

Profile

I am an engineer with a strong foundation in information theory, earned during my Bachelor's degree at the University of Padova, and a deep passion for audio that led me to pursue a Master's degree in Music and Acoustic Engineering at Politecnico di Milano. During academy I gained a solid understanding of deep learning, machine learning, control systems, signal processing, and electronics. Alongside my studies, I have continuously advanced my professional development, working in the IT sector as a full-stack developer, software architect, and DevOps engineer.

Education	Master's Degree in Music and Acoustic Engineering	09/2021 - 10/2024
	<i>DEIB, Politecnico di Milano (PoliMi)</i>	Milan, Italy

- **Relevant Courses:** Machine Learning, Computer Music, Sound Analysis Synthesis and Processing, Creative Programming and Computing, Musical Acoustics, Electronics and Electroacoustics, Computer Security
- **Thesis:** *Latent Space Regularization via Normalizing Attribute Transformations for Symbolic Music Generation*
- **Advisor:** Alberto Bernardini
- **Grade:** Cum Laude (110/110)

Bachelor's Degree in Information Engineering	09/2013 - 07/2021
<i>DEI, University of Padua (UNIPD)</i>	Padua, Italy

- **Relevant Courses:** Algorithms for Engineering, Systems and Models, Control systems, Electronics, Telecommunications
- **Thesis:** *Evaluation of the performance of commercial STT and NER services applied to digitized oral sources*
- **Advisor:** Sergio Canazza Targon
- **Grade:** 93/110
- **Note:** Suspension of studies from 2016 to 2019.

High School Certificate in Information Technology	09/2007 - 07/2013
<i>I.T.I.S. Carlo Zuccante</i>	Mestre, Italy

- **Relevant Courses:** Computer Science, Electronics, Systems, Statistics
- **Thesis:** *The MIDI Protocol & Touchscreen XY MIDI Controller*
- **Grade:** 87/100

Publications	M. Pettenò, A. I. Mezza and A. Bernardini, Latent Space Regularization..., <i>Forthcoming</i>, 2025
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R. B. Luzietti et. al, FONTI 4.0: Evaluating Speech-to-Text Automatic Transcription of Digitized Historical Oral Sources. *Proceedings of the Eighth Italian Conference on Computational Linguistics CliC-it*, 2021¹

¹Although my name is mentioned only in the acknowledgments and not among the authors, this publication consists of much of the work done for my bachelor's degree thesis.

Research Interests	Deep Learning, Representation Learning, Music Information Retrieval (MIR), Audio Generation, AI-Assisted Music Composition, Music Understanding
Research Projects	<p>Latent Space Regularization via Normalizing Attribute Transformations for Symbolic Music Generation 2024 <i>Thesis in Music and Acoustic Engineering MS</i> github Keywords: symbolic music, attribute-controlled generation, data gaussianization Supervised extension of the well-established variational information bottleneck framework by including a regularization loss aimed at encoding a specific attribute into a designated dimension of the latent space. The novelty of the approach lies in the introduction of an invertible parametric mapping whose goal is to transform the original and possibly complex distribution of the target attribute to a new one that is coherent with that of the latent space. In particular, such a transformation is designed so as to encourage synergy between the attribute regularization term and the Kullback-Leibler divergence. The dataset generated to train the models is publicly available on Zenodo.</p> <p>Do Unconditional Deep Generative Models Spontaneously Learn How to Encode Human-Interpretable Musical Attributes? 2023 <i>Music and Acoustics Engineering Capstone course in MS.</i> github Keywords: variational autoencoders, latent space topological structure Latent space analysis of the pre-trained recurrent variational autoencoder model MusicVAE by Google Magenta in its 2-bars melody unconditional version. The study is focused on investigating the presence of any correlations between the topological structure of the latent space and different human-interpretable musical attributes of the output.</p> <p>Evaluation of the performance of commercial STT and NER services applied to digitized oral sources 2021 <i>Thesis in Information Engineering BS</i> github Keywords: speech-to-text, named-entity-recognition, gcp, aws This thesis is part of the Fonti 4.0 project and it aims to test the performances of STT commercial services on digitized historical oral sources in order to discover which one is the most accurate and find out if the quality of the digitized audio or other elements in the recording impact the accuracy of automatic transcription. In the experiment the transcription services were evaluated through some metrics obtained aligning and comparing the reference manual transcription with the automatic transcription and a web interface has been implemented that allows you to explore how they change these indices vary according to the quality of the audio, the language spoken and the presence or absence of disturbing events. Furthermore, a first step is taken to study the NER algorithms.</p>
Professional Experience	<p>Full Stack Developer 11/2021 - 08/2023 <i>cclera s.r.l (Arsenalia Group) - Via Lepetit, 8, 20124</i> Milan, Italy</p> <ul style="list-style-type: none"> • Description: full-stack development on the SAP Hybris Commerce platform. • Platforms: SAP Hybris Commerce • Customers: Bonfiglioli, Cellularline, PegPerego, Metal Work • Job type: Part-time <p>DevOps Engineer 09/2019 - 02/2021 <i>Walit s.r.l - Via Dandolo, 25/B, 31100</i> Treviso, Italy</p> <ul style="list-style-type: none"> • Description: Design and maintenance of the Google Cloud infrastructure for a deep learning project. CI/CD orchestration in Gitlab. Application security monitoring with OWASP ZAP. • Platforms: Google Cloud Platform (GCP)

