

Adam Gerald Schmidt - Curriculum Vitae

1318 Jones Dr

Ann Arbor, MI 48105

(517) 303-6188

adamgeraldschmidt@gmail.com

schmadam.com

Education

University of Michigan, Ann Arbor, MI

M.A. in Media Arts - May 2024

School of Music, Theatre & Dance

B.S.E. in Electrical Engineering - May 2022

College of Engineering

B.S. in Sound Engineering - May 2022

School of Music, Theatre & Dance

Research Interests

- Realtime Active Electronic Control of Physical Systems
- Electromagnetically Actuated Musical Instruments/Interfaces (EMAIIs)
- New Interfaces for Musical Expression (NIMEs)
- Robotic and Animatronic Art and Performance
- Haptics for Musical Instruments and Interfaces

Programming, Software, and Skills

Technical Programming: Arduino, Python, Matlab, C++

Creative Programming: Max/MSP, Pure Data, Faust, Processing, TouchDesigner

CAD: Fusion 360, Rhino, OpenSCAD, Blender, Adobe Illustrator

CAM: 3D Printing, CNC Routing, Laser Etching/Cutting, PCB Milling

PCB Design: KiCad, Eagle, Mentor Graphics, Altium

Audio/Video: Logic, Ableton, Pro Tools, Audacity, Final Cut Pro

Engineering: Electronics Bench Test Gear, LTSpice

Workshop: Fine Metals and Jewelry, Woodworking, Welding, Luthiery

Professional Record

EMBiR Lab, Ann Arbor, MI

Sep 2022 - Present

Graduate Research Assistant

I provide practical experience with electronics and robotics by designing and building experimental test setups using 3D-printing, laser cutting, and other digital fabrication techniques. I have contributed to the development of an open source quadruped robot and the design and fabrication of experimental setups for researching the spatio-temporal dynamics of bipedal rodents. In Summer 2023, I aided in grant writing to raise funds for the first annual *Artificial Horizons* robotic art exhibition, which I then co-curated and co-directed.

Bob Moog Foundation (Remote)

Jan 2020 - Aug 2022

Electronics Design Consultant

I was commissioned to design and prototype the *ThereScope* - an educational Theremin for teaching elementary school students about audio concepts. I was given design constraints and came up with a prototype that met the specified operation and budget requirements.

UMich Battery Controls Group, Ann Arbor, MI

Summer 2022

Graduate Research Assistant

I accelerated research efforts by providing practical experience with electronic system design and providing quick turnaround for experimental test setups using digital fabrication.

Shure Inc. Chicago, IL

Summer 2021

Pro Audio Circuitry Intern

During this internship I designed, built, and tested the GOTCHA - an analog headphone/earphone audio amplifier for objective product testing. I also researched near-field wireless power transfer and implementation.

Shure, Inc. Remote

Summer 2020

Wireless Product Management Intern

Picking up my duties from the prior summer, there was an additional focus on current events. I helped compile historical and projected sales data to assess and prioritize the long list of products that needed 'how-to-clean' videos in response to the Covid-19 Pandemic. Additionally, I kept my ear to the ground on 5G new-wave radio and how the pro audio industry felt it would shift the roles of people and telecommunication companies in the context of live sound.

Shure Inc. Chicago, IL

Summer 2019

Wireless Product Management Intern

I was tasked with compiling, interpreting, and presenting 3 years of historical data to evaluate the market shares of Shure and competitor products. I performed tests on shure and competitor products to aid this market analysis. I produced a written and video guide for Jennifer Lopez's technical crew to customize her wireless microphones.

Robots & Robotic Art

FLORA (*Floral Length-Oscillating Robotic Actor*)

January 2024

Human-controlled animatronic. With Jessica Carlson and Tao Chou

Jessica and I designed, fabricated, assembled and iterated this novel robotic design over the course of six months, resulting in a robust and expressive animatronic flower that withstood its debut performance in *Asking Alice*.

Moving Nostalgia

December 2023

Interactive kinetic/light sculpture/game. With Sydney Payton and Stéphanie Morissette

Collaborating with visual artists, I acted as the electronics designer, programmer, and builder of this interactive sculpture. Participants play a game of trivia around the sculpture, but soon realize the questions are fake and their buzzers merely light up LEDs on the board in their team's color. Initially a competition to answer questions fastest, the game quickly devolves into a contest between teams to see who can light up the most LEDs and conquer the board first.

Forbidden Fruit

November 2023

Interactive kinetic/light sculpture. With Erfun Ackleye and Marilyn Mok

I designed, assembled, and programmed the 3D-printed hands, flower mechanisms, and "forbidden fruit" that respond to a spectator's proximity to the sculpture.

Spigot

October 2023

Kinetic and Audio sculpture. With Alexandra Collins and Rachel Bean.

