

# NACHIKETA GARGI

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## EDUCATION

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### University of Michigan

Class of 2022

*B.S.E. in Computer Science (expected)*

#### RELEVANT COURSEWORK:

C++ Programming and Introductory Data Structures (EECS 280), Discrete Math (EECS 203), Introduction to Linguistic Analysis (LING 210) at U-M  
Advanced Machine Learning, Differential Equations, Advanced Mechanics in high school

#### CLUBS AND ORGANIZATIONS:

StartUM (Entrepreneurship club), UM::Autonomy (autonomous vehicle design team), MIDAS (Michigan Institute of Data Science) Computational Music Theory, Project Music (experimental musical instrument design)

#### AWARDS:

Dean's List, 1st Place StartUM Pitch Competition, 1st Place Music Makeathon, 1st Place Michigan Hackers CTF Computer Security Challenge

## WORK EXPERIENCE

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### Research Assistant

Sep 2018 - Present

*MIDAS Research Group* - [midasmusictheory.org](http://midasmusictheory.org)

Python, OpenCV, music21, Tesseract

- Research assistant for the Michigan Institute for Data Science project A Computational Study of Patterned Melodic Structures Across Musical Cultures, a collaborative research project between EECS, Math, and Music faculty.
- Developed novel method of optical mark recognition to detect and process Devanagari script and additional markings to produce a computer-readable archive of Indian classical music compositions documented in 1860. Corpus will be used for data analysis to determine data-driven musicological conclusions between other musical traditions including Irish folk music and Baroque music.

### Full Stack Developer

Jun 2017 - Sep 2018

*YouSound* - [yousound.com](http://yousound.com)

Vue, AWS, socket.io, Node.js

- Singlehandedly developed a scaleable backend for an artist chat platform using Node.js and socket.io, deployed at production scale using AWS.
- Implemented a web-scale video live-streaming platform (like twitch.tv) using AWS Elemental MediaLive, MediaPackage, and CloudFront.
- Worked directly with founder and designers to implement and integrate Vue.js front-end for the chat platform using existing and new APIs while rapidly adapting to and using a consistent code style.

### Software Engineering Intern

Jun 2016 - Sep 2016

*Primity Bio* - [primitybio.com](http://primitybio.com)

Angular, Node.js, Mocha

- Developed a web-based realtime, collaborative data analysis platform (similar to Google Docs) for clients to view flow cytometry data.
- Used test-based (Mocha) development with Node, Angular, and MongoDB.
- This work was presented at an FDA conference in Washington, D.C.

## PROJECTS AND PUBLICATIONS (CLICK TITLES TO LEARN MORE)

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### **Software Team Manager: Project Music**

Jan 2019 - Present

*Member of Executive Board*

Software Team Manager responsible for maintaining the club's online code presence, managing the software aspects of current projects, and participating in weekly meetings with the rest of the club's executive board.

### **Music Makeathon: 1st Place**

Oct 2018

*Realtime Sound-controlled Audio and Video Resampling*

C++, JUCE, Max

Built a live, real-time audio processor with C++ and JUCE that uses an FFT comparison heuristic to replace input audio with audio from existing songs, producing a unique "remixing" effect. In addition, used Max to control video playback based on frequency and amplitude of input audio. The entire project was completed within 18 hours. **Won first place** in the U-M Project Music 2018 Makeathon. Featured in [U-M Engineering Newsletter](#).

### **Conference Publication: Deep Neural Music Generation**

Jun 2018 - Sep 2018

*International Society of Music Information Retrieval 2018*

Python, Keras, L<sup>A</sup>T<sub>E</sub>X

"Adversarial Reinforcement Learning for Music Generation" using a generative adversarial network with music theory constraints. Accepted to [ISMIR 2018](#), [Late Breaking Session](#).

### **FRC Robot and Object Localization**

Jan 2018 - Apr 2018

*FieldAC*

C++, OpenCV, Darknet

As part of FRC team, trained a custom model for an object detection framework (YOLOv3) on game pieces. Used a novel method for sensor fusion to maintain a field model using optical flow in conjunction with YOLOv3, onboard LiDAR, and IMU to estimate pose of robot and game pieces on the field. Model was used for an autonomous routine to manipulate the nearest game piece.

### **Independent Electronic Music Production**

Oct 2016 - Present

*Kanooli*

Ableton Live

Regularly produce electronic compositions under the alias Kanooli. Developed branding strategy and [accompanying website](#), and have accumulated over 200k plays through releases on several indie music labels with large audiences.

### **AutoMuse**

Oct 2014 - June 2016

*Automated computer music composition*

Python, Keras

Used markov chains and LSTM neural networks to generate music from a dataset of scraped MIDI files.

## SKILLS

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Programming Languages	JS, Python, Go, Bash, C++, Java, Max/MSP
Frameworks and Technologies	Keras, Numpy, JUCE, Vue, OpenCV, Unreal Engine 4
Creative Software	Ableton Live, After Effects, Photoshop, Logic
Other	Git, AWS, GCP, Slack, Trello

NACHIKETA GARGI, MAY 2019