Barcelona, Spain / Vancouver, Canada
 +1 (778) 386 1367 / +34 684306775
 behzad.haki@upf.edu
 www.behzadhaki.com
in behzad-haki-141bb18b
 behzadhaki

Behzad Haki

Education

2020–Now **PhD Candidate in Sound and Music Computing**,
Universitat Pompeu Fabra (UPF), Barcelona, Spain
I am currently engaged in a PhD research focusing on the application of deep learning to drum generation, catering to both composition and accompaniment requirements. My studies revolve around creating lightweight neural models optimized for real-time drum pattern generation. A cornerstone of my efforts is the practical deployment of these models into music production software environments like VSTs, as well as into hardware formats such as Eurorack. My foremost goal is to provide musicians with versatile deep generative tools, designed for seamless integration across various platforms. By doing so, I aspire to foster active and sustained engagement, allowing artists to enhance their creativity while working within their established production environments.

2017–2018 **Master in Sound and Music Computing**,
Universitat Pompeu Fabra (UPF), Barcelona, Spain
In the course of my master's studies, I specialized in sound and music computing at the Music Technology Group. Under the mentorship of Sergi Jordà, I immersed myself in a comprehensive curriculum that spanned music perception and cognition, real-time interaction, audio programming, digital signal processing, and deep learning. Each of these topics provided me with a holistic understanding of the intricate interplay between music and technology. For my thesis, I embarked on a project utilizing LSTM networks to generate basslines intricately interlocked with drum patterns.

2008–2013 **BASc in Electrical Engineering**,
University of British Columbia (UBC), Vancouver, Canada
During my undergraduate years, I pursued a degree in Applied Science, majoring in Electrical and Computer Engineering. As I navigated the multifaceted curriculum, my interests began to converge on the intricate fields of Digital Signal Processing (DSP) and acoustics. In my final year, I channeled my efforts and studies into these domains, delving deep into the nuances of signal manipulation and the science of sound. This specialized focus laid the groundwork for my understanding of the intersection between engineering principles and auditory phenomena, equipping me with a robust foundation that would later influence my advanced academic pursuits.

Skills

Programming Python, C/C++, Matlab, Pure Data, Max/MSP, Concurrent Programming
Tools PyTorch, TensorFlow, JUCE, Docker

Acoustics	EASE, CadnaA, ARTA, winMLS
	LEAP EnclosureShop and CrossoverShop
Data Science	Deep Learning. NLP Techniques for Music Generation. Collection, Curation and Processing of Large-scale Datasets

Languages

English	Fluent
Farsi	Fluent

Publications

Behzad Haki, Błażej Kotowski, Cheuk Lee, and Sergi Jorda. TapTamDrum: A Dataset for Dualized Drum Patterns. In *Proceedings of the 24th International Society for Music Information Retrieval Conference*. ISMIR, November 2023.

Behzad Haki, Julian Lenz, and Sergi Jorda. NeuralMidiFx: A Wrapper Template for Deploying Neural Networks as VST3 Plugins. In *Proceedings of the 4th International Conference on on AI and Musical Creativity*, September 2023.

Behzad Haki, Teresa Pelinski, Marina Nieto, and Sergi Jorda. Completing Audio Drum Loops with Symbolic Drum Suggestions. In *Proceedings of the International Conference on New Interfaces for Musical Expression (NIME) 2023*. NIME, April 2023.

Behzad Haki, Marina Nieto, Teresa Pelinski, and Sergi Jordà. Real-Time Drum Accompaniment Using Transformer Architecture. In *Proceedings of the 3rd International Conference on on AI and Musical Creativity*. AIMC, September 2022.

Thomas Nuttall, Behzad Haki, and Sergi Jorda. Transformer neural networks for automated rhythm generation. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, Shanghai, China, June 2021.

Behzad Haki and Sergi Jorda. A bassline generation system based on sequence-to-sequence learning. In Marcelo Queiroz and Anna Xambó Sedó, editors, *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 204–209, Porto Alegre, Brazil, June 2019. UFRGS.

