

# Seunghyun Oh

<https://ooshyun.github.io>

**Github** <https://github.com/ooshyun>

**Email** [seunghyun.daniel.oh@gmail.com](mailto:seunghyun.daniel.oh@gmail.com)

**Address** Songpa-gu, Seoul, Korea

## Summary

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- Embedded DSP Engineer with 3+ years of Hands-on experience in implementing DSP algorithms
- Experience developing Digital Filter, Real-time DSP algorithms, Optimization, Microphone Calibration
- Experience designing Machine Learning for Speech Enhancement
- Overall knowledge of semiconductor, circuit design, and chip design
- Steady learner with active problem-solving and communicative skills
- Proficient in C, Python, Tensorflow, Pytorch

As an individual with 3+ years of engineering industry work experience as an Embedded DSP Engineer, I'm looking for part/full-time work in Machine Learning Research & development; this is due to my persistent interest in pursuing a research career to analyze human-related information in a tiny device; Tiny ML can widely being practiced in the health-care industry today. I desire to establish strong foundations before I pursue graduate studies down eventually.

## Education

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### Hanyang University

MAR 2018–FEB 2020, SEOUL, KOREA

Master of Engineering in Electronic Computer Engineering, GPA 3.8/4.0

### Inha University

MAR 2012–FEB 2018, INCHEON, KOREA

Bachelor of Engineering in Information Communication Engineering, GPA 3.3/4.0

## Skills

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**Program Language:** Python, C, Tensorflow, Pytorch, Assembly, CMake, Bash, LaTeX

**Software:** Git, Xtensa, STM32CubeIDE, Linux, Cadence, Jira,

**Language:** Korean (Native), English (Proficient)

## Work Experience

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### Freelance / Embedded Machine Learning Engineer

APR 2023–Present SEOUL, KOREA

**Summary** — Design Real-time speech processing and Deep Learning Model for Speech Enhancement in Embedded device

### Olive Union / Embedded Digital Signal Processing Engineer 3+years, APR 2020–APR 2023, SEOUL, KOREA

**Summary** — Develop DSP algorithms and Optimization for real-time signal processing in embedded device

#### **Detail**

- Designed Embedded virtual platform to simulate DSP algorithm
- Designed Digital Filter and Code Optimization
- Maintained DSP Firmware using Git and GPU hardware resource
- Developed Real time speech/audio signal processing Framework in C for Tensilica DSP core
- Calibrated Microphone and Speaker
- Developed API to fit speech amplification in remote care service
- Developed Speech amplification/compression API for Android/iOS

## Selected Projects

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### TinyML Model in Embedded device

Freelance / APR 2023–Present, SEOUL, KOREA

**Summary** — Develop Real-time signal processing framework in Embedded device, and Deep learning model

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for Speech enhancement

#### **Detail**

- (ongoing) Build Real-time DSP pipeline for speech
- Design Deep Learning model for speech enhancement
- Develop Machine Learning model for speech enhancement in STM32F746VE
- Tools: C, Embedded C, Python, Tensorflow, Tensorflow Lite

#### **Speech Enhancement in 2023 ICASSP Clarity Challenge**      Personal / JAN 2023–FEB 2023, SEOUL, KOREA

**Summary** — Separate target speaker using source separation deep learning model to improve speech clarity for hearing-aid

#### **Detail**

- Developed Deep Learning Model Training pipeline
- Separated target speaker with Conv-tasnet model using PIT Loss function
- Tools: Python, Pytorch

#### **Performance**

- Top 5 Rank in 2023 ICASSP SP Clarity Challenge

#### **Embedded virtual platform for DSP algorithm**      Olive Union / FEB 2023–MAR 2023, SEOUL, KOREA

**Summary** — Develop virtual hardware platform to evaluate DSP algorithm In embedded environment

#### **Detail**

- Developed virtual hardware platform to have fixed point DSP using CMSIS-DSP library
- Developed data communication for microphone in device using SCO with sounddevice library and UART
- Tools: Python, C++

#### **Performance**

- Built Fixed-point virtual environment to simulate real-time DSP algorithms

#### **Digital Filter Design and Code Optimization**      Olive Union / OCT 2022–JAN 2023, SEOUL, KOREA

**Summary** — Design Digital Filter to remove noise, and Optimize algorithm to improve battery usage time

#### **Detail**

- Designed Digital Filter with 2 stage Transposed-Directed-Form-II biquid digital IIR
- Optimized DSP algorithm using SIMD operation in Tensilica Hifi DSP Framework
- Tools: C

#### **Performance**

- Eliminated Aliasing and DC offset
- Reduced 72% cycles and 85% memory in Digital filter API
- Improved battery time 35 mins

