NACHIKETA GARGI
STUDENT, DEVELOPER, MUSICIAN

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UNIVERSITY OF MICHIGAN
2018 – 2022
B.S.E. Computer Science

ORGANIZATIONS
- Project Music (Software Team Manager)
- WolverineSec Computer Security CTF Team
- Alternate Reality Initiative
- StartUM
- UM::Autonomy

AWARDS
- Dean's List
- 1st @ StartUM Pitch Competition
- 1st @ Music Makeathon
- 1st @ Michigan Hackers CTF Computer Security Challenge

THE NUEVA SCHOOL
2014 – 2018

PROGRAMMING
- JavaScript (Node.js, Express, Loopback, Vue, Angular)
- Python (NumPy, OpenCV, Keras, Tensorflow)
- C/C++ (OpenCV, JUCE, Arduino, PCL, UE4)
- C# (Unity, .NET)
- Verilog
- Go
- Java

CREATIVE
- Ableton Live & Max/MSP
- Adobe Creative Suite
- Blender
- Logic Pro X
- Unity 3D
- Unreal Engine 4

TOOLS
- Ghidra
- Wireshark
- Quartus

WORK EXPERIENCE

UNIVERSITY OF MICHIGAN (Ann Arbor, MI) .... 2018 – 2019
research assistant
Developed novel OCR techniques for digitizing scanned music corpus with OpenCV and Keras

- 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 music compositions documented in 1860.
- Corpus will be used for data analysis to find musicological connections with other musical traditions including Irish folk music and Baroque music.

YOUSOUND (Sunnyvale, CA) .... 2017 – 2018
full stack developer
Full stack web development with Node.js and Vue deployed on AWS

- 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.
- Realized functional new web components from designs

PRIMITY BIO (Fremont, CA) 2016
software engineering intern
Realtime data visualization frontend with AngularJS

- Worked on a web-based real-time, collaborative data analysis platform for clients using test-based development with Node, Angular, and MongoDB.
- This work was presented at an FDA conference in Washington, D.C.

COURSEWORK

- Data Structures and Algorithms (EECS 281)
- Intro to Logic Design (EECS 270)
- C++ Programming and Introductory Data Structures (EECS 280)
- Discrete Math (EECS 203)
- Applied Linear Algebra (MATH 214)
- Computational Linguistics (LING 441)
- Intro to Linguistic Analysis (LING 210)
- Intro Engineering – Quadcopter Section (ENGR 100)
- Physics (Mechanics & EM)

I N V I S O (Ann Arbor, MI)...Fall 2019 - Present
ARKit, ARCore, Unity
Augmented reality spatial audio authoring tool

- Working with Professor Anıl Çamcı on porting his WebGL-based Inviso spatial audio authoring tool to AR platforms including ARKit and ARCore. Prototyping AR interactions for an audio-focused application.

C T F   C H A L L E N G E S (Online) ....Fall 2014 - Present
Web Security, Reverse Engineering, Binary Exploitation, Forensics
Competitive online cybersecurity hacking challenges

- Top 30 placements on numerous online CTF challenges including CamsCTF, EasyCTF, and PicoCTF. Also participated in the Flare On 2019 Challenge.

M U S I C   M A K E A T H O N   2 0 1 8 (Ann Arbor, MI) ....Fall 2018
C++, JUCE, Max
Realtime Sound-controlled Audio and Video Resampling

- 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.](#)

I S M I R   2 0 1 8 (Paris, France) .... Summer 2018
Python, Keras
Abstract on deep neural music generation with reinforcement learning

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

F R C   T E A M   4 9 0 4 (San Mateo, CA)... Spring 2018
C++, OpenCV, Darknet
Robot and object localization with 2D LiDAR and CNN sensor fusion

- 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.

M U S I C   P R O D U C T I O N .... Fall 2016 - Present
Ableton Live
Electronic music production under the alias "Kanooli"

- Regularly produce electronic compositions under the alias Kanooli. Developed branding strategy and accompanying [website](#), and have accumulated over 300k plays through releases on several indie music labels with large audiences.

A U T O M U S E .... Fall 2015 – Spring 2016
Python, Keras, Flask
Automated computer music composition

- Used Markov chains and LSTM neural networks to generate music from a dataset of scraped MIDI files. Created a website where users could listen to "infinite radio" generated in real-time by the model with an accompanying piano roll visualizer.