Work Experience

2014–2019	**Acoustic Engineer**, *BAP Acoustics*, Vancouver, Canada • Conduct noise and vibration measurements • Model and simulate noise emissions from existing and proposed future noise sources • Conduct room acoustic measurements

• Model and simulate acoustics of indoor spaces • Simulate loudspeaker drivers based on electrical and acoustical measurements • Design loudspeaker cabinets and cross-over circuits for specialized applications • Simulate outdoor public warning systems • Develop specialized software implementing acoustic standards • Measure noise from railways to monitor the corrugation of tracks • Write memorandums and reports

Teaching Experience

Fall 2019   **Introduction To Programming (First Year Engineering)**,
Department of Information and Communications Technologies (DTIC)
Universitat Pompeu Fabra (UPF)

This introductory course provides engineering students with a foundational understanding of programming, with a specific focus on Python. Through hands-on exercises, students are acquainted with the basics of Python programming, equipping them with essential coding skills that serve as a stepping stone for more advanced computational tasks.

Winter 2020   **Electronic Music Production Lab (Fourth Year Engineering)**,
Department of Information and Communications Technologies (DTIC)
Universitat Pompeu Fabra (UPF)

Tailored for senior engineering students, this lab-oriented course delves into the realm of electronic music production. Utilizing the Pure Data environment, participants explore the intricacies of audio digital signal processing (DSP), gaining hands-on experience in crafting sound and understanding the underlying technical processes.

Winter 2021,   **Computer Organization (First Year Engineering)**,
2022, 2023   *Department of Information and Communications Technologies (DTIC)*

A fundamental course for first-year engineering students, Computer Organization offers a deep dive into the architecture and operation of computers. Key topics include memory management techniques, the nuances of assembly language, and other foundational concepts that underpin the organization and functioning of computing systems.

Winter 2021,   **Computational Music Creativity (Masters)**,
2022, 2023   *Department of Information and Communications Technologies (DTIC)*
Universitat Pompeu Fabra (UPF)

Situated at the intersection of music and technology, this master's level course delves into the world of computational music creativity. Participants are introduced to the basics of deep generative models, providing insights into how advanced algorithms can be leveraged to foster musical creativity and innovation.

Supervisions

2022-23   **3 Master Students, 2 Undergraduate Student**, *UPF, DTIC*

2020-21   **3 Master Students**, *UPF, DTIC*

2019-20   **3 Master Students, 1 Undergraduate Student**, *UPF, DTIC*

Throughout my academic journey at UPF, I have had the distinct privilege of supervising and mentoring a diverse group of students, aiding them in both their academic and research pursuits. My mentorship has spanned seven master's students from UPF, two undergraduates from the institution, as well as two visiting master's students and one visiting undergraduate. Notably, while it's often uncommon for master's students to achieve this feat, each of my master's mentees successfully published their works at esteemed conferences, a testament to our collaborative efforts and their dedication. These supervisory roles, both within and outside UPF, have been deeply enriching, underscoring my commitment to fostering academic excellence and pushing the boundaries of collaborative research.

Conference Reviewer

2020   **New Interfaces for Musical Expression Conference (NIME)**

2023   **International Conference on on AI and Musical Creativity (AIMC)**

Open-Source Projects

2020-Now   **GrooveTansformer: A Suite of Generative Models**,
https://github.com/behzadhaki/GrooveTransformer
This suite encompasses a collection of generative transformer models specifically tailored for the generation of symbolic drum patterns. Built on the transformer architecture, these models leverage advanced deep generative techniques to produce rhythmic sequences. The project is open-sourced and accessible to the global community, inviting collaboration and further exploration.

2023   **GrooveTansformer: Eurorack Module**
In 2023, the 'Groove Transformer' took a groundbreaking leap, evolving from a purely digital realm to the tactile world of Eurorack modules. Recognizing the potential of merging modern machine learning capabilities with the hands-on, modular approach of Eurorack, this initiative aimed to amplify user engagement and control in music generation.

