Dongwon Son

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Education

- **Seoul National University** — Seoul, Korea
  Bachelor - Mechanical Engineering — *March 2010 - Feb 2014*

- **Seoul National University** — Seoul, Korea
  Master - Mechanical Engineering - Advisor: Dongjun Lee — *March 2018 - Feb 2020*
  Thesis: *Multi-Contact Simulator and Reinforcement Learning for Screw Tightening Tasks*

- **Korea Advanced Institute of Science and Technology (KAIST)** — Seoul, Korea
  Dr. candidate - AI Graduate School - Advisor: Beomjoon Kim — *Sep 2022 - Present*

Skills Summary

- **Languages**: Python, C++, MATLAB
- **Frameworks**: TensorFlow, Keras, Jax, ROS, OpenGL, Pybullet, Open3D, OMPL, FCL
- **Tools**: SolidWorks, EasyEDA

Experience

- **Samsung/Hanwha Techwin** — Changwon, Korea
  QA Engineer - Gas Turbine Engine Division — *May 2014 - Sep 2017*
- **Samsung Research** — Seoul, Korea
  AI Researcher - AI Methods Team — *Feb 2020 - June 2022*
  - **Data-driven Grasping**: Develop algorithm for grasping in a heavily cluttered environment.
  - **Sim-to-real Transfer**: Reduce sim-to-real gap through robot control and domain randomization.
  - **Planning**: Apply AlphaGo Zero to arrangement task.
  - **Data Efficient Reinforcement Learning Algorithm**: Develop data efficient RL algorithm for vision-based object manipulation.

Projects

- **Manipulator Identification**: identification of physics parameters for Franka Emika Panda
- **Manipulator Controller Design**: impedance controller, admittance controller, compliance controller
- **Motor Driver Design And FOC Control**: PCB design, MCU programming, anticogging, FOC control

Publications

- **Data-driven Contact Clustering for Robot Simulation**: Myungsin Kim, Jaemin Yoon, Dongwon Son, and Dongjun Lee. ICRA. 2019. paper
- **Learnable Environment Model with Data Efficiency for MPC of Assembly Tasks**: Dongwon Son, Hyunsoo Yang, and Dongjun Lee. IROS Workshop LRPC. 2019. video paper
- **Sim-to-Real Transfer of Bolting Tasks with Tight Tolerance**: Dongwon Son, Hyunsoo Yang, and Dongjun Lee. IROS. 2020. video paper
- **Reinforcement Learning for Vision-based Object Manipulation with Non-parametric Policy and Action Primitives**: Dongwon Son, Myungsin Kim, Jaechol Sim, and Wonsik Shin. IROS. 2021. video paper
- **Grasping as Inference: Reactive Grasping in Heavily Cluttered Environment**: Dongwon Son. RA-L. 2022. video paper
- **Interaction-Based Grasp Metric for Improving Grasp Prediction Performance (under review)**: Dongwon Son, Jaecheol Sim, Wonsik Shin, Jeongmin Choi, and Myungsin Kim. RA-L. 2022. paper

Research Interests

- Manipulation (object manipulation, grasping, vision-based assembly, long-horizon manipulation)
- Computationally efficient simulator (physics engine, rendering)
- Sim-to-real transfer
- Structured network design for manipulation
- Composition between model-based approaches and data-driven methods
- Open-source cost efficient manipulator design