HAO WU

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Education

Carnegie Mellon University Pittsburgh, PA, USA
Master of Science in Music & Technology 2023-Present
Current Grade: 4.0
Core Coursework: Digital Signal Processing, Advanced Digital Signal Processing, Machine Learning for Signal Processing, Computer System, Computer Music
Teaching:

- 18-290: Signals and Systems, Spring 2024 & Fall 2024, CMU
  Teaching Assistant, Hold Office Hours, Lead Recitation Sessions, Grade Homework

Foshan University Foshan, China
Bachelor of Engineering 6/2011
Electrical and Information Engineering
Awards:

- First Prize in Electronic Design Competition (School) 11/2009
- Excellent Student Cadre Award 2008-2009
- Academic Excellence Award 2007-2008

Extracurricular**:**

- Vice President of Guitar Association of School 2008-2009

Research Experience

- Master's Thesis Research 8/2024 – Present
  Optimizing Automated Guitar Tablature Transcription by Prioritizing Expressive Techniques
  This research explores novel methods for improving guitar tablature transcription by emphasizing musical expression over mechanical efficiency. While traditional approaches often prioritize minimizing finger movement and hand repositioning, this study aims to refine transcription algorithms by integrating guitar-specific playing techniques. The goal is to create transcriptions that better reflect the musical nuances of the guitar, balancing playability with a more authentic and expressive representation of the music.

- Auditory Lab and Spatial Experiences Lab, CMU 5/2024 – 7/2024
  Research Assistant, Advisors: Professor Laurie Heller, Professor Daniel Rosenberg
  The effect of motion on the integration of hearing, vision, and knowledge
  Implemented a DOA algorithm using two microphones to evaluate the results of auditory perception experiments and calibrate the localization performance of the Wave Field Synthesis (WFS) speaker array system. Participated in a perceptual experiment to measure the angle at which localization becomes indistinguishable. Developed an interactive Python shell program to simplify the process of auditory experiments. Maintained a Max project for controlling the WFS system and interacting with a motion tracking system.

- Guangzhou Rantion Technology Ltd., Algorithm Team 04/2021 - 05/2023
  Audio Algorithm Engineer
  Guitar Chord Recognition Algorithm
  Designed a real-time guitar chord recognition algorithm using traditional DSP techniques, with a correction module based on music theory. Participated in non-real-time music chord recognition research, which uses machine learning techniques. Both algorithms are preliminary research tasks for potential future products of the company.

Work Experience

Guangzhou Rantion Technology Ltd. 04/2021 - 05/2023
Audio Algorithm Engineer Guangzhou, China
Responsible for research and development of audio processing algorithms
Accountable for building software testing platforms and audio frameworks
Mentor other colleague engineers not familiar with instruments or music.

- Designed a real-time guitar chord recognition algorithm. Participated in non-real-time music chord recognition research based on ML method. Created desktop applications to demonstrate both algorithms.
- Developed Guitar Tuner algorithm and framework for the Donner Music app (Published on App Store).
- Participated in develop guitar effects for the Donner Arena2000 Guitar Multi-Effects Processor (available for sale) and independently developed a wireless control mobile app, ArenaControl (Published on App Store).
- Independently developed a real-time testing and visualization platform based on the JUCE framework, enabling the research team to perform A/B tests and visualize waveforms with customizable tags.
- Developed a cross-platform audio data routing and handling framework, called FUSION, for other application development teams in the company to use, easing their efforts in the low-level audio data management.
- Created a metronome audio framework for the Donner Music app (Published on App Store)

Foshan Yunlian Technology Ltd. 10/2017 - 04/2021
Senior iOS Developer
Led a team of three in developing iOS apps for the company.

- Developed and maintained two apps: Lianhe Meeting (a multi-party video conferencing app) and Yidingdong (an instant messaging app), both published on the App Store.
- Designed the architecture for message routing, transformation, and persistence modules across all apps.
- Designed and implemented the network module, converting the requesting event into an object-oriented style, which improved the customizability and reusability of the network requests and reduced debugging time.
- Introduced the Swift and SwiftUI into the development process, increasing the development efficiency and speed.

Guangdong Lingnanpass CO., Ltd. 06/2016 - 10/2017
iOS Developer

Responsible for cross-company universal SDK development and iOS app development for the city's public transportation system.

- Designed and developed a universal transportation card recharge SDK for cooperating companies, enabling their intelligent wearable devices to wirelessly recharge the transportation card. The SDK is compatible with future cooperating companies as well.
- Developed the official iOS app designed by the Guangdong Province Public Transportation Department, facilitating virtual transportation card management directly from users' cellphones.

Guangzhou Niuyun Technology Ltd. 05/2015 - 06/2016
iOS Developer
Responsible for the development and maintenance of a multi-party video conferencing app.

- Independently developed the Huixiang iOS app from the ground up.

YAL Solution (startup) 09/2014 - 02/2015
Co-Founder
My partner and I aimed to support underground bands and music enthusiasts by developing a rhythm mobile game to enhance the exposure of their music. During this project, I taught myself application development, initiated the program, and took responsibility for both technical implementation and creative direction.

89 Instrument (startup) 09/2011 - 07/2014
Co-Founder
Offer offline guitar courses.
Offer song mixing service for local bands and individuals.
Selling guitar-related products on the Internet.

Music Experience

Over 15 years of guitar-playing experience
Released two albums with the band I played in from 2011 to 2019
Performed in over 60 live shows
Wrote a dozen songs for the band I played in before
Mixed the song demos and created live performance control DAW programs for the band
Taught guitar on weekends as part-time job at several musical institutions from 2011 to 2018

Skills

Programming Languages: C, C++, Objective-C, Swift, Python, Nyquist

Tools: MATLAB/Octave, JUCE, PyTorch, VS Code, Xcode, Logic Pro, Protools, Max8, Latex

Music Skills: Guitar performance, Composition, Arrangement, Audio Mixing, Midi music editing,

Languages: Mandarin (native), English (proficient)