# Seonwoo Min

Applied Scientist · Amazon
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*"Sometimes you win. Sometimes you learn."*

## Work Experience

**Amazon - AWS Health AI** — *Seattle, United States*
Applied Scientist II — *Apr 2024 -*
- Trustworthy Machine Learning Models for Clinical Document Understanding

Applied Scientist I — *Oct 2023 - Apr 2024*
- Medical Ontology Linking - Associating Textual Mentions to Concepts in a Medical Knowledge Base

**NAVER Cloud - Hyperscale AI Information Extraction Team** — *Seongnam, South Korea*
Research Intern — *May 2023 - Sep 2023*
- Uncertainty Estimation for Large Language Models

**LG AI Research - Fundamental Research Laboratory** — *Magok, South Korea*
Research Scientist — *Aug 2021 - Sep 2022*
- Cross-Modality Supervision for Domain Generalization
- Transformers for (Molecular) Graphs

**NAVER Clova - Optical Character Recognition Team** — *Seongnam, South Korea*
Research Intern — *Jul 2019 - Aug 2019*
- Self-Supervised Training of Protein Language Models

## Education

**Seoul National University** — *Seoul, South Korea*
Ph.D. in Electrical and Computer Engineering — *Mar 2015 - Aug 2021*
- Data Science & Artificial Intelligence Laboratory (Advisor: Prof. Sungroh Yoon)
- Representation Learning for Biological Sequence Data

B.S. in Electrical and Computer Engineering — *Mar 2011 - Feb 2015*
- Cum Laude (GPA: 3.64/4.3)

## Selected Publications

Grounding Visual Representations With Texts for Domain Generalization — *ECCV 2022*
**Seonwoo Min**, Nokyung Park, Siwon Kim, Seunghyun Park, Jinkyu Kim

Pre-training of Protein Sequence Representations With Structural Information — *IEEE Access 2021*
**Seonwoo Min**, Seunghyun Park, Siwon Kim, Hyun-Soo Choi, Sungroh Yoon — *MLCB Workshop 2019 (**Oral**)*
**50+ Citations**

Deep Learning Improves Prediction of CRISPR-Cpf1 Guide RNA Activity — *Nature Biotechnology 2018*
Hui Kwon Kim*, **Seonwoo Min***, Myungjae Song, Soobin Jung, Jae Woo Choi, Younggwang Kim, Sangeun Lee, Sungroh Yoon, Hyongbum Henry Kim (***Co-first Authors**) — *ISMB Highlight Track 2018 (**Oral**)*
**300+ Citations**

Deep Learning in Bioinformatics — *Briefings in Bioinformatics 2017*
**Seonwoo Min**, Byunghan Lee, Sungroh Yoon
**1800+ Citations**

# Awards, Honors, and Scholarships

## Awards

| | | |
|---|---|---|
| Winner (6/4-lead) & Runner-up (12/3/2-lead) | PhysioNet/Computing in Cardiology Challenge | *2021* |
| Nomination Award | Schmidt Science Fellowship | *2021* |
| **BK21 Plus Outstanding Researcher Award** | **Minister of Education, South Korea** | ***2020*** |
| National R&D Excellence Top 100 Award | Ministry of Science and ICT, South Korea | *2019* |
| Travel Award | Neural Information Processing Systems LMRL | *2019* |
| Research Excellence Award | Biological Research Information Center, South Korea | *2018* |
| Outstanding Highly-cited Paper Award | Electrical and Computer Engineering Department, SNU | *2018* |
| Distinguished TA Award | Innovation Center for Engineering Education, SNU | *2018* |
| Nomination Award | Microsoft Research Asia Fellowship | ***2018*** |
| Highly-cited Paper Paper Award | Briefings in Bioinformatics, Oxford University Press | *2017* |
| Travel Award | Neural Information Processing Systems | *2017* |
| Gold Award (Individual) & Silver Award (Team) | Korea University Ski Team Association Championship | *2015* |