2023   **NeuralMidiFx**,
https://neuralmidifx.github.io/
Addressing the deployment challenges of AI music generators in musician-favored platforms like DAWs, I developed NeuralMidiFx. This open-source template streamlines the integration of neural-based music systems as VST3 plugins. With a focus on ease of use, NeuralMidiFx reduces technical hurdles, empowering researchers to easily share their generative tools with a broader audience.

2021-2023 **Groove2Drum VST**,
https://github.com/behzadhaki/Groove2DrumVST
An advanced VST plugin deploying the GrooveTransformer modules, Groove2Drum offers musicians immediate generative drum pattern capabilities for both composition and accompaniment, seamlessly integrating AI-driven rhythms into standard music production workflows.

2020-2023 **TapTamDrum Dataset**,
https://taptamdrum.github.io/
Inspired by traditional drumming practices, TapTamDrum offers a dual-voice reduction dataset, capturing the essence of complex drum patterns using hands-only interpretations. Collected from four experienced drummers, this resource simplifies multi-voiced sequences for rhythm analysis and generation, providing a unique lens for rhythmic exploration.

2020-22 **MonotonicGrooveTransformer**,
https://github.com/behzadhaki/MonotonicGrooveTransformer
Designed for live musical accompaniment, this system utilizes a transformer encoder model trained to generate drum patterns from rhythmic inputs. Despite its training on short samples, strategic design enables it to accompany extended musical sequences seamlessly in real-time.

2020-22 **TransformerGrooveInfilling**,
https://transformergrooveinfilling.github.io/
Utilizing Transformer-based models, this tool augments audio drum loops with fitting symbolic events. By converging raw audio with symbolic transcriptions through a spectral approach, a real-time VST plugin is provided, seamlessly integrating its generative strengths into live production.

Workshops

2023 **NeuralMidiFx Workshop at AIMC 2023**, *University of Sussex, UK*
In this workshop, participants were introduced to NeuralMidiFx, a JUCE-based VST3 wrapper designed to simplify the integration of AI-driven symbolic music generative models into plugins. Tailored for those unfamiliar with plugin development, attendees were walked through the entire deployment process, culminating in the creation of a VST3 plugin using a pre-trained generative model.

Artist Collaborations

2022-Now **Collaboration with Raül Refree**, *Barcelona, Spain*
Teaming up with Raül Refree, we've been a preparing a series of live concerts that integrate the GrooveTransformer. This collaboration is aimed at showcasing and exploring the fusion of traditional musical expertise with AI-driven generative tools

Showcases

2023-Now **CCCB: El Bongosero**, *Barcelona, Spain*,
https://elbongosero.github.io/
At the Centre de Cultura Contemporània de Barcelona (CCCB), we are currently running an interactive installation as part of a six-month exhibition. In this dynamic setting, museum visitors actively collaborate with a generative system. Beyond mere interaction, the installation is designed as a live platform for data collection. As attendees contribute their input, they play a vital role in the continuous enrichment and evolution of the model, ensuring its refinement throughout the exhibition's ongoing duration

2023 **Sonar+D Music Festival**, *Barcelona, Spain*,
https://sonar.es/es/actividad/project-area-music-and-sound
During the Sonar+D festival, we showcased the GrooveTransformer Eurorack module to the general public.

2023 **+RAIN Film Festival**, *Barcelona, Spain*,
https://www.upf.edu/es/web/rainfilmfest
In this concert, Nicholas Evans, my colleague and co-developer of the GrooveTransformer Eurorack Module, performed with the developed module

Non-Academic Publications

Haki, Behzad, De Santis, Eric. "Good Communication in Restaurants: Acoustic Capacity". BAP Acoustics Online Blog. May, 2015. http://bapacoustics.com/general/good-communication-in-restaurantsacoustic- capacity/

Haki, Behzad. "How Good is Bluetooth at its best?". Serene Audio Online Blog. November, 2015. http://www.sereneaudio.com/blog/how-good-is-bluetooth-audio-at-its-best