

# YEONGHYEON PARK

Ph.D. candidate, ECE, Sungkyunkwan University, Rep. of Korea

Research engineer, SK Planet Co., Ltd., Rep. of Korea

## CONTACT

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**E-mail:** yeonghyeon@g.skku.edu

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## RESEARCH INTEREST

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My research aims to develop effective on-device anomaly detection systems for edge computing in diverse environments. I focus on achieving high-performance anomaly detection on edge devices by leveraging neural network optimization techniques and pre-trained neural networks. This involves exploring unsupervised and self-supervised learning strategies that employ pre-trained attention mechanisms to improve detection accuracy. I have gained substantial experience in industrial anomaly detection in the manufacturing and safety sectors and have also worked on biomedical data analysis.

## EDUCATION

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<b>Ph.D. Department of Electrical and Computer Engineering</b>	Feb.2022 - Feb.2025
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*Sungkyunkwan University*

GPA: 4.17/4.5

- Dissertation: Effective Anomaly Detection Towards Edge Computing  
by Leveraging Pre-trained Attention Mechanisms

- Advisor: Prof. Juneho Yi

<b>M.S. Department of Computer and Electronic Systems Engineering</b>	Mar.2018 - Feb.2020
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*Hankuk University of Foreign Studies*

GPA: 4.43/4.5

- Thesis: Performance enhancement method for electrocardiogram analysis

- Advisor: Prof. Il Dong Yun

<b>B.S. Department of Digital Information Engineering</b>	Feb.2012 - Feb.2018
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*Hankuk University of Foreign Studies*

GPA: 4.21/4.5

## EXPERIENCE

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<b>Graduate Research Assistant</b>	Oct.2021 - on going
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*Sungkyunkwan University*

Suwon, Korea

- Pre-trained attention mechanism-based anomaly detection strategy

- Proposed a pre-trained attention-based deterministic masking method for output reliability
- Design a self-supervised learning strategy based on the above deterministic masking method
- Studied the generalization ability of the neural networks for proper anomaly detection models
- Solar panel anomaly detection model with a pre-trained attention mechanism
  - Proposed a way to reduce computational load and power consumption for edge computing
  - Designed defective feature emphasizing method through a pre-trained attention mechanism
  - Proposed a feature extraction method, more effective than an end-to-end deep learning model

## Research Engineer

*SK Planet Co.,Ltd.*

Sep.2019 - on going

Pangyo Techno Valley, Korea

- Research and develop anomaly detection systems
- Recognized as “**Key Talent**” for 3 consecutive years (2021, 2022, and 2023)
  - Awarded annually to one exceptional team member based on peer and leader evaluations
- Wafer imaging with line scan camera (w/ SK Hynix Inc.)
  - Wafer imaging with a line-scanning device while the robotic arm moved the wafer
  - Developed a real-time algorithm to reconstruct the distorted images into a circle shape
  - Addressed the challenge of unpredictable robotic arm trajectories during reconstruction
- GAN-based neural network for low-cost particulate matter sensor failure/malfunction detection
  - Proposed a multiple-hypothesis generator to enhance output reliability
  - Designed a feature map distance-based loss term for discriminator training
- ARHIS: Audio-based road hazard information system
  - Designed a neural network for on-device computing purpose
  - Created dataset via driving noise acquisition in various road conditions with Hankook Tire [\[Press Release\]](#) [\[Promotional Video\]](#)

## Graduate Research Assistant

*Hankuk University of Foreign Studies*

Sep.2017 - Aug.2019

Yongin, Korea

- Research on biosignal analysis, medical image analysis, and anomaly detection
- Cardiac disease diagnosis through deep learning and ECG (w/ SNUBH)
  - Collaborated with Seoul National University Bundang Hospital (SNUBH)
  - Studied myocardial infarction and arrhythmia
  - Designed an ECG artifact-removing method for accurate diagnosis of myocardial infarction
  - Proposed signal processing method to emphasize the characteristics of arrhythmia
- Time-series anomaly detection model to complete training in a short time
  - Proposed a neural network structure that completes training in a short period

- Designed to ease computational load by reducing the number of parameters
- Studied time-series signal processing including Fourier transform with machine sound
- Small-scale tissue segmentation on neuroimage (w/ SNUBH)
  - Investigated characteristics of the nigrosome of neuroimage for accurate segmentation
  - Participated in initial segmentation label construction work

## Research Intern

Jan.2017 - Feb.2017

*StoryAnt Inc.*

Yongin, Korea

- Research and develop the intelligent archive
  - Developed a prototype web service that features national treasure document classification

## HONORS AND AWARDS

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### Key Talent Award

2021, 2022, and 2023

*SK Planet Co., Ltd.*

- Recognized as an exceptional team member in annual evaluations based on peer and leader evaluations.  
Only one individual is selected per team each year.

