

Christodoulos Benetatos

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Education

- University of Rochester**, PhD in Electrical and Computer Engineering Sept 2018 – Dec 2024
- Focus Areas: Deep Learning, Music and Audio Signal Processing
 - Supervised by Prof. Zhiyao Duan
- National Technical University of Athens**, B.Sc/M.Sc in Electrical and Computer Engineering Sept 2011 – Dec 2017
- Thesis: A Brain Computer Interface (BCI), using Steady State Visual Evoked Potentials (SSVEP), for the task of maze navigation.
 - Supervised by Prof. A. G. Stafylopatis and Dr G. Siolas

Experience

- Research Scientist Intern**, ByteDance Inc. – Santa Clara, CA June 2022 – Aug 2022
- Developed generative models (VAE and Transformers) to improve various automatic music generation pipelines.
- Research Scientist Intern**, Kwai Inc. – Seattle, WA Aug 2020 – Nov 2020
- Conducted multimodal modeling of dance videos focusing on visual beat tracking and real-time body gesture recognition.
 - Created a real time digital audio effects suite in C++ for iOS.
- Research Assistant**, University of Rochester, AIR Lab – Rochester, NY Sept 2018 – Dec 2024
- Developing novel AI tools (algorithms and prototypes) to assist in the music making process using generative models.
- Software Engineer**, Metis Cyberspace Technology – Athens, Greece Jan 2018 – Aug 2018
- Designed algorithms for real-time remote monitoring and performance assessment of equipment onboard vessels.

Projects

- Guitar Score Reduction as a Reinforcement Learning Problem** 2023 – present
- Framed the task of guitar score reduction as a combinatorial optimization problem and used Proximal Policy Optimization (PPO) to solve it.
 - Designed novel rule-based and data-driven reward functions to guide the learning process.
 - Used a transformer-based RL agent that operates on scores represented as graphs.
- HARP** 2023 – present
- Lead Developer
 - HARP lets users of Digital Audio Workstations (DAWs) access large state-of-the-art deep learning models using cloud-based services, without breaking the within-DAW workflow.
- Euterpe: A Web Framework for Interactive Music Systems** 2021 – 2023
- Enables researchers without JavaScript expertise to easily deploy musical agents on the web.
 - A Vue based client side app with real-time audio/MIDI synchronization and data visualization.
 - Re-Implemented various deep-learning musical agents using Euterpe and presented a tutorial in ISMIR 2023.

Draw and listen!	2020 – 2021
<ul style="list-style-type: none"> • Built a sketch-based system for music inpainting enabling users to draw a melodic contour and hear them realized instantly. • Derived a new melody disentanglement scheme -> ‘melody = contour + rhythm + context’. • Designed a VAE architecture that realizes the above disentanglement and a frontend in Vue to support the user interaction with the model. 	
Score Following for Event Augmented Live Performances	2021 – 2022
<ul style="list-style-type: none"> • Implemented a modified the ODTW algorithm for real-time audio-score alignment. • Developed a PyQT UI to visualize the alignment and activate events. • Used OSC to send events in real-time to a TouchDesigner instance for triggering sound and video effects. • Deployed the system in a mini-concert with the TableTopOpera. 	
BachDuet	2019 – 2020
<ul style="list-style-type: none"> • Designed a RNN model for real-time musical counterpoint improvisation. • Trained on duets extracted from Bach Chorales. • Implemented a prototype system and demoed it live at various venues. 	

Publications

Euterpe: A Web Framework for Interactive Music Systems	2023
Yongyi Zang*, <i>Christodoulos Benetatos</i> *, Zhiyao Duan, (* equal contribution) Journal of the Audio Engineering Society (JAES)	
HARP: Bringing Deep Learning to the DAW with Hosted, Asynchronous, Remote Processing	2023
Hugo Flores Garcia, <i>Christodoulos Benetatos</i> , et al. NeurIPS workshop on Machine Learning for Creativity and Design	
Draw and listen! a sketch-based system for music inpainting	2022
<i>Christodoulos Benetatos</i> , Zhiyao Duan Transactions of the International Society for Music Information Retrieval (TISMIR)	
Collagenet: Fusing arbitrary melody and accompaniment into a coherent song	2022
Abudukelimu Wuerkaixi, <i>Christodoulos Benetatos</i> , Zhiyao Duan International Conference on Music Information Retrieval (ISMIR)	
BachDuet: A deep learning system for human-machine counterpoint improvisation	2020
<i>Christodoulos Benetatos</i> , Joseph VanderStel, Zhiyao Duan New Interfaces for Musical Expression (NIME)	

Talks and Demos

Score Reduction for Guitar through Reinforcement Learning – San Francisco, CA	Nov 2024
• Demo at the International Symposium on Music Information Retrieval (ISMIR)	
HARP 2.0: Expanding Hosted, Asynchronous, Remote Processing For Deep Learning In The DAW – San Francisco, CA	Nov 2024
• Demo at the International Symposium on Music Information Retrieval (ISMIR)	
Euterpe: A Web Framework for Interactive Music Systems – Madrid, Spain	June 2024
• Oral presentation at the AES International Conference	
Computer-Assisted Music-Making Systems: Taxonomy, Review, and Coding – Milan, Italy	Nov 2023

- Tutorial and Live Coding at the International Symposium on Music Information Retrieval (ISMIR)

Automatic Rendering of Augmented Effects in Immersive Concerts – Rochester, NY

Nov 2022

- Demo at the 7th Annual Frameless XR Symposium

BachDuet: A deep learning system for human-machine counterpoint improvisation – Delft, Netherlands

Nov 2019

- Demo at the International Symposium on Music Information Retrieval (ISMIR)

Skills

Programming Languages: Python, C++, JavaScript, Java, Matlab

Frameworks: Pytorch, JUCE, Vue.js, PyQt, Spring

Languages: Greek (native), English (fluent)

Music Skills

Instruments: Classical Guitar, Flute, Mandolin, Cajon

Music Production: Reaper, Sample Library Programming