This automata was a site-specific project for an empty fountain on campus that was shut off for the winter. My role was to design, 3D-print, build, and program the mechanism that animated the up-cycled umbrella frame. I also created micro glass sculptures that adorned the finished product. The sculpture takes on a life of its own and became known to many as "the Breather".

EyeWall

October 2023

Kinetic sculpture. With Chelsea Schmidt

I augmented, appropriated, and assembled an animatronic eye from Nilheim Mechatronics to create the mechanisms that enabled this eerie kinetic sculpture. I designed and programmed the electronics (Arduino, Teensy, & Blender).

LARS (*Lamp Arm Robot Something*)

December 2022

Motion-capture controlled mechatronic display. With Rebecca Zhang and Gavin Ryan.

I acted as the lead designer, machinist, fabricator, and programmer of this robot used in the Visualizing Telematic Music Performance project. LARS is designed to facilitate anthropomorphism by being controlled by human motion-capture data.

Robertra

April 2022

with Juliet Schlefer and Noah Tappen

I was the lead electronics designer and programmer of this 7.5-foot tall humanoid robot designed for a theatrical vocal performance. The audio-animatronic head was reactive to audio input, and the animatronic eyes were controlled by a puppeteer.

Publications

Schmidt, A. & Gurevich, M. “ The Hummellaphone: An Electromagnetically Actuated Instrument and Open-Source Toolkit” In Proceedings of the International Conference on New Interfaces for Musical Expression. Mexico City, 2023. (Winner of Best Poster Award)

Musical Instruments & Gear

Electromagnetic Harpsichord - [github](#)

Ongoing

Inventor; collaborating with University of Michigan Professor Joseph Gascho

Inspired by Andrew McPherson’s Magnetic Resonator Piano, we are using Lorentz Force Actuation, optical sensors, and custom electronics to selectively sustain vibrations on brass harpsichord strings.

Lorentz Lap Brass - [video demo](#)

December 2023

Inventor

Inspired by experiments with the EM Harpsichord, this haptic feedback instrument uses optical sensors, Max/MSP, and lorentz-force actuation to generate a haptically-felt feedback. Despite only possessing 2 strings, its form is reminiscent of lap steel guitars.

Groove Wheel - [video demo](#)

October 2023

Inventor

Utilizing my iPhone’s integrated IMUs, this playful controller streams movement data to Max/MSP to scan through and pan between audio samples.

Bouba Guitar

September 2023

Inventor; in collaboration with Sarah Burg, Joey Loeb, and Aiden Williams.

Inspired by experiments with the EM Harpsichord, this haptic feedback instrument uses optical sensors, speakers, and lorentz-force actuation to generate a haptically-felt feedback.

Hummellaphone

Sep 2022 - Present

Inventor and Lead Researcher

I am designing and building an open-source novel musical instrument that serves as a STEM learning platform and HCI/UX research platform. Users and builders of the instrument will be able to participate in several open-source modules/workshops that focus on developing practical knowledge in and deep understanding of circuit design, 3D design, 3D fabrication, acoustics, and digital signal processing. Researchers can utilize this tool to investigate haptics, control theory, NIMEs, and HCI. The Hummellaphone project is being generously funded by the Umich ArtsEngine and EXCEL Lab.

ThereScope

January 2023

Sole Electronics Engineer

This project is a digital theremin for use in the classroom context. The user can change the waveform (sine, square, triangle, sawtooth, noise) and view it using the iPad app WaveViewer (developed by Mike Crandall for the ThereScope). Volume and pitch are controlled with capacitive sensors. Digital Sound Synthesis and sensor reading is performed by code exported from Faust and is running on a Teensy 4.0 microcontroller.

Harmonic String Control Guitar

May 2022

Taking inspiration from sustainer systems like the eBow, Sustainiac, and the Moog Guitar, six seniors in Performing Arts Technology students teamed up to build a new sustainer system where the first several harmonics on the string can be accentuated or suppressed to create custom harmonic profiles. This was our final project for EECS 452: Signal Processing MDE and took form as a single-string guitar.

Polyphonic Sustainer Guitar

December 2022

I designed and built a 6-channel guitar sustainer system that allowed for sustaining vibration in six strings simultaneously. Modeling the modern eBow, each string can be sustained in fundamental or harmonic mode. Each string has a dedicated quarter-inch output for interesting effects processing and recording/mixing techniques.

GOTCHA

August 2021

'Gain Obstructed to Terminate Changes to the Headphone Amplifier'

The GOTCHA was designed and built in the Summer of 2021 as a Pro Audio Circuitry Intern at Shure Inc. This is used for testing THD, output impedance, and other quantitative parameters of headphones and earphones. This furthered my experience with analog circuits, PCB design, quantitative testing, and design consulting. The final unit provided THD: < 0.01%, Output impedance <0.1 Ohms, and Frequency Response: +/- 0.01dB from 20Hz-20kHz.