- **Job type:** Full-time

System Integration Engineer

01/2019 - 07/2019

Alpenite Ltd - 38 Craven Street, WC2N 5NG

London, UK

- **Description:** architect/developer role in collaboration with an Indian team for analysis and development of logistics and retail integration on Mulesoft middleware. Integration strategies used: AMQP messaging protocol (RabbitMQ as message-broker), REST/SOAP API calls to ERP M3, reading/writing files on FTP.
- **Platforms:** Mulesoft
- **Customers:** Stella McCartney
- **Job type:** Full-time

Full Stack Developer

01/2017 - 01/2019

Alpenite s.r.l (Arsenalia Group) - Via delle Industrie, 27/7, 30175

Venice, Italy

- **Description:** full-stack development for B2B and CRM on the SAP Hybris Commerce platform. CRM: integration of the IFM Group phone bar, ASM (Assisted Service Module), ticketing and notification system, asynchronous integration of the RFC SAP call for prices and availability of goods on the ZK framework (event queue system). B2B: multi-login function for users linked to multiple customers, Authorization Matrix framework (functionality/site content visibility BE control), mobile channel development on PWA with Workbox library and site content management setup with CMS.
- **Platforms:** SAP Hybris Commerce
- **Customers:** Kering Eyewear
- **Job type:** Full-time

IT Help Desk Operator

09/2014 - 01/2017

Alfa Telematica s.r.l. - Via Antonio Pacinotti, 4, 30175

Venice, Italy

- **Customers:** Regione Veneto
- **Job type:** Part-time

Creative Projects**Ego**

2023

Creative Programming & Computing course in MS[github](#)Keywords: three.js, glsl, svelte, mediapipe, max4live, tone.js

Creative coding project meant to explore the idea of human perception, in particular the idea of identity and self consciousness and the way it is distorted and biased.

Pulseq - Fractal Sequencer

2022

Advanced Coding Tools and Methodologies course in MS[github](#)Keywords: fractal sequencer, web app, svelte, tone.js, glsl

Fractal sequencer implemented in Svelte as a single-page application (SPA) and inspired by Eurorack module Bloom by Qu-Bit Electronix.

Computer Music Projects**Padder - Computer Music System**

2022

Computer Music Languages and Systems course in MS[github](#)Keywords: arduino, touchosc, supercollider, processing

Musical instrument based on a virtual pedal that, thanks to the interaction between the different blocks of its architecture, can generate chords that can be played in real time during a musical performance. This kind of approach could be seen as a handsfree way to generate chords, instead of using a piano or a keyboard.

OranJam - JUCE 2022*Computer Music Languages and Systems course in MS*[github](#)Keywords: juce, c++, cmake

Polyphonic subtractive synthesizer implemented in JUCE. Features: oscillators bank, white noise generator, ADSR envelope, filters bank and LFO.

HarMMMLonizer - Supercollider 2022*Computer Music Languages and Systems course in MS*[github](#)Keywords: supercollider, harmonizer, delay lines, crosstalk delay feedback

Real-time harmonizer implemented in Supercollider. It features a controllable number of voices and a delay line for each voice with three different feedback configurations, including a crosstalk one for stereo ping-ping effects.

Template Based Chord Recognition 2021*Computer Music Representations and Models course in MS*[github](#)Keywords: MIR, chord recognition, librosa, libfmp

Propose and implement a metric able to evaluate the performance of the template based chord recognition algorithm. The proposed metric is then used to evaluate the performance on 4 different songs. Finally, the evaluation is repeated for different values of the algorithm parameters.

Rhythmic and Harmonic Analysis 2021*Computer Music Representations and Models course in MS*[report](#)Keywords: music theory

Rhythmic analysis of the song *Pyramid Song* by Radiohead and harmonic analysis of the jazz standard *Peace* by Horace Silver in the arrangement of Norah Jones.

**Sound
Analysis
Synthesis
and
Processing
Projects****Wave Digital Filter Modeling** 2022*Sound Synthesis and Spatial Processing course in MS*[report](#)Keywords: wdf, matlab, virtual analog

Design of a three-way crossover network in the Wave Digital (WD) domain starting from a reference analog circuit. The model is then implemented in MATLAB using the trapezoidal discretization method (bilinear transformation).

