

Chankyo Kim

<https://chankyokim.github.io>

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| RESEARCH INTERESTS | Non-linear Optimization, Control Theory, Dynamics, Energy Efficient Approach, Learning-based Control, Robotic Vision, Multi-agent Robotics |
| EDUCATION | <div><div>Seoul National University (SNU), Seoul, KoreaMar. 2015 – Present</div><div><i>B.Sc, Department of Mechanical & Aerospace Engineering</i> <i>B.Sc, Interdisciplinary Major in Artificial Intelligence</i><ul style="list-style-type: none">Graduation with Honors, Summa Cum Laude, Advanced GPA : 3.98/4.0, Physics TA for 2 semesters</div><div>University of Florida (UF), ELI, Florida, USAFall. 2015<ul style="list-style-type: none">Course: Listen/Speaking, Reading/Writing (Grade:A)International Connection with Engineering Students and Faculty</div></div> |
| RESEARCH EXPERIENCES | <div><div>Undergraduate ResearcherAug. 2021 – Present</div><div>Visual Information Processing Lab, SNU (<i>Advisor: Prof. Joonseok Lee</i>) Project Title: Domain Generalization in Human Pose Estimation via Meta-learning<ul style="list-style-type: none">Suggested idea of applying modified Model-Agnostic Meta-Learning (MAML) for domain generalization in human pose estimationDeveloped human pose dataset of various view points, resolution, and luminous intensity for few-shot training using MPII, Supervisely, and personal collection on Youtube.Designed architecture of pretrained model and meta-learner based on PoseNet and Model Regression NetworkIn preparation of conference paper publication in ECCV, 2022</div><div>Undergraduate ResearcherMar. 2021 – Present</div><div>Clean Energy & Nanoheat Lab, SNU (<i>Advisor: Prof. Sangwook Park</i>) Project Title: Design and Optimization of Intelligent Power System with Integrated Floating PV/Hydrogen Energy<ul style="list-style-type: none">Led intelligent power system research of renewable energy; research project selected as undergraduate research funding from SNUDesigned power-tracking method from city-size electricity demand considering operational limit of every power system component using MATLAB and HOMER softwareOrganized novel renewable power plant of combined floating PV, hydrogen system to improve power generation efficiency with decreased COE (cost of energy) and zero GHG (greenhouse gas) emissionsEstablished reliability completeness by presenting analysis criteria of LPSP (system reliability drawback)Wrote paper about novel optimization algorithm in integrated renewable power plant</div><div>Undergraduate Research Internship, UROPMar. 2020 – Sep. 2020</div><div>Biorobotics Lab, SNU (<i>Advisor: Prof. Kyujin Cho</i>) Project Title: Development of Novel Tendon-clutching Algorithm Integrated of Trajectory Estimation and Feedback Control in Soft Teleoperation Glove<ul style="list-style-type: none">Suggested idea of applying one-way clutch mechanism on tendon-driven method to provide feedback control and trajectory estimation in one wayIntegrated data of encoder and force sensor for robust/real-time operation of soft teleoperation gloveManufactured soft teleoperation gloves as well as virtual environment with robot hand using MATLAB</div><div>Full-Time /Part-Time ResearcherDec. 2019 – Jun. 2020</div></div> |

Dynamic Robotic Systems Lab, SNU (*Advisor: Prof. Jaeheung Park*)

- Participated as first member of TEAM SNU for ANA Avatar Xprize Competition, worldwide robot control challenge that 77 teams have qualified, sponsored over \$10M in prizes by ANA, judges included Ed Colgate, Thomas K. Ferris, Guy Hoffman
- Team SNU selected to advance as the Finalists, 15 teams have been selected, expected to participate on final testing in Fall, 2022

Main Contributions:

Project Topic: ***Design and Manipulation for Slave Robot***

- Developed a non-linear control framework codes for torque distribution and joint elasticity using QP solver to achieve stability in upper body
- Developed virtual space environment to test control of teleoperated robot hands using Unity

Project Topic: ***Design and Manipulation for Master System***

- Led initial development of integrated master system of HMD, Exosuit, Haptic Gloves
- Defined conversion matrix to extract joint trajectories from Kinect data and transfer to manipulation actuators in slave robot
- Determined the threshold of latency by comparing physical and extrapolated marker for estimation of teleoperation performance

- PUBLICATIONS
- [1] Y. Choi, **C. Kim**, J. Lee, Domain generalization in human pose estimation via meta-learning, *European Conference on Computer Vision (ECCV)*, 2022. In preparation
 - [2] **C. Kim**, S. Park, Optimization and Efficiency analysis of intelligent power system of Floating PV and Hydrogen System: a case study from Hapcheon Dam, *Sustainable Cities and Society*, 2021. Manuscript revision.
 - [3] **C. Kim**, et al., AI Python Coding with MIT Autonomous Race Car, *Hongreung Publishing Company*, Korea, 2021. (expected Dec. 2021)