### Excellence Award in Manufacturing Data Analysis Competition

Nov.2023

*Korea AI Manufacturing Platform (KAMP)*

### Best Conference Paper Award

Dec.2021

*IEEE International Conference on Architecture, Construction, Environment and Hydraulics*

### Graduate Scholarship

2018 - 2020

*Department of Computer and Electronic Systems Engineering, Hankuk University of Foreign Studies*

- Full-tuition scholarship for full semesters

### Excellence Undergraduate Thesis Award

Nov.2017

*Department of Digital Information Engineering, Hankuk University of Foreign Studies*

### Academic Excellence Scholarship

2013-2017

*Department of Digital Information Engineering, Hankuk University of Foreign Studies*

- Full-tuition scholarship (Spring.2016, Fall.2016, and Spring.2017)

- Half-tuition scholarship (Spring.2013)

## PUBLICATIONS

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### Journals

[J8] **YeongHyeon Park**, Sungho Kang, Myung Jin Kim, Yeonho Lee, Hyeong Seok Kim, and Juneho Yi  
“[Visual Defect Obfuscation Based Self-Supervised Anomaly Detection.](#)”, *Scientific Reports*, Aug.2024

[J7] **YeongHyeon Park**, Myung Jin Kim, Uju Gim, and Juneho Yi “[Boost-up Efficiency of Defective](#)

Solar Panel Detection with Pre-trained Attention Recycling”, *IEEE Transactions on Industry Applications*, Mar.2023

[J6] **YeongHyeon Park** and JongHee Jung “Efficient Non-Compression Auto-Encoder for Driving Noise-Based Road Surface Anomaly Detection”, *IEEE Transactions on Electrical and Electronic Engineering*, Jul.2022

[J5] **YeongHyeon Park**, Won Seok Park, and Yeong Beom Kim “Anomaly detection in particulate matter sensor using hypothesis pruning generative adversarial network”, *ETRI Journal*, Dec.2020

[J4] **YeongHyeon Park**, Il Dong Yun, and Si-Hyuck Kang, “The CNN-based Coronary Occlusion Site Localization with Effective Preprocessing Method”, *IEEE Transactions on Electrical and Electronic Engineering*, Vol.15, no.10, pp.1549-1551, Aug.2020

[J3] **YeongHyeon Park**, Il Dong Yun, and Si-Hyuck Kang, “Preprocessing Method for Performance Enhancement in CNN-based STEMI Detection from 12-lead ECG”, *IEEE Access*, Vol.7, pp.99964-99977, Jul.2019

[J2] **YeongHyeon Park** and Il Dong Yun, “Arrhythmia detection in electrocardiogram based on recurrent neural network encoder–decoder with Lyapunov exponent”, *IEEE Transactions on Electrical and Electronic Engineering*, Vol.14, no.8, pp. 1273-1274, May.2019

[J1] **YeongHyeon Park** and Il Dong Yun, “Fast Adaptive RNN Encoder-Decoder for Anomaly Detection in SMD Assembly Machine”, *Sensors*, Vol.18, no.10, pp.3573, Oct.2018

## Conferences

[C11] **YeongHyeon Park\***, Sungho Kang\*, Myung Jin Kim, Yeonho Lee, and Juneho Yi “Exploiting Connection-Switching U-Net for Enhancing Surface Anomaly Detection”, *IEEE International Conference on Electrical, Control and Instrumentation engineering (ICECIE) 2024* (\* Equal contribution)

[C10] **YeongHyeon Park**, Sungho Kang, Myung Jin Kim, Hyeonho Jeong, Hyunkyu Park, Hyeong Seok Kim, and Juneho Yi “Neural Network Training Strategy to Enhance Anomaly Detection Performance: A Perspective on Reconstruction Loss Amplification.”, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2024*

[C9] Hanbyul Lee\*, **YeongHyeon Park\***, and Juneho Yi “Enhancing Defective Solar Panel Detection with Attention-guided Statistical Features using Pre-trained Neural Networks”, *IEEE International Conference on Big Data and Smart Computing (BigComp) 2024* (\* Equal contribution)

[C8] **YeongHyeon Park**, Uju Gim, and Myung Jin Kim “Edge Storage Management Recipe with Zero-Shot Data Compression for Road Anomaly Detection”, *IEEE International Conference on Information and Communication Technology Convergence (ICTC) 2023*

