

# Nahyeon Kim

Seoul, Republic of Korea, (+82) 10-6723-9099  
lmc\_r136a@snu.ac.kr

## 1 Research Interests

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Machine Learning, Robotics, Autonomous Driving

## 2 Education

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Seoul National University, Seoul, Korea

Mar. 2018 - Feb. 2023

B.S. in Mechanical Engineering and Entrepreneurship (GPA: 3.38/4.0)

**Relevant Courses:** *Mechanical System Design Project, Theory and Practice of Humanoid Walking Control, Artificial Intelligence, Linear Algebra for Electrical Systems, Computer Vision, Deep Learning, Computer Graphics, Materials and Manufacturing Processes, Mechatronics, Mechanical System Modeling and Control, Mechanical Product Design, Dynamics, Creative Engineering Design*

## 3 Work Experience

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Korea Institute of Science and Technology, Seoul, Korea

Undergraduate Researcher

Oct. 2021 - Present

- ◊ Knowledge Distillation for Data-Free Subtask Network Compression
- ◊ Data-Free Channel Pruning via Neural Network Inversion

Saige Research, Seoul, Korea

Research Assistant

Feb. 2021 - Aug. 2021

- ◊ Optical Character Recognition(OCR) for Automating Manufacturing Process
- ◊ Information Extraction for Document Understanding

Seoul Stock Exchange, Seoul and Pangyo, Korea

Junior Developer

Aug. 2020 - Feb. 2021

- ◊ Web Development using Django
- ◊ App Development using React-Native

## 4 Research Projects

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**Knowledge Distillation for Data-Free Subtask Network Pruning**

Advisor: Dr. Suhyun Kim, Korea Institute of Science and Technology

Mar. 2022 - Present

- ◊ Discovered that previous fine-tuning methodology performed poorly on data-free pruning, and that it performs even worse when focused on a subtask
- ◊ Proposed a novel post-pruning method with knowledge distillation and domain-adaptation
- ◊ Solved the accuracy degradation problem and improved performance significantly in data-free conditions.

**Data-Free Channel Pruning with Network Inversion Data**

Advisor: Dr. Suhyun Kim, Korea Institute of Science and Technology

Oct. 2021 - Present

- ◊ Explored the most suitable network-inversion methodology for pruning
- ◊ Implemented network inversion methodologies to be applicable to various models

**Optical Character Recognition(OCR) for Automating Manufacturing Process**

Research Team, Saige Research

May. 2022 - Aug. 2022

- ◊ Developed a character recognition algorithm for automating the manufacturing process
- ◊ Computerize detected characters by OCR recognition

**Information Extraction for Document Understanding**

Research Team, Saige Research

May. 2022 - Aug. 2022

- ◊ Developed a document understanding model to accurately understand the meaning of the letters captured and recognized by the camera in the manufacturing process
- ◊ Implemented an algorithm that corrects to true values according to the meaning even if it is incorrectly recognized due to the anomaly

## 5 Development Projects

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Seoul Stock Exchange

Feb. 2021 - Aug. 2020

- ◇ Developed web service using Django
- ◇ Developed hybrid application using React-Native
- ◇ Deployed the android app to the Google Play Store
- ◇ Developed recommendation algorithm for OTT media service

## 6 Coursework Projects

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### Simulation of Humanoid Walking

Theory and Practice of Humanoid Walking Control

Institute of Convergence Science and Technology, Seoul National University

Sep. 2022 - Present

- ◇ Simulated basic robotic motion using MUJOCO Simulator and DYROS JET Controller
- ◇ Controlled and simulated robot walking based on Inverse Kinematics

### Wireless Stereoscopic Mouse with Gyroscope Sensor

Mechatronics

Mechanical Engineering, Seoul National University

Mar. 2021 - Sep. 2021

- ◇ Designed a mouse to detect 3d motion via gyroscope sensor and to input stereoscopic data
- ◇ Won first place in the course and won the Encouragement Award in the Creative Design Festival of the College of Technology

### Application of Traditional Computer Vision Methods to Deep Learning

Computer Vision

Computer Science, Seoul National University

Sep. 2021 - Dec. 2021

- ◇ Applied traditional computer vision algorithms as deep learning augmentation.
- ◇ Implemented Warping, SIFT, Hough transform for line detection and GABOR filters from scratch
- ◇ Blended images by using laplacian pyramid and implemented Moving Object Detection based on Lucas-Kanade Method

### Basics of Graphics and Ray-Tracing

Computer Graphics

Computer Science, Seoul National University

Sep. 2021 - Dec. 2021

- ◇ Implemented a hierarchical dynamic model using matrix stacks using OpenGL
- ◇ Implemented a system for swept surface with geometric transformations and spline curves.
- ◇ Created a synthetic scene with geometric objects and various materials, showing them via ray tracer

### Ball Classification Machine using I-Beam

Mechanical Product Design

Mechanical Engineering, Seoul National University

Sep. 2019 - Dec. 2021

- ◇ Created a machine that can classify various types of balls in a short time using I-beam, PVC, MDF, and acrylic

### Mini Car with Hydraulic Cylinder and Motor

Creative Engineering Design

Mechanical Engineering, Seoul National University

Sep. 2018 - Dec. 2018

- ◇ Designed and manufactured a forklift mini car that picks up objects using hydraulic cylinders and motors.
- ◇ Learned techniques using drills, milling machines, electric saws, laser cutters, and 3d printers.

## 7 Skills

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Python, Pytorch, MATLAB, SOLIDWORKS, Git, React, React-Native, Javascript, C/C++