Anthony Hong

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Education

Carnegie Mellon University (CMU) Pittsburgh, PA, USA
Bachelor of Engineering and Arts, Electrical and Computer Engineering and Music Technology
Additional Major: Artificial Intelligence

Relevant Coursework

Advanced Digital Signal Processing (Graduate)
Introduction to Deep Learning
Introduction to Computer Systems
Machine Learning for Signal Processing (Graduate)
Introduction to Machine Learning
Introduction to Embedded Systems (Spring 2024)

Skills

Technical: real-time DSP, audio prototyping, acoustics, data structures and algorithms, systems programming
Musical: FL Studio, Logic Pro, Pro Tools, electronic music production, piano, sound engineering
Tools: Matlab, Juce, C/C++, CMake, Python, PyTorch, Git, Google Cloud, HTML/CSS, Java, Max/MSP/Jitter
Languages: English (native), Chinese (native), Shanghainese (native)

Experience / Projects

Virtual Eurhythmics Tutor Sept. 2023 - Present

- Developed a program that plays randomly generated rhythms for users to practice musicianship
- Designed logic to support different BPM's and accurate timings
- Designed algorithms to generate sequences of fixed total duration and record it as text score
- Designed algorithms to mark bars and split and tie notes across downbeats for visual clarity

Gerzz Interactive May. 2023 - Sept. 2023
Machine Learning and Signal Processing Intern Shanghai, China

- Modified the existing VITS model for training singing voice conversion, improved clarity of pronunciation and naturalness of unvoiced components
- Implemented real-time reverb and Transformers robot voice effect algorithms in C++
- Developed a real-time AI acoustic echo cancellation system in C++ based on an offline implementation written in Python

Filter-dependent Point Cloud Audio Visualization Feb. 2023 - Mar. 2023

- Developed an audio filter whose shape also modifies granularity of point cloud visualization
- Programmed the filter to be shaped arbitrarily by mouse
- Written entirely in Max/MSP/Jitter

Carnegie Mellon University Aug. 2022 - May. 2023
Teaching Assistant Pittsburgh, PA, USA

- "Signals and Systems": covered system properties, convolution, Fourier/Laplace/Z Transform, sampling
- "Digital Signal Processing": covered multirate DSP, filter design, Discrete/Fast Fourier Transform
- Hosted weekly office hours to help students understand important signal processing concepts
- Created homework assignments and exams that aid students' understanding

Course Projects Jun. 2022 - May. 2023

- "Introduction to Deep Learning" Course Projects
  - Created Pytorch classes from scratch for loading and preprocessing speech and image data
  - Implemented various models for different tasks from scratch, using basic Pytorch functions
  - Reviewed multiple research papers describing different model architectures and their performances
  - Attention-based Automatic Speech Recognition
    - Reviewed the "Listen, Attend, and Spell" research paper

        - Implemented an attention mechanism, a pyramidal bi-directional long-short-term memory (pBLSTM)-based encoder (listener), and a LSTM-based decoder (speller)
        - Used the Librispeech dataset for training, validating, and testing
        - Achieved 8.9 Levenshtein distance during testing
    - Convolutional neural network for face classification
        - Reviewed research papers on Convnext and ResNet
        - Experimented with and built Convnext and ResNet from scratch, using pytorch functions
        - Used the VGGFace2 dataset for training, validating and testing
        - Achieved 90% test accuracy using the Convnext model
    - Deep neural network for frame-level speech recognition
        - Built a multi-layer perceptron (MLP) for mapping speech to phonemes
        - Experimented with various MLP architectures and other hyperparameters, including but not limited to: dropout probability, learning rate, scheduler, batch size, and optimizer
        - Used the Librispeech dataset for training, validating, and testing
        - Achieved 88% test accuracy
- "Advanced Digital Signal Processing" Matlab Simulations
    - Noise canceller using adaptive filtering and the LMS update algorithm
    - Linear predictive coding-based vocoder
    - Phase vocoder that changes the time and pitch of music independently
- "Introduction to Computer Systems" Course Projects
    - Tiny interactive shell that supports background jobs, process interruptions, and zombie reaping
    - Dynamic memory allocator (1300+ lines of C code) achieving high throughput and utilization
    - Cache simulator adopting the LRU replacement policy
    - Fast matrix transposition implemented with blocking techniques

Carnegie Mellon University AB Tech Aug. 2021 - Dec. 2022
Sound Engineer Pittsburgh, PA, USA

- Set up sound and lighting equipments
- Assisted operating sound board during the performance to monitor sound quality and feedback
- Communicated with stage managers to ensure smooth transition between performances

Music Producer Dec. 2015 - Present

- Produced high-quality original music, solely responsible for all aspects of production: composition, sound design, sound recording, mixing and mastering
- Used signal processing methods to generate real-time audiovisual artwork accompanying original music
- Created a musician website from scratch using HTML/CSS, regularly updating content

References

Richard Stern, Professor of Electrical and Computer Engineering at CMU: rs1e@andrew.cmu.edu
Ying Xu, CTO at Gerzz Interactive: ishine2010@gmail.com
Tiange Ling, CEO at Gerzz Interactive: tiangeling@gmail.com

Awards / Honors

Dean's list, Fall 2022
International Electronic Music Competition Top 25%, Aug. 2019
Black Hole Recordings China Remix Competition Honorable Mention, Feb. 2019
United States Academic Decathlon China Music Section Gold Medalist, Feb. 2019