[C7] Sungho Kang, Hyunkyu Park, **YeongHyeon Park**, Yeonho Lee, Hanbyul Lee, Seho Bae, and

- Juneho Yi “Exploiting Monocular Depth Estimation for Style Harmonization in Landscape Painting.”, *IEEE International Conference on Knowledge Innovation and Invention (ICKII) 2023*
- [C6] Hyunkyu Park, Sungho Kang, **YeongHyeon Park**, Yeonho Lee, Hanbyul Lee, Seho Bae, and Juneho Yi “Edge Storage Management Recipe with Zero-Shot Data Compression for Road Anomaly Detection”, *IEEE International Conference on Knowledge Innovation and Invention (ICKII) 2023*
- [C5] **YeongHyeon Park**, Myoung Jin Kim, Won Seok Park, and Juneho Yi “Recycling for Recycling: RoI Cropping by Recycling a Pre-trained Attention Mechanism for Accurate Classification of Recyclables”, *IEEE International Conference on Smart Information Systems and Technologies (SIST) 2023*
- [C4] **YeongHyeon Park**, Myoung Jin Kim, and Won Seok Park “Frequency of Interest-based Noise Attenuation Method to Improve Anomaly Detection Performance”, *IEEE International Conference on Big Data and Smart Computing (BigComp) 2023*
- [C3] **YeongHyeon Park**, Myoung Jin Kim, and Uju Gim “Attention! Is Recycling Artificial Neural Network Effective for Maintaining Renewable Energy Efficiency?”, *IEEE Texas Power and Energy Conference (TPEC) 2022*
- [C2] **YeongHyeon Park** and JongHee Jung “Non-Compression Auto-Encoder for Detecting Road Surface Abnormality via Vehicle Driving Noise”, *IEEE International Conference on Architecture, Construction, Environment and Hydraulics (ICACEH) 2021*
- [C1] **YeongHyeon Park** and Myoung Jin Kim “Design of Cost-Effective Auto-Encoder for Electric Motor Anomaly Detection in Resource Constrained Edge Device”, *IEEE Eurasia Conference on IOT, Communication and Engineering (ECICE) 2021*

## PATENTS

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- [P5] KR Patent 1027374770000, [Management Method of Foreign Matter for Liquid Products based on a Graph and an Device Supporting the Same](#), Nov.2024.
- [P4] KR Patent 1027374760000, [Management Method of Foreign Matter for Liquid Products and an Device Supporting the Same](#), Nov.2024.
- [P3] KR Patent 1024517510000, [ECG preprocessing method and STEMI detection method](#), Sep.2022.
- [P2] KR Patent 1023465330000, [Road condition detection device and system, road condition detection method using the same](#), Dec.2021.
- [P1] KR Patent 1021790400000, [Apparatus and Method for Anomaly Detection of SMD Assembly Device Operation based on Deeplearnig](#), Nov.2020.

## PROFESSIONAL ACTIVITIES

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### Journal Reviewer

- *Discover Artificial Intelligence* 2024.10 -
- *IEEE Transactions on Circuits and Systems for Video Technology (T-CSVT)* 2024.09 -
- *IEEE Signal Processing Letters* 2024.08 -
- *Journal of Nondestructive Evaluation* 2024.03 -
- *Electronics Letters* 2024.01 -
- *Signal, Image and Video Processing* 2024.01 -
- *Scientific Reports* 2023.09 -
- *The Journal of Supercomputing* 2023.08 -
- *IEEE Access* 2021.06 -

### Conference Reviewer

- *IEEE International Joint Conference on Neural Networks (IJCNN)* 2025
- *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)* 2025
- *IEEE International Conference on Big Data and Smart Computing (BigComp)* 2025

## CERTIFICATIONS

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<b>NVIDIA DLI Instructor Certificate</b> [ <a href="#">link</a> ] <i>NVIDIA</i>	Apr.2022
<b>NVIDIA University Ambassador Certificate</b> [ <a href="#">link</a> ] <i>NVIDIA</i>	Apr.2022
<b>Big Data Analysis Engineer</b> <i>Korea Data Agency</i>	Jul.2021
<b>NVIDIA DLI Certificate - Applications of AI for Anomaly Detection</b> [ <a href="#">link</a> ] <i>NVIDIA</i>	May.2021
<b>Advanced Data Analytics Semi-Professional</b> <i>Korea Data Agency</i>	Nov.2020
<b>Deep Learning Specialization (including 5 course certifications)</b> [ <a href="#">link</a> ] <i>Coursera</i>	Mar.2020