

## Soonshin Seo

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### [Personal Details & Contact Information]

- Ph.D. Student, Auditory Intelligence Lab., Computer Science and Engineering, Sogang University
- 1993.12.18, Male
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- Website: <https://github.com/sunshines14>

### [Research Interests]

- Automatic Speech Recognition
- Acoustic Scene Classification
- Sound Event Detection
- Automatic Speaker Verification

### [Education]

- **Ph.D. Candidate (2021.08 ~)**
  - Auditory Intelligence Lab., Computer Science and Engineering, Sogang University, South Korea
  - Advisor: Prof. Ji-Hwan Kim
- **Ph.D. Student (Joint Master. & Ph.D. Program) (2018.09 ~ 2021.08)**
  - Auditory Intelligence Lab., Computer Science and Engineering, Sogang University, South Korea
  - Advisor: Prof. Ji-Hwan Kim
  - CGPA (3.60/4.30)
- **Undergraduate Intern (2017.01 ~ 2018.08)**
  - Auditory Intelligence Lab., Computer Science and Engineering, Sogang University, South Korea
  - Advisor: Ji-Hwan Kim
- **B.E. degree (2014.03 ~ 2018.08)**
  - Linguistics & Computer Science and Engineering (Double Major), Hankuk University of Foreign Studies, South Korea
  - CGPA (3.09/4.50)

### [Publications]

#### ■ International Journals

- Soonshin Seo, Changmin Kim, and Ji-Hwan Kim, “Convolutional Neural Networks Using Log Mel-Spectrogram Separation for Audio Event Classification with Unknown Devices,” *Journal of Web Engineering*, 2021. (SCIE, IF 0.396) (Under Review)
- Donghyun Lee, Hosung Park, Soonshin Seo, Hyunsoo Son, Gyujin Kim, and Ji-Hwan Kim, “Robustness of Differentiable Neural Computer Using Limited Retention Vector-based Memory Deallocation in Language Model,” *KSII Transactions on Internet and Information Systems*, 2021. (SCIE, IF 0.648)
- Donghyun Lee, Hosung Park, Soonshin Seo, Changmin Kim, Hyunsoo Son, Gyujin Kim, and Ji-Hwan Kim, “Language Model Using Differentiable Neural Computer Based on Forget Gate-based Memory Deallocation,” *Computer, Materials & Continua*, 2021. (SCIE, IF 4.89)

- Soonshin Seo, and Ji-Hwan Kim, “Self-Attentive Multi-Layer Aggregation with Feature Recalibration and Normalization for Text-Independent Speaker Verification System,” *Electronics*, 9(10), 2020. (SCIE, IF 2.412)
- Hosung Park, Soonshin Seo, Changmin Kim, Hyunsoo Son, and Ji-Hwan Kim, “Hybrid CTC-attention networkbased end-to-end speech recognition system for Korean language,” *Journal of Web Engineering*, 2020. (SCIE, IF 0.396) (Under Review)

#### ■ Domestic Journals

- Soonshin Seo, and Ji-Hwan Kim, “Masked Cross Self-Attentive Encoding for Speaker Embedding,” *The Journal of the Acoustical Society of Korea*, 39(5), 2020. (SCOPUS)

