# Benjamin Genchel

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## Skills

- Deep Learning
- Machine Learning
- Algorithms
- Data Structures
- Research
- Data Analysis
- System Design
- Optimization
- Digital Signal Processing
- Linear Algebra
- Object Oriented Design
- Software Testing
- Probability & Statistics
- Electronics
- Sound Design
- Music Production
- Audio
- Music

## Languages

- Python
- C++
- Java
- MatLab
- JavaScript
- HTML
- CSS

## Tools/Libs

- Linux / Unix
- Git
- PyTorch
- AWS
- Google Cloud Platform
- Arduino
- SQL
- Ableton Live
- Max/MSP
- Node.js
- Pixi.js
- P5.js
- JQuery
- Bootstrap

## Education

**M.S. Music Technology** — **Georgia Institute of Technology**
**Focus:** Music Informatics, Generative Machine Learning — **Graduated**: May 2019

**B.S. Electrical Engineering** — **University of California, San Diego**
**Focus:** Computer Science, Machine Learning — **Graduated:** June 2015
**Minor:** Mathematics — **GPA:** 3.5

## Experience

**Expressive Machinery Lab**, *Software Engineer / Lead Developer* Aug. 2018 – Present

- Developing a web based version of GrooveMachine, an interactive, pedagogical tabletop sequencer, using Node.js and Pixi.js.
- Managing developers and designers - proposing, updating and monitoring tasks via Trello.
- Organizing code and managing repository, setting standards and practices for contributors.

**GTCMT Music Informatics Group**, *Graduate Researcher* Aug. 2017 – Present

- Researching symbolic music generation with deep learning. Works include the application of Deep Reinforcement Learning, LSTM-RNNs and Auto-encoders.
- Presented on lesser known artificial intelligence systems and music theory.
- Presented seminal and recent machine learning and computational music analysis research.

**Music and A.I. Lab – Academia Sinica**, *Research Intern* May 2018 – Aug. 2018

- Accepted to the Taiwan International Graduate Student (TGIP) Internship program on recommendation of advisors and peers.
- Collaborated on a study comparing chord conditioned melody generation systems and proposing a benchmark for future comparisons.
- Continued previous research work with guidance from lab colleagues.

**Classy.org**, *Data Science Intern* Jan. 2017 – May 2017

- Applied LDA and t-SNE to discover and visualize topic clusters in Customer Service text data.
- Reported on the recommendation frequency of customer service support articles using data taken from the Desk.com platform.
- Worked with DevOps to set up a Redshift data warehouse using Amazon Cloud Formation.

**CleverPet,** *Software Engineer* Jun. 2015 – Sept. 2016

- Designed, developed, tested and maintained cloud backend on Google Cloud Platform.
- Developed embedded firmware for interfacing with cloud backend and interacting with users.
- Created and presented a design proposal for mobile apps.
- Collaborated closely with founders and leads, aiding in discussions on system architecture, customer support and marketing.

**The Intellisis Corporation,** *Software Engineering Intern* Jun. 2014 – Sept. 2014

- Designed and developed native Android application in Java to demonstrate the mobile potential of a speaker recognition based security system.
- Developed Python desktop application for collecting data on potential system attacks.
- Parallelized Python/Py.test unit test runs resulting in 10x reduced total run time

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## Projects

**Jazz Melody Generation with Deep Reinforcement Learning** Aug. 2018 – Present
Exploring the application of deep reinforcement learning to the task of symbolic melody generation conditioned with chordal harmony, using a custom dataset of Bebop Jazz lead sheets. Architecture based off of SeqGAN, augmented with additional reward functions.

**Lead Sheet Generation with Interdependent RNNs** Jan. 2018 – Mar. 2019
LSTM-RNN architecture exploring the interdependence of note pitch and note duration. Used for generating jazz improvisations for Shimon, the robotic marimba player.

**Musical Painting Bot** Feb. 2018 – Present
Robot designed to move and virtually paint along to music/sound using a custom visualization that produces musical events. Performed to an original composition at GTCMT Listening Machines 2018. Currently being developed for use in an improvisatory performance for analog synthesizer and piano.

**Snow White Magic Mirror** May 2019 – Present
Voice activated / commanded model of the Evil Queen's Magic Mirror from Disney's *Snow White*, running on a RaspberryPi 3 B+. 3D character model animated using Blender and OpenGL.

**Sound Happening** Feb. 2018 – May 2018
Interactive musical installation in which participants play with colored balls that control musical generation.

**Breadboard MIDI Controller** Feb. 2018 – Present
MIDI Controller constructed from prototyping parts on a breadboard. Interfaced with Ableton Live using OSC messages passed from Max/MSP. Performed at the 2018 Guthman Musical Instrument Competition Preshow.

**Georgia Tech Video Game Development Club** Aug. 2017 – May 2019
Composed music and designed sounds for multiple student developed games. Received the *DeLeonic Award* for exemplary contributions to the organization in April 2019.

## Publications

**Explicitly Conditioning Melody Generation: A Case Study with Interdependent RNNs**
Benjamin Genchel, Ashis Pati, Alexander Lerch. Conference Paper, Proceedings of the 7th International Workshop on Musical Meta-creation (MUME). Charlotte, North Carolina 2019.

**Learning from History: Recreating and Repurposing**
**Harriet Padberg's Computer Composed Canon and Free Fugue**
Richard Savery, Benjamin Genchel, Jason Smith, Anthony Caulkins, Molly Jones, Anna Savery. Conference Paper, Proceedings of the 2019 Conference on New Instruments for Musical Expression (NIME). Porto Allegre, Brazil 2019.

**Lead Sheet Generation with Musically Interdependent Networks**
Benjamin Genchel, Alexander Lerch. Late Breaking Abstract, Proceedings of Computer Simulation of Musical Creativity (CSMC). Dublin, Ireland 2018.