## Honors

| | | |
|---|---|---|
| Chief Graduate Student | Data Science & Artificial Intelligence Laboratory, SNU | *2020* |
| Assistant Chief Graduate Student | Data Science & Artificial Intelligence Laboratory, SNU | *2019* |
| Graduate Student of the Year | Data Science & Artificial Intelligence Laboratory, SNU | *2018* |
| **Captain** | **Seoul National University Ski Team** | ***2015*** |

## Scholarships

| | | |
|---|---|---|
| **Global Ph.D. Fellowship (∼ $100,000)** | **National Research Foundation of Korea** | ***2016 - 2020*** |
| Global Capability Enhancement Program (∼ $6,000) | National Research Foundation of Korea | *2018 - 2019* |
| National Science Scholarship (∼ $25,000) | Korea Student Aid Foundation | *2011 - 2014* |

# Academic/Industry Activities

## Mentoring

| | |
|---|---|
| AWS AI/ML Scholarship Program | *Jun 2024 - Oct 2024* |

## Invited Talks

| | | |
|---|---|---|
| Oasis of Knowledge | *Hyperscale AI, NAVER Cloud* | *Sep 2023* |
| Open Tech Seminar | *LG AI Research* | *Dec 2021* |
| Summer Conference | *Korean Institute of Electronics and Information Engineers* | *Jun 2018* |
| Korea Computer Congress | *Korean Institute of Information Scientists and Engineers* | *Jun 2018* |
| Invited Seminar | *Korea Institute of Radiology & Medical Sciences* | *Sep 2017* |
| Bioinformatics Research Exchange | *Bioinformatics Institute of Seoul National University* | *Apr 2017* |
| Invited Seminar | *Laboratory of Genome Editing, Yonsei University* | *Dec 2016* |

## Reviewer

| | | |
|---|---|---|
| International Conference on Learning Representations | | *2021 - 2025* |
| International Conference on Machine Learning | *Top Reviewer in 2020* | *2020 - 2024* |
| Neural Information Processing Systems | *Top Reviewer in 2019* | *2019 - 2024* |
| Annual AAAI Conference on Artificial Intelligence | | *2025* |
| Journal of Chemoinformatics | | *2023* |
| Methods | | *2017 & 2021* |

## Republic of Korea Patents

Deep Learning Based System for Evaluating the RNA-Guided Nuclease Activity — *Sept 2019*
Hui Kwon Kim*, **Seonwoo Min***, Myungjae Song, Soobin Jung, Sungroh Yoon, and Hyongbum Kim

System and Method for Generating Sequences of Personal Authentication — *Sept 2019*
Ho Bae, **Seonwoo Min**, and Sungroh Yoon

## All Publications

### Conferences

Pure Transformers Are Powerful Graph Learners — *NeurIPS 2022*
Jinwoo Kim, Dat Nguyen, **Seonwoo Min**, Sungjun Cho, Moontae Lee, Honglak Lee, Seunghoon Hong
**100+ Citations**

Transformers Meet Stochastic Block Models — *NeurIPS 2022*
Sungjun Cho, **Seonwoo Min**, Jinwoo Kim, Moontae Lee, Honglak Lee, Seunghoon Hong

Grounding Visual Representations With Texts for Domain Generalization — *ECCV 2022*
**Seonwoo Min**, Nokyung Park, Siwon Kim, Seunghyun Park, Jinkyu Kim

Towards High Generalization Performance on Electrocardiogram Classification — *Computing in Cardiology 2021*
Hyeongrok Han, Seongjae Park, **Seonwoo Min**, Hyun-Soo Choi, Eunji Kim, Hyunki Kim, Sangha Park, Jinkook Kim, Junsang Park, Junho An, Kwanglo Lee, Wonsun Jeong, Sangil Chon, Kwonwoo Ha, Myungkyu Han, Sungroh Yoon
Winner (6, 4-lead) and Runner-up (12, 3, 2-lead) in PhysioNet Challenge