- WORK EXPERIENCES
- Co-founder and Engineering Team Leader** Jan. 2021 – Present
AI Tech Play, Initiative for AI development and education Boston, USA / Seoul, Korea
- Launched 2021 Autonomous Racecar AI coding Competition in South Korea
- Main Contributions:
- Co-Founded non-profit organization AI Tech Play with support of KAIT Foundation, Knowledge AI Inc., Boston, USA and Dr. Robert Shin, director at MIT Beaver Works
 - Led full procedure of Engineering Team of AI Tech Play; developed Python code for recognition/control algorithm of autonomous driving car
 - First-authored academic book of control theory, robotic vision, and Python programming
- Game Developer/ Internship** Sep. 2020 – Feb. 2021
Intellicon Meta Lab, R&D Startup Seoul, Korea
- Online Game Development: CCTV
- Participate in full software development life-cycle for production of ‘CCTV’; including HTML designing, coding, debugging, data analysis, and documenting game flows
- Main Contributions:
- Developed interactive text-based game system applying non-linear network managing ‘Twine’ software, inspired by concept of MUD (Multi User Dungeon)
 - Constructed DBMS (Database Management System) for game traffic analysis using MySQL and Python
 - Released complete version of game on Dec. 2020
- Police Officer** Oct. 2017 – June. 2019
Seoul Public Security Force Command, Seoul Metropolitan Police Agency Seoul, Korea

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| | <ul style="list-style-type: none"> Served as data collecting and riot control agent; trained and equipped to confront protests and maintain public order Led and trained 30 agent team member through instruction of specialized tactical programs for 6 months; notable events including security service management for U.S. Embassy & Consulate in the Republic of Korea | |
| RESEARCH FUNDINGS, AWARDS, HONORS | <p>SNU X-Corps, College of Engineering, SNU 2021</p> <ul style="list-style-type: none"> \$7,000 Grant for research on Autonomous Renewable Power Plants in the context of optimized energy-efficient system <p>Sinyang Undergraduate Scholarship, Sinyang Cultural Foundation Spring. 2020 – Present</p> <ul style="list-style-type: none"> Full-tuition, Eminence Scholarship <p>Certificate of Appreciation, Dean of the College of Engineering, SNU July. 2021</p> <ul style="list-style-type: none"> Acknowledgement of genuine and creative efforts at the forefront of AI education in Korea: generating autonomous driving AI program for domestic youth with support of MIT Beaver Works <p>Special Award, Creative Design Fair, College of Engineering, SNU Sep. 2020</p> <ul style="list-style-type: none"> \$1,000 Award for research on <i>Teleoperation and Soft Robotics</i> <p>1st Prize, Engineering Design, SNU ME Mechanical Product Design July. 2020</p> <ul style="list-style-type: none"> “Design and Control of Classification/Recognition Robot” <p>Best Teaching Assistant Award, SNU Fall. 2019</p> <p>Eminence Scholarship (full tuition), SNU Spring. 2017, Fall. 2019</p> <p>Merit-Based Scholarship (50% tuition), SNU Fall. 2016</p> <p>Bronze Award, Samsung Humantech Paper Award, Samsung Feb. 2014 – Feb. 2015</p> <ul style="list-style-type: none"> \$3,000 Award, “Assessment of auto-immune responses for nanoparticle toxicity from protein corona analysis” | |
| ORAL PRESENTATIONS | <p>[1] C. Kim, S. Park, et al., Optimization and efficiency analysis of intelligent power system of floating PV and hydrogen system, SNU X-CORPS, 2021.</p> <p>[2] C. Kim, Modern control system and robotics in autonomous driving, Northeast Asia Student Round Table Conference, 2021.</p> <p>[3] C. Kim, S. Hwang, K. Cho, Development of Novel Tendon-clutching Algorithm Integrated of Trajectory Estimation and Feedback Control in Soft Teleoperation Glove, Creative Design Fair, SNU, 2020.</p> | |
| TEACHING EXPERIENCES | <p>Teaching Assistant</p> <p><i>Physics (034.006 001)</i>, Department of Physics & Astronomy, SNU Fall. 2021</p> <p><i>Physics (034.006 002)</i>, Department of Physics & Astronomy, SNU Fall. 2019</p> <ul style="list-style-type: none"> Tutored 5-10 undergraduate students 2 hours per week for 2 semester. Developed contents for weekly recitation on diverse theories in field of dynamics, electronics, modern physics Designed practice exams to assist and chart their progress Provided periodical one-on-one instruction and Q&A session for additional advice in background knowledge of calculus and linear algebra Discussed with professor and other TA to systemize teaching method and supplementary materials Awarded Best Teaching Assistant | |
| LEADERSHIP AND EXTRA CURRICULAR ACTIVITIES | <p>10th Vice Chairman/ Team Leader of General Affairs Mar. 2020 – June. 2021</p> <p>SNU TOMORROW's EDGE MEMBERSHIP (STEM) Seoul, Korea</p> <ul style="list-style-type: none"> Led initiative to create industry-academic exchange and assisted in implementation of membership bylaws | |

- Organized teenager mentoring program “2021 Vision Mentoring for Prospective Engineer”
- Recruited \$10,000 in sponsorship with DB Cultural Foundation (DB group), Innovation Center for Engineering Education (Seoul National University)

SKILLS AND LANGUAGES

Robotics: Convex Optimization, Control, Pose estimation, MAML (Model-Agnostic Meta-learning), CNC Milling

Energy: Sensitivity Analysis, Solar Cell & Hydrogen Production Analysis

Software: MuJoCo, Unity, MATLAB, Python, C++, CAD, HOMER, MySQL, Kinect, LaTeX

Libraries: ROS, OpenCV, PoseNet, Faster-RCNN, TensorFlow

Language: Korean (Native), English (Fluent), Spanish (Conversational)