Seunghyun Oh

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Summary

- 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

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

Program Language: Python, C, Tensorflow, Pytorch, Assembly, CMake, Bash, LaTeX
Software: Git, Xtensa, STM32CubeIDE, Linux, Cadence, Jira,
Language: Korean (Native), English (Proficient)

Work Experience

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

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

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

Remote fitting care service in website Olive Union / JAN 2022–JUN 2022, SEOUL, KOREA

Summary — Develop Speech amplification algorithm API to communicate and modify data between app and website for remote web fitting service

Detail

- Developed the protocol between app and web for speech amplification,
- Developed Python API to fit and visualize speech amplification data in website
- Verified the fitting range in speech amplification using draggable plot with PyQt
- Tools: C, Python, PyQt

Performance

- Built Pipeline for remote care fitting service between iOS/Android app and website

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

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

- **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

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

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

Samsung Volunteer Corporations / Leader and Mentor — JUN 2016 - DEC 2017, SEOUL, KOREA

- Awarded Best Performance

Military Service / Republic of Korea Auxiliary Police — DEC 2013 - SEP 2015, INCHEON, KOREA