Bag of Tricks for Electrocardiogram Classification With Deep Neural Networks — *Computing in Cardiology 2020*
**Seonwoo Min**, Hyun-Soo Choi, Hyeongrok Han, Minji Seo, Jin-Kook Kim, Junsang Park, Sunghoon Jung, Il-Young Oh, Byunghan Lee, Sungroh Yoon
6th Place in PhysioNet Challenge

Deep Recurrent Neural Network-Based Identification of Precursor MicroRNAs — *NeurIPS 2017*
Seunghyun Park, **Seonwoo Min**, Hyun-Soo Choi, Sungroh Yoon
**100+ Citations**

Neural Universal Discrete Denoiser — *NeurIPS 2016*
Taesup Moon, **Seonwoo Min**, Byunghan Lee, Sungroh Yoon

### Journals

Polyphonic Music Generation With Sequence Generative Adversarial Networks — *Journal of KIISE 2024*
Sang-gil Lee, Uiwon Hwang, **Seonwoo Min**, Sungroh Yoon

Contrastive Time-Series Anomaly Detection — *TKDE 2023*
Hyungi Kim, Siwon Kim, **Seonwoo Min**, and Byunghan Lee

Massively Parallel Evaluation of the Activities and Specificities of 17 Small Cas9s — *Nature Methods 2023*
Sang-Yeon Seo, **Seonwoo Min**, Sungtae Lee, Jung Hwa Seo, Jinman Park, Hui Kwon Kim, Myungjae Song, Dawoon Bae, Sung-Rae Cho, Hyongbum Henry Kim

Deep Learning to Predict the Editing Efficiencies and Outcomes of Diverse Base Editors — *Nature Biotechnology 2023*
Nahye Kim, Sungchul Choi, Sungjae Kim, Myungjae Song, Jung Hwa Seo, **Seonwoo Min**, Jinman Park, Sung-Rae Cho, Hyongbum Henry Kim

Sniper2L, a High-Fidelity Cas9 Variant With High Activity — *Nature Chemical Biology 2023*
Young-hoon Kim, Nahye Kim, Ikenna Okafor, Sungchul Choi, **Seonwoo Min**, Joonsun Lee, Keunwoo Choi, Janice Choi, Vinayak Harihar, Youngho Kim, Jin-Soo Kim, Jungjoon K. Lee, Taekjip Ha, Hyongbum Henry Kim

Improving Generalization Performance of Electrocardiogram Classification Models — *Physiological Measurement 2023*
Hyeongrok Han, Seongjae Park, **Seonwoo Min**, Hyun-Soo Choi, Eunji Kim, Hyunki Kim, Sangha Park, Jinkook Kim, Junsang Park, Junho An, Kwanglo Lee, Wonsun Jeong, Sangil Chon, Kwonwoo Ha, Myungkyu Han, Sungroh Yoon

TargetNet: Functional microRNA Target Prediction With Deep Neural Networks — *Bioinformatics 2022*
**Seonwoo Min**, Byunghan Lee, Sungroh Yoon

DNA Privacy: Analyzing Malicious DNA Sequences Using Deep Neural Networks — *TCBB 2022*
Ho Bae, **Seonwoo Min**, Hyun-Soo Choi, Sungroh Yoon

Generation of a More Efficient Prime Editor 2 by the Rad51 DNA-Binding Domain — *Nature Communications 2021*
Myungjae Song, Jung Min Lim, **Seonwoo Min**, Jeong-Seok Oh, Dong Young Kim, Jae-Sung Woo, Hiroshi Nishimasu, Sung-Rae Cho, Sungroh Yoon, Hyongbum Henry Kim
**50+ Citations**

Pre-training of Protein Sequence Representations With Structural Information — *IEEE Access 2021*, *MLCB Workshop 2019 (**Oral**)*
**Seonwoo Min**, Seunghyun Park, Siwon Kim, Hyun-Soo Choi, Sungroh Yoon
**50+ Citations**

Protein Transfer Learning Improves Identification of Heat Shock Protein Families — *PLOS ONE 2021*
**Seonwoo Min**, Hyungi Kim, Byunghan Lee, Sungroh Yoon

