ship hull surface using stereo vision,” *Autonomous Robots*, vol. 47, pp. 109-120, 2023.

[1] S. Hong, **D. Chung**, J. Kim*, Y. Kim, A. Kim and H. Yoon, ”In-water visual ship hull inspection using a hover-capable underwater vehicle with stereo vision,” *Journal of Field Robotics*, vol. 36, no. 3, pp. 531-546, 2019.

DOMESTIC JOURNALS

[1] J. Park, **D. Chung**, J. Kim*, ”자율 수중 작업 및 선체 검사 자동화를 위한 AUV 기술,” *The Society of Naval Architects of Korea*, vol. 57, issue 3, pp. 7-11, Sep 2020.

INTERNATIONAL CONFERENCES

[3] **D. Chung** and J. Kim*, “Pose Estimation Considering an Uncertainty Model of Stereo Vision for In-Water Ship Hull Inspection,” in *Proceedings of 11th IFAC Conference on Control Applications in Marine Systems* (*CAMS*), Opatija, Croatia, Sep 2018.

[2] S. Hong, **D. Chung**, and J. Kim*, “Development of a Hover-Capable AUV System for Automated Visual Ship-Hull Inspection and Mapping,” in *Proceedings of MTS/IEEE OCEANS*, Anchorage, USA, Sep 2017.

[1] **D. Chung**, S. Hong, and J. Kim*, “Underwater Pose Estimation Relative to Planar Hull Surface Using Stereo Vision,” in *Proceedings of IEEE/OES International Symposium on Underwater Technology*(*UT*), Busan, Republic of Korea, Feb 2017.

DOMESTIC CONFERENCES

[9] J. Kim, **D. Chung**, C. Lee, J. Kim*, “가항영역 탐지를 통한 운하 환경에서의 자율 경로 생성,” 한국해양과학기술협의회 공동학술대회, May 2023.

[8] **D. Chung**, J. Kim, C. Lee, J. Kim*, “자율운항 연구를 위한 다중 센서 데이터 소개,” 한국해양과학기술협의회 공동학술대회, May 2023.

[7] C. Lee, **D. Chung**, J. Kim, J. Kim*, H. Choi, and J. Lee, “포항 운하에서의 자율 운항 실험을 위한 최적 경로 추종,” 대한조선학회 추계학술대회, Nov 2021.

[6] J. Kim, **D. Chung**, C. Lee, Y. Cho, J. Kim*, W. Jang, and S. Park, “포항 운하에서의 자율 운항 실험을 위한 다중 센서 융합,” 한국해양공학회 추계학술대회, Oct 2021.

[5] **D. Chung**, S. Hong, and J. Kim*, “평활도 제약조건을 고려한 수중 3차원 곡면 복원 기법,” 한국로봇학회 한국로봇종합학술대회, May 2021.

[4] **D. Chung**, S. Hong, and J. Kim*, “수중 선체 상대 항법을 위한 스테레오 영상 기반의 선체 표면 상대 포즈 추정,” 한국로봇학회 한국로봇종합학술대회, Jan 2018.

[3] S. Hong, **D. Chung**, J. Kim*, C. Jung, S. Ahn, and J. Lee, “선체 수중검사 자동화 시스템 개발 및 기초 실험,” 한국해양과학기술협의회 공동학술대회, Apr 2017.

[2] **D. Chung**, S. Hong, and J. Kim*, “수중 로봇의 선체 상대 항법을 위한 스테레오 영상 기반의 선체 표면 법선 벡터 추정,” 한국로봇학회 한국로봇종합학술대회, Feb 2017.

[1] **D. Chung** and J. Kim*, “쿼터니언 피드백을 이용한 무인 수중 잠수정의 자세제어,” 한국해양공학회 춘계학술대회, May 2016. (Outstanding student paper presentation award)

REGISTERED PATENTS

[5] J. Kim, **D. Chung**, ”POSITION ESTIMATION METHOD AND CLEANING ROUTE CONTROL METHOD OF AUTONOMOUS HULL CLEANING ROBOT,” 10-2406552-0000. Jun 2022.

[4] J. Kim, **D. Chung**, ”AUTONOMOUS HULL CLEANING ROBOT OPERABLE WITHOUT REQUIRING TETHER AND HUMAN INTERVENTION,” 10-2402001-0000. May 2022.

[3] **D. Chung**, H, Truong, T, Jonsson, J. Park, Y. Kim ”VEHICLE AND METHOD FOR DETECTING LANE,” 10-2255924-0000. May 2021.

[2] J. Park, H. Lee, **D. Chung**, H, Truong ”VEHICLE AND METHOD FOR GENERATING MAP CORRESPONDING TO THREE-DIMENTIONAL SPACE,” 10-2238522-0000. Apr 2021.

[1] J. Kim, J. Park, S. Hong, **D. Chung**, "NORMAL VECTOR EXTRACTION APPARATUS AND METHOD THEREOF BASED ON STEREO VISION FOR HULL UNDERWATER INSPECTION USING UNDERWATER ROBOT," 10-1923581-0000. Nov 2018.

AWARDS

- Second award in "LG Mobile Projector Marketing Idea Contest" — Aug 2009
- Outstanding student paper presentation award (Domestic conference [4]) — Nov 2016
- Grand prize in KAOSTS paper contest (International Journal [4]) — May 2024

OTHER EXPERIENCE

Reviewer

Journals

- Scientific Reports — Aug. 2024
- IEEE Robotics and Automation Letters — Sept. 2024
- Expert Systems With Applications — Sept. 2024

Conferences

- UR (2022), IROS (2022), ICRA (2024), IFAC (2023)

Invited Talk

- **Dongseo University** Multimodal maritime dataset acquisition and calibration — Aug. 2024
- **Inha University** Pohang Canal Dataset and NV-LIOM — Sept. 2024

Teaching Assistnace, Department of mechanical engineering, KAIST

- **ME401** Capstone design — Fall semester, 2018
- **ME490** Programming for autonomous mobile system — Fall semester, 2018
- **ME652** Mobile robotics — Spring semester, 2018
- **ME251** Dynamics — Fall semester, 2017

Republic of Korea Marine Corps., Pohang, Gyeongsangbuk-do, Republic of Korea

- Sergent, 72nd battalion — May 2011 – Feb 2013

SKILLS

Programming Languages: C++, OpenGL, Matlab, Python

LANGUAGES

- Korean: Native language.
- English: Intermediate.
  - TOEIC 955 - Sep 2024