Leslie Speaker Emulation 2022*Sound Synthesis and Spatial Processing course in MS*[report](#)Keywords: leslie speaker, matlab, digital audio effect

Efficient implementation of the Leslie rotary speaker as a digital audio effect.

Acoustic Source Localization with Microphone Array 2022*Digital Audio Analysis and Processing course in MS*[report](#)Keywords: sound localization, doa estimation, matlab, microphone arrays

Acoustic source localization using the Delay-And-Sum (DAS) beamformer and the MUSIC methods to estimate the Direction Of Arrival (DOA) of two audio sources sampled by a 64 microphones array.

RIR Estimation with Wiener Filters 2022*Digital Audio Analysis and Processing course in MS*[report](#)Keywords: room impulse response, wiener filter, matlab, convolution

Estimation of the Room Impulse Response (RIR) of a small reverberant environment by means of a Wiener filter. The obtained filter is obtained using the Overlap-and-Add (OLA) algorithm.

Musical Acoustics Projects	Design of a Recorder Flute	2023
	<i>Musical Acoustics: Characterization of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, matlab, flute modeling	
	Design of a recorder flute in MATLAB dimensioning the bore, the last two finger holes, the flue channel and the instrument mouth.	
	Brass Instrument Simulation	2023
	<i>Musical Acoustics: Characterization of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, comsol, trumpet modeling	
	Implementation of a trumpet model in COMSOL in order to simulate its acoustic response.	
	Design of a Piano	2023
	<i>Musical Acoustics: Characterization of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, comsol, matlab, piano modeling	
	Design and analysis of a piano soundboard and its bridge in COMSOL.	
	Horn Design	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, matlab, horns modeling	
	Design of an exponential and compound horns in MATLAB.	
	Musical Instruments Modeling Techniques	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, matlab, piano modeling, guitar modeling	
	Implementation in MATLAB of the FD model for a piano string considering the hammer interaction and of an acoustic guitar model with 20 resonances.	
	Helmholtz Resonator Tree	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, helmholtz resonator, matlab, simulink	
	Modeling of a complex resonant system through a hierarchical structure of Helmholtz resonators.	
	Glass Harp	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, comsol, glass harp modelling	
	3D and axysymmetric modeling of a wineglass for glass harp in COMSOL with eigenfrequencies analysis.	
	2D and 1D systems	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, matlab	
	Circular membrane and circular plate characterization in MATLAB. Analysis of the interaction in a system formed by a circular plate coupled with an iron string.	
	Helmholtz Resonator and System Impedance	2022
	<i>Musical Acoustics: Modeling of Musical Instruments course in MS</i>	<u>report</u>
	<u>Keywords:</u> applied acoustics, helmholtz resonator, matlab	
	Analysis of the characteristics of a Helmholtz resonator in MATLAB.	
Additional Experience	Volunteer at 24th ISMIR Conference	November, 2023
	<i>Politecnico di Milano</i>	Milan, Italy
	<ul style="list-style-type: none"> Assisted with event coordination and attendee registration 	

- Supported speakers and managed technical equipment
- Helped ensure smooth operations during sessions and networking events

Digital Skills

Programming Languages: Python, C++, MATLAB, GLSL, JAVA, JS, CSS

ML/DL: Keras, Tensorflow, PyTorch, Google Magenta, NumPy, SciPy, scikit-learn

Big Data Tools: Apache Beam, Apache Airflow, Apache Spark

Scientific Tools: LaTeX, Jupyter Notebooks, Zotero

MIR: librosa, FMP Notebooks

DevOps: GCP, AWS, CI/CD, Docker, LXC, Proxmox

Web: Tone.js, Three.js, Svelte, Vue.js, Firebase, Flask, Spring, PWA, Workbox, Hugo

Computer Music Languages: JUCE, Supercollider, Faust, PureData

DAWs: Logic Pro, Ableton Live, Reaper, Ardour

Acoustics: COMSOL, REW

Cybersecurity: gdb, OWASP ZAP, ghidra

DBMS: Microsoft SQL Server, MySQL, SQLite, MongoDB, Redis, MariaDB

Design: Figma

Operating Systems: Linux, macOS, Windows, Hackintosh, Android

Others: Blockchain

Musical Background

As a self-taught multi-instrumentalist, I have a well-rounded skill set across guitar, piano, and drums, while not being a virtuoso in any of them. My passion for synthesizers has always been a major influence, and listening across genres has enriched my understanding of music. I have experience playing in bands, which has further developed my collaborative skills. Additionally, I have a solid background in music theory, which I have developed independently over the years through my playing and further strengthened through courses in my master's degree.

Languages

Italian: Mother tongue

English: Fluent (C1)

French: Base (A1)

References

Available upon request.