Learned Embeddings From Deep Learning to Visualize and Predict Protein Sets — *Current Protocols 2021*, *NeurIPS LMRL Workshop 2020*
Christian Dallago, Konstantin Schütze, Michael Heinzinger, Tobias Olenyi, Maria Littmann, Amy X. Lu, Kevin K. Yang, **Seonwoo Min**, Sungroh Yoon, James T. Morton, Burkhard Rost
**50+ Citations**

Recording of Temporal Information About Biological Events Using Cas9 — *Cell 2021*
Jihye Park, Jung Min Lim, Seok-Jae Heo, Jinman Park, Yoojin Chang, Hui Kwon Kim, Dongmin Jung, Ji Hea Yu, **Seonwoo Min**, Sungroh Yoon, Sung-Rae Cho, Inkyung Jung, Taeyoung Park, Hyongbum Henry Kim

Predicting the Efficiency of Prime Editing Guide RNAs in Human Cells — *Nature Biotechnology 2020*
Hui Kwon Kim, GooSang Yu, Jinman Park, **Seonwoo Min**, Sungtae Lee, Sungroh Yoon, Hyongbum Henry Kim
**200+ Citations**

Prediction of the Sequence-Specific Cleavage Activity of Cas9 Variants — *Nature Biotechnology 2020*
Nahye Kim, Hui Kwon Kim, Sungtae Lee, Jung Hwa Seo, Jae Woo Choi, Jinman Park, **Seonwoo Min**, Sungroh Yoon, Sung-Rae Cho, Hyongbum Henry Kim
**100+ Citations**

Sequence-Specific Prediction of the Efficiencies of Adenine and Cytosine Base Editors — *Nature Biotechnology 2020*
Myungjae Song, Hui Kwon Kim, Sungtae Lee, Younggwang Kim, Sang-Yeon Seo, Jinman Park, Nahye Kim, Jae Woo Choi, Hyewon Jang, Jeong Hong Shin, **Seonwoo Min**, Jhejiu Quan, Jihun Kim, Hoon-Chul Kang, Sungroh Yoon, Hyongbum Henry Kim
**100+ Citations**

High-Throughput Analysis of xCas9, SpCas9-NG and SpCas9 in Human Cells — *Nature Biomedical Engineering 2020*
Hui Kwon Kim, Sungtae Lee, Younggwang Kim, Jinman Park, **Seonwoo Min**, Jae Woo Choi, Tony Huang, Sungroh Yoon, David Liu, Hyongbum Henry Kim
**100+ Citations**

SpCas9 Activity Prediction by DeepSpCas9 With High Generalization Performance — *Science Advances 2019*
Hui Kwon Kim, Younggwang Kim, Sungtae Lee, **Seonwoo Min**, Jung Yoon Bae, Jae Woo Choi, Jinman Park, Dongmin Jung, Sungroh Yoon, Hyongbum Henry Kim
**200+ Citations**

Learning-Based Instantaneous Drowsiness Detection Using Wired and Wireless EEG — *IEEE Access 2019*
Hyun-Soo Choi, **Seonwoo Min**, Siwon Kim, Ho Bae, Jee-Eun Yoon, Inha Hwang, Dana Oh, Chang-Ho Yun, Sungroh Yoon

Deep Learning Improves Prediction of CRISPR-Cpf1 Guide RNA Activity
*Nature Biotechnology 2018*
*ISMB Highlights Track 2018 (**Oral**)*
Hui Kwon Kim*, **Seonwoo Min***, Myungjae Song, Soobin Jung, Jae Woo Choi, Younggwang Kim, Sangeun Lee, Sungroh Yoon, Hyongbum Henry Kim (***Co-first Authors**)
**300+ Citations**

Deep Learning in Bioinformatics
*Briefings in Bioinformatics 2017*
**Seonwoo Min**, Byunghan Lee, Sungroh Yoon
**1800+ Citations**

## ArXiv

Supervised Neural Discrete Universal Denoiser for Adaptive Denoising
*ArXiv 2021*
Sungmin Cha*, **Seonwoo Min***, Sungroh Yoon and Taesup Moon (***Co-first Authors**)