# Seunggeun **CHI**

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## Research Interests

My research interests lie in **Machine Learning** and its applications to real-world problems. **Representation Learning** in **Computer Vision** problems is my primary study. My research also spans over **Combinatorial Optimization** problems which aim to extract rules by applying **Reinforcement Learning**.

## Education

### Purdue University
*West Lafayette, U.S.*

PH.D. STUDENT IN ELECTRICAL AND COMPUTER ENGINEERING — *Aug. 2021 - current*

- *C-Design Lab*, Advisor : Karthik Ramani

### Seoul National University
*Seoul, S.Korea*

M.S. IN COMPUTER SCIENCE AND ENGINEERING — *Mar. 2019 - Aug. 2021*

- *Optimization Lab*, Advisor : ByungRo Moon

### Seoul National University
*Seoul, S.Korea*

B.S. IN COMPUTER SCIENCE AND ENGINEERING — *Mar. 2013 - Feb. 2019*

- *Computer Architecture Lab*, Advisor : SangLyul Min

## Publications

### Conference Proceedings

- H, Chi, M. H. Ha, **S. Chi**, S. Lee, Q. Huang, K. Ramani. InfoGCN: Representation Learning for Human Skeleton-based Action Recognition. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022, submitted*
- M. H. Ha, **S. Chi**, S. Lee. Learning to Escape to Promised Lands: Multi-mode Policy Learning for the Traveling Salesmen Problem. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS), 2022, submitted*
- [**C1**] M. H. Ha, **S. Chi**, S. Lee, Y. Cha, B. R. Moon. Evolution-based Meta Reinforcement Learning for Portfolio Optimization. In proceedings of the 23rd *The Genetic and Evolutionary Computation Conference (GECCO), 2021*

## Research & Project

### HandVAE: An interactive 3D hand generation system
*C-Design Lab, Purdue Univ.*

RESEARCH ASSISTANT — *Sept. 2021 - Apr. 2022*

- Targeting UIST 2022
- Disentangled properties of hands with Beta-VAE
- Developed UI for interactive hand generation and annotation
- Developed federated learning system

### Learning Joint Relations for Predicting Pose under Occlusion
*C-Design Lab, Purdue Univ.*

RESEARCH ASSISTANT — *Sept. 2021 - Mar. 2022*

- Targeting ECCV 2022
- Applied the self-supervised learning to make the model understand joint relations and infer occluded joint from visible joints
- State-of-the-art performances on 3D Hand Pose Estimation datasets

### Weakly Supervised Action Segmentation for Video
*C-Design Lab, Purdue Univ.*

RESEARCH ASSISTANT — *July. 2020 - Sept. 2020*

- Introduced a loss function for video segmentation combining Triplet loss and Temporal Cycle Consistency Loss
- Defined the Action Segmentation problem as a Neural Machine Translation problem
- Visualized the attention matrices to interpret Machine's inference

### Improving Multi-Joint dynamics with Contact(MuJoCo) by applying Hierarchical Reinforcement Learning
*OptLab, Seoul National Univ.*

RESEARCH ASSISTANT — *Sep. 2019 - Jul. 2020*

- Proposed a hierarchical architecture to give the agent frequent reward signals by setting subgoals
- Designed and developed a hierarchical architecture of model and environment
- Applied policy gradient with self-critical sequence training in optimization

### Predicting stock price by applying Combinatorial Optimization

*OptLab, Seoul National Univ.*

Research Assistant

*Jan. 2019 - Jun. 2019*

- Analyzed data with the ANOVA(Analysis of variance) method and Regression method
- Applied Genetic Algorithm, Evolutional Computation, and Fourier transformation to find better solutions
- Applied distributed computing to accelerate independent computation

### Accelerating computation of Machine Learning by using Field-Programmable Gate Array

*ArchiLab, Seoul National Univ.*

Research Assistant

*Aug. 2018 - Jan. 2019*

- Applied methods of SIMD(Single Instruction Multiple Data) with the low-level language of Verilog
- Reduced data size with SVD(Singular Value Decomposition)
- Rearranged units to utilize parallel computation

### Designing spatial-navigation on chrome-extension

*ArchiLab, Seoul National Univ.*

Research Assistant

*Sep. 2018 - Dec. 2018*

- formulated malfunctioning cases and defined user-friendly environment
- Developed user-friendly navigation UI
- `https://github.com/WICG/spatial-navigation`

## Skills

### Research and Development Stacks

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|---|---|
| **Major Languages** | **Python**, **C/C++**, java, Verilog |
| **Machine Learning** | **PyTorch**, **TensorFlow** |
| **Computer Vision** | OpenCV, OpenGL |
| **Web Languages** | Nginx, HTML5, PHP, JavaScript, CSS |
| **Database** | MySQL, SQLite |

### Other Tools and Skills

| | |
|---|---|
| **Other Langauges** | Shell Scripts(bszh, zsh), Matlab, R |
| **Operating Systems** | macOS, Linux Debian/Ubuntu, Windows |
| **Text Editors & IDE** | **Vim**, VSCode, Eclipse |
| **Software** | SolidWorks, Catia, AutoCAD |
| **VCS** | Git |

## Working Experience

### SK Hynix

*Icheon, S.Korea*

Intern Researcher

*Sep. 2017 - Dec. 2017*

- Designed an exclusive chip for testing 3D NAND flash architecture and verified the reliabilty of existing architectures
- Developed a module for predicting locality of data and tested it with real data

### Korean National Police Agency

*Dokdo, S.Korea*

Dokdo Security Police

*Dec. 2013 - Sep. 2015*

- Defended the disputed territory as a squad leader

## Teaching Experience

| | | |
|---|---|---|
| CS.4190.681A | **Genetic Algorithm,** 2019-spring, 2021-spring | *Teaching Assistant* |
| CS.4190.407 | **Algorithm,** 2019-fall, 2020-spring | *Teaching Assistant* |
| CS.M1522.407 | **Data Structure,** 2019-spring, 2020-spring, 2021-spring | *Teaching Assistant* |
| CS.4190.308 | **Computer architecture,** 2018-spring | *Teaching Assistant* |
| CS.035.001 | **Digital Computer Concept and Practice,** 2017-fall, 2018-fall | *Teaching Assistant* |
| PE.051.004 | **Volley ball,** 2018-fall, 2019-spring, 2021-spring | *Teaching Assistant* |

## Honors & Awards

### Competition of accelerating General-Purpose GPU sponsored by Intel

*Manycore Programming Lab*

1st place

*2018*

### The National Scholarship for Science and Engineering

*Korea Ministry of Science and ICT*

Full scholarship

*Mar. 2018 - Aug. 2021*