#### ■ International Conferences

- Soonshin Seo, Donghyun Lee, and Ji-Hwan Kim, “Shallow Convolution-Augmented Transformer with Differentiable Neural Computer for Low-Complexity Classification of Variable-Length Acoustic Scene,” in *Proceedings of the Annual Conference of the International Speech Communication Association (INTERSPEECH)*, 2021. (Accepted)
- Soonshin Seo, and Ji-Hwan Kim, “MobileNet using Coordinate Attention and Fusions for Low-Complexity Acoustic Scene Classification with Multiple Devices,” in *Detection and Classification of Acoustic Scenes and Events Challenge (DCASE Challenge)*, 2021.
- Gyujin Kim, Soonshin Seo, Donghyun Lee, Hosung Park, Changmin Kim, Hyunsoo Son, and Ji-Hwan Kim, “Metric Learning-based Multilevel Parameter Adaptation for Converted and Synthesized Speech Spoofing Detection,” in *Proceedings of the International Workshop in Smart Info-Media Systems in Asia (SISA)*, 2020.
- Soonshin Seo, Changmin Kim, Donghyun Lee, Hosung Park, Hyunsoon Son, Gyujin Kim and Ji-Hwan Kim, “Acoustic Scene Classification System in Multi-Device Environment Using Frequency-Tuned Spectrogram and Residual Convolutional Neural Networks,” in *Proceedings of the International Conference on Electronics, Electrical Engineering, Computer Science (EEECS)*, 2020.
- Soonshin Seo, Changmin Kim, and Ji-Hwan Kim, “Multi-Channel Feature using Inter-Class and Inter-Device Standard Deviations for Acoustic Scene Classification,” in *Detection and Classification of Acoustic Scenes and Events Challenge (DCASE Challenge)*, 2020.
- Soonshin Seo, Daniel Jun Rim, Minkyu Lim, Donghyun Lee, Hosung Park, and Ji-Hwan Kim, “Robust Speaker Verification System in Vehicle Driving Environment,” in *Proceedings of the Seoul International Conference on Speech Sciences (SICSS)*, 2019.
- Soonshin Seo, Daniel Jun Rim, Minkyu Lim, Donghyun Lee, Hosung Park, Junseok Oh, Changmin Kim, and Ji-Hwan Kim, “Shortcut Connections based Deep Speaker Embeddings for End-to-End Speaker Verification System,” in *Proceedings of the Annual Conference of the International Speech Communication Association (INTERSPEECH)*, 2019.
- Hosung Park, Soonshin Seo, Daniel Jun Rim, Changmin Kim, Hyunsoo Son, Jeong-Sik Park, and Ji-Hwan Kim, “Korean Grapheme Unit-based Speech Recognition Using Attention-CTC Ensemble Network,” in *Proceedings of the International Symposium on Multimedia and Communications (ISMAC)*, 2019.
- Soonshin Seo, Minkyu Lim, Donghyun Lee, Hosung Park, Junseok Oh, Daniel Jun Rim, and Ji-Hwan Kim, “Environmental Noise Robustness for Korean Fricatives using Speech Enhancement Generative Adversarial Networks,” in *Proceedings of the IEEE International Conference on Big Data and Smart Computing (IEEE BigComp)*, 2019.
- Hosung Park, Soonshin Seo, Minkyu Lim, Donghyun Lee, Yoseb Kang, Junesek Oh, and Ji-Hwan Kim, “Implementation of Korean Grapheme-to-Phoneme Rules with Morpheme Analysis,” in *Proceedings of the International Conference on Electronics, Electrical Engineering, Computer Science (EEECS)*, 2018.

- Hosung Park, **Soonshin Seo**, Minkyu Lim, Donghyun Lee, Yoseb Kang, Juneseok Oh, and Ji-Hwan Kim, “Sequence-to-Sequence Korean Phoneme-to-Text Conversion for Korean Speech Recognition,” in *Proceedings of the International Conference on Electronics, Electrical Engineering, Computer Science (EEECS)*, 2018.
- **Soonshin Seo**, Hosung Park, Minkyu Lim, Donghyun Lee, and Ji-Hwan Kim, “CMVN based Noise Processing for Unvoiced Sound /ㅅ/ in Korean,” in *Proceedings of the Seoul International Conference on Speech Sciences (SICSS)*, 2017.

#### ■ Domestic Conferences

- Hosung Park, **Soonshin Seo**, Hyunsoo Son, Changmin Kim, and Ji-Hwan Kim, “Self-attentive Layer for Discriminant Vector Training in Low-resource Speech Recognition,” in *Proceedings of the Korea Computer Congress*, 2020. (Best Paper)
- **Soonshin Seo**, Minkyu Lim, Donghyun Lee, Yoseb Kang, Juneseok Oh, and Ji-Hwan Kim, “Performance Enhancement of Speech Recognition System using Noisy Speech,” in *Proceedings of the Korean Society of Speech Sciences*, 2018.
- **Soonshin Seo**, Hosung Park, Donghyun Lee, Minkyu Lim, Yoseb Kang, and Ji-Hwan Kim, “Implementation of Noisy Speech Generation System for Acoustic Model Performance Improvement in Noisy Environment,” in *Proceedings of the Korean Society of Speech Sciences*, 2017.

#### [Research Experience]

##### ■ Development of Human Enhancement Technology for Auditory and Muscle Support (2020.05 ~ on going)

- Member of the Speech and Audio Team
- Supported by the Ministry of Science and ICT
- Research Details
  - Real Time Sound Event Detection System under Different Mobile Devices
    - Data Collection from YouTube/Preparation/Augmentation
    - Log Mel-Spectrogram, Delta and Delta-Delta features
    - Residual CNN based Classifier using Late Fusion (2020)
    - MobileNet based Classifier with Coordinate Attention (2021)
    - Real-Time Android Test (Google Pixel, LG V50, Samsung Galaxy S7, Apple iPhone SE)

##### ■ Development of Data Augmentation Technology by using Heterogeneous Information and Data Fusion (2020.04 ~ 2021.02)