#### **Maintenance of DSP Firmware and resource**      Olive Union / JUN 2021–MAR 2023, SEOUL, KOREA

**Summary** — Maintain DSP source code and GPU hardware resource

#### **Detail**

- Designed MCU-DSP Protocol
- Maintained DSP sources code and version with Gitlab
- Maintained DSP license server and Built GPU resource
- Tools: Git

#### **Develop Speech amplification API for Android/iOS**      Olive Union / APR 2020–DEC 2020, SEOUL, KOREA

**Summary** — Develop speech amplification algorithm for Android and iOS, and Verify the data for speech amplification in device

#### **Detail**

- Developed API in C to extract non-linear speech amplification algorithm through Hearing Test
- Developed API in C to encode the data for embedded environment
- Developed GUI application to handle the data in speech amplification algorithm
- Tools: C, CMake, Python, PyQt

#### **Performance**

- Built fine tune and verification process for speech amplification

## **Research Experience**

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- Samsung Electronics / Project Designer in Analog Circuit Lab** JUN 2019–DEC 2019, SEOUL, KOREA
    - Verified transceiver and receiver for single-ended PAM2 with differential sensing
  - LX Semicon / Project Designer in Analog Circuit Lab** MAR 2018–DEC 2019, SEOUL, KOREA
    - Developed PHY interface for DDR3 and LPDDR3
    - Designed DLL with offset-calibration using digital method for 800-2000MHz
  - Lab Intern / Intelligent Circuit and System design Lab** JUN 2017–DEC 2017, INCHEON, KOREA
    - Designed Bandgap reference voltage with cascade structure and verification

## Certificates & Awards

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- **Top Rank 5 / 2023 ICASSP SP Clarity Challenge** JAN 2023–FEB 2023, SEOUL, KOREA
- **DeepLearningAI TensorFlow Developer / Coursera** APR 2021–JUL 2021, SEOUL, KOREA
- **Academic Excellence Scholarship / Inha University** SPRING 2017, SEOUL, KOREA
- **OPIC IM3 / English Certificate** MAR 2023, SEOUL, KOREA

## Extracurricular activities

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- Algorithm Study** FEB 2023– Present, SEOUL, KOREA
  - Study and Arrange Data Structure, Algorithm, Network, Operating System, Computer Science, Design Pattern, Programming Language(Python, C)
  - Outcomes: Introduction to Algorithms and Data Structure
- Digital Signal Processing study** FEB 2023– Present, SEOUL, KOREA
  - Study and Arrange digital signal processing and trend with deep learning
  - Outcomes: 2023 DAE(Deep Audio Everything) Lab
- TinyML for Speech Enhancement** APR 2022–NOV 2022, SEOUL, KOREA
  - Explore and Arrange Deep Learning for Speech Enhancement in embedded system
  - Tools: Python, Tensorflow, Tensorflow lite
  - Outcomes: Speech Evaluation, ML Training Pipeline, Document
- CS224N study** JUL 2021–DEC 2021, SEOUL, KOREA
  - Study Theories and Model for Deep Learning and Natural Language Processing in Stanford CS224N
  - Outcomes: Blog for CS224N, Github code for CS224N Assignment
- Digital Filter study** JAN 2021–JUN 2021, SEOUL, KOREA
  - Practice Scratch code for digital filter, applying filter, discrete fourier transform, overlap and add operation, Windowing, and Design Graphic Equalizer in a paper
  - Outcomes: Github code for Digital Filter Design

## Teaching Experience & Presentation

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- Poster Presentation In 19th RF/Analog Circuit Workshop** FALL 2019, SEOUL, KOREA
  - **Seunghyun Oh**, Changsik Yoo, A 800MHz To 1.066GHz All Digital Delay Locked Loop With SAR Algorithm for LPDDR3 and DDR3, In 19th RF/Analog Circuit Workshop 2019.09
- Hanyang University / Teaching Assistant**
  - ECN1001, Electronic Circuits 1 with Professor Tae-Yeoul Yun SPRING 2019, SEOUL, KOREA
    - Led weekly basic circuit experiments
  - ELE3074, Digital Logic Circuits with Professor David Phillip Wagner FALL 2018, SEOUL, KOREA
    - Planned an experiment course and led basic logic circuit experiments
- Inha University / Student Mentor** SPRING 2017, SEOUL, KOREA
  - Taught students in Electronic Circuits 1

## Community Experience

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**Samsung Volunteer Corporations / Leader and Mentor**

- Awarded Best Performance

JUN 2016 - DEC 2017, SEOUL, KOREA

**Military Service / Republic of Korea Auxiliary Police**

DEC 2013 - SEP 2015, INCHEON, KOREA