

# Chankyo Kim

<https://chankyokim.github.io>

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

- 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. [pdf]
  - [3] **C. Kim**, et al., AI Python Coding with MIT Autonomous Race Car, *Hongreung Publishing Company*, Korea, 2021. (expected Dec. 2021). [pdf]

- 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** July. 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
- Served as data collecting and riot control agent; trained and equipped to confront protests and maintain public order

	<ul style="list-style-type: none"> <li>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 &amp; Consulate in the Republic of Korea</li> </ul>	
RESEARCH FUNDINGS, AWARDS, HONORS	<p><b>SNU X-Corps</b>, College of Engineering, SNU 2021</p> <ul style="list-style-type: none"> <li>\$7,000 Grant for research on Autonomous Renewable Power Plants in the context of optimized energy-efficient system</li> </ul> <p><b>Sinyang Undergraduate Scholarship</b>, Sinyang Cultural Foundation Spring. 2020 – Present</p> <ul style="list-style-type: none"> <li>Full-tuition, Eminence Scholarship</li> </ul> <p><b>Certificate of Appreciation</b>, Dean of the College of Engineering, SNU July. 2021</p> <ul style="list-style-type: none"> <li>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</li> </ul> <p><b>Special Award, Creative Design Fair</b>, College of Engineering, SNU Sep. 2020</p> <ul style="list-style-type: none"> <li>\$1,000 Award for research on <i>Teleoperation and Soft Robotics</i></li> </ul> <p><b>1<sup>st</sup> Prize, Engineering Design</b>, SNU ME Mechanical Product Design July. 2020</p> <ul style="list-style-type: none"> <li>“Design and Control of Classification/Recognition Robot”</li> </ul> <p><b>Best Teaching Assistant Award</b>, SNU Fall. 2019</p> <p><b>Eminence Scholarship</b> (full tuition), SNU Spring. 2017, Fall. 2019</p> <p><b>Merit-Based Scholarship</b> (50% tuition), SNU Fall. 2016</p> <p><b>Bronze Award, Samsung Humantech Paper Award</b>, Samsung Feb. 2014 – Feb. 2015</p> <ul style="list-style-type: none"> <li>\$3,000 Award, “Assessment of auto-immune responses for nanoparticle toxicity from protein corona analysis”</li> </ul>	
ORAL PRESENTATIONS	<p>[1] <b>C. Kim</b>, 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] <b>C. Kim</b>, Modern control system and robotics in autonomous driving, Northeast Asia Student Round Table Conference, 2021.</p> <p>[3] <b>C. Kim</b>, 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><b>Teaching Assistant</b></p> <p><i>Physics (034.006 001)</i>, Department of Physics &amp; Astronomy, SNU Fall. 2021</p> <p><i>Physics (034.006 002)</i>, Department of Physics &amp; Astronomy, SNU Fall. 2019</p> <ul style="list-style-type: none"> <li>Tutored 5-10 undergraduate students 2 hours per week for 2 semester.</li> <li>Developed contents for weekly recitation on diverse theories in field of dynamics, electronics, modern physics</li> <li>Designed practice exams to assist and chart their progress</li> <li>Provided periodical one-on-one instruction and Q&amp;A session for additional advice in background knowledge of calculus and linear algebra</li> <li>Discussed with professor and other TA to systemize teaching method and supplementary materials</li> <li>Awarded Best Teaching Assistant</li> </ul>	
LEADERSHIP AND EXTRA CURRICULAR ACTIVITIES	<p><b>10th Vice Chairman/ Team Leader of General Affairs</b> Mar. 2020 – June. 2021</p> <p><b>SNU TOMORROW’s EDGE MEMBERSHIP (STEM)</b> Seoul, Korea</p> <ul style="list-style-type: none"> <li>Led initiative to create industry-academic exchange and assisted in implementation of membership bylaws</li> <li>Organized teenager mentoring program “2021 Vision Mentoring for Prospective Engineer”</li> </ul>	

- 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)

**REFERENCES**

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