- Member of the Speech and Audio Team
- Supported by the Ministry of Science and ICT
- Research Details
  - Korean Speech Recognition System on YouTube Traveling Vlog Environments
  - Sound Event Detection System on YouTube Traveling Vlog Environments

##### ■ Technical development of Korean Speech Recognition System in Vehicle (2018.09 ~ 2019.12.31)

- Member of the Speech and Audio Team

- Supported by the Ministry of Trade, Industry and Energy
- Research Details
  - Automatic Korean Speech Recognition System in Vehicle Driving
    - TDNN-based Acoustic Model
    - N-Gram-based Language Model Adaptation
    - WFST-based Decoding Networks
  - Korean Speaker Verification System in Vehicle Driving
    - Data Preparation for Vehicle Driving
    - Data Augmentation using Noise Mixing and SpecAugment
    - Voice Activity Detection
    - L2-Normalization
    - Multi-Utterances Enrollment
  - Residual CNN-based Deep Speaker Embedding
    - Additional Identity Mapping
    - Shortcut Connections based multiple pooling
    - Random Masking Method
    - Cross Self-Attention Module

■ **Development of QA systems for Video Story Understanding to Pass the Video Turing Test (2018.09 ~ on going)**

- Member of the Speech and Audio Team
- Supported by the Ministry of Science and ICT
- Research Details
  - Korean Real Time Speech Recognition System
    - Online Decoding Parameters Optimization
    - N-Gram-based Language Model Compression
  - Automatic Transcription Generation System
    - Weakly Labeled Data Collected in YouTube
    - DNN-based Forced Alignment

■ **Development of Distant Speech Recognition and Multi-Task Dialog Processing Technologies for In-Door Conversational Robots (2017.01 ~ 2020.05)**

- Member of the Speech and Audio Team
- Supported by the Ministry of Trade, Industry and Energy
- Research Details
  - Noisy Speech Generation System for Environmental Noise Data

- Korean Speech Recognition System for Multi-Channel

#### [Achievements]

- **The 12<sup>th</sup> Place in Task 1a of the IEEE AASP Challenge on Detection and Classification of Acoustic Scenes and Events (DCASE Challenge) (2021.07)**
  - Subject: Low-Complexity Acoustic Scene Classification with Multiple Devices
  - URL: <http://dcase.community/challenge2021/task-acoustic-scene-classification-results-a>
- **The 13<sup>th</sup> Place in Task 1a of the IEEE AASP Challenge on Detection and Classification of Acoustic Scenes and Events (DCASE Challenge) (2020.07)**
  - Subject : Acoustic Scene Classification with Multiple Devices
  - URL: <http://dcase.community/challenge2020/task-acoustic-scene-classification-results-a>
- **The 5<sup>th</sup> Place in S/W Implementation & Demo Challenge (2017.12)**
  - From the Korea Software Congress 2017

#### [Teaching Experience]

- **Speech Recognition Course (Advanced Level) (2021.06)**
  - Teaching Assistant
  - At LG U+ Magok Campus
- **Speech Recognition Course (Advanced Level) (2018.11)(2019.07)(2019.08)(2020.07)**
  - Teaching Assistant
  - At Samsung Electronics Leadership Center
- **Speech Recognition Course (Advanced Level) (2019.02)**
  - Teaching Assistant
  - At LG Electronics Seocho R&D Campus
- **The 36th Speech Communication and Signal Processing Conference (2019.08)**
  - Tutorial Speaker
  - Subject: Implementation of Speech Recognition System Using Kaldi Toolkit
  - At University of Seoul
- **Introduction to Dialogue-based User Interface (2019 Fall Semester)**
  - Teaching Assistant
  - At Sogang University

#### [Graduate Coursework]

- **2021 1<sup>ND</sup> Semester**
  - Applied Data Science and Engineering Colloquium
- **2020 2<sup>ND</sup> Semester**

- Pattern Recognition (EE)
- Special Topics on Statistical Signal Processing
- AI System Architecture

■ **2020 1<sup>ST</sup> Semester**

- Special Study
- Analysis and Design of Speech Recognitions Systems
- Pattern Recognition (CS)
- Topics in Computer Network

■ **2019 2<sup>ND</sup> Semester**

- Special Study

■ **2019 1<sup>ST</sup> Semester**

- Special Study
- Speech Processing
- Natural Language Processing

■ **2018 2<sup>ND</sup> Semester**

- Artificial Intelligence II
- Intellectual Property and Patent
- Introduction to Dialogue-based User Interface
- Advanced Neural Networks

**[Technical Skills]**

- Python, Linux, Shell Script, C++
- Kaldi, PyTorch, Keras, Tensorflow