Electric Guitar - 'Topology'

December 2020

My second electric guitar. Designed in Fusion 360. I combined traditional woodwork and implemented new CAD/CAM processes to machine a sculpted design on my personal CNC machine.

Brass Bagpipes

December 2019

An amalgamation of broken trumpet and trombone pieces soldered together and connected to a bagpipe pipe bag. Brass reeds excite the horns when filled with air. A functional trumpet is attached to act as the chanter. Works best when connected to the blowing end of a vacuum.

Bamboo Aerophone

October 2018

Carved bamboo with experimentally discovered hole placement, this entirely acoustic instrument is played with a tenor saxophone mouthpiece. My first attempt at an Aerophone.

Electric Guitar - 'Bleu'

August 2017

My first electric guitar. Designed in Fusion 360. I combined traditional woodwork and learned CAD/CAM processes to machine profile. Sculpted with hand tools.

Performances/Installations

Asking Alice **January 2023**

Robotics Team Lead; Grant Writer; with SinYu Deng, Kara Roseborough, and Jessi Carlson.

This performance combines contemporary dance with interactive robotics, live visuals

Artificial Horizons - Robotic Art Exhibition **Oct 2023 - Nov 2023**

Grant Writer, Curator, and Organizer - with Talia Y. Moore, Abhishek Narula, and Renay Hutchins

Electromagnetic Harpsichord - Debut and Public Demonstration **October 2023**

with Professor Joseph Gascho at the 63rd Annual Michigan Organ Conference

Good Man's Brother - Stoner Rock Band **Summer 2023 - Present**

Electric Bassist - Our band performs regularly at local bars and festivals

EyeWall **July 2022, October 2023**

In collaboration with resin artist Chelsea Schmidt, Eyewall is an eerie installation consisting of an amalgamation of animatronic eyeballs made up of custom 3D-printed parts, software, and handmade cast resin eyeballs. This interactive robotic/kinetic artwork invites viewers to first look back, and then look within. Installed at the 2022 Interactive Media Design showcase and the 2023 Artificial Horizons Exhibition.

Visualizing Telematic Music Performance **December 2022**

Robotics Team Lead from May 2022 - May 2023;

With Dr. Michael Gurevich, Dr. John Granzow, and Dr. Brent Gillespie

I designed and built 2 bespoke robots to visualize telematic music. Live motion-capture data from musicians was processed and used to control these robots which were located in different geographic locations from the musicians controlling them. The research and development culminated with a telematic music performance between Ann Arbor, MI and Charlottesville, VA in December 2022.

Robot Show by Juliet Schlefer, Ann Arbor, MI **April 2022**

Co-Director, Creator, and Electronics Manager

Vocalist Juliet Schlefer performed a contemporary senior recital in April 2022 where she featured compositions and experiments for voice and electronics/robotics. I developed the electronics and assisted in fabricating a 7-foot animatronic robot to accompany her performance. An EXCEL grant was awarded to our team to help fund the costs of prototyping and building the robot.

Other Notable Performance Experience:

Jamais Vu - Garage Rock Band - electric bass **Fall 2017- Fall 2022**

Little House Show - House Band - electric bass **Fall 2021 - Winter 2022**

Michigan Basketball Band - Tuba and Electric Bass **Fall 2017 - Winter 2020**

Michigan Marching Band - Tuba **Fall 2017 - Fall 2018**

Administrative Experience

Artificial Horizons - Robotic Art Exhibition

May 2023 - Dec 2023

Grant Writer, Curator, and Organizer - with Talia Y. Moore, Abhishek Narula, and Renay Hutchins
Designed to coincide with the 2023 IEEE IROS Conference in Detroit, MI.

Project Music - Experimental Musical Instrument Design Team

Jan 2018 - Present

President

Project Music is a club dedicated to designing, building, and testing experimental musical instruments and devices. We have put on 2 Music Hackathons for students at the University of Michigan where participating teams built audio projects from the ground up in 48 hours using software and hardware. The focus of the Fall 2021 semester has been analog audio circuitry in the forms of eurorack modules and guitar effects pedals. With Project Music, I have led workshops in CAD, Max/MSP, Soldering and Piezo Microphone Building, and LTSpice.

UMich Music Hackathon, Ann Arbor, MI

Oct 2018 & 2019

Founder and Director

The executive team of Project Music hosted the first music-based hackathon held at the University of Michigan. We built relationships with seven different audio and music companies to provide prizes and judges for the events, and our events fostered the creation of six musical inventions. My colleagues and I led workshops and provided technical support and advice over the 48-hour events.

Audio Engineering Society - U of M student chapter

Jan 2018 - Present

Member

The Michigan chapter of AES holds mix listening sessions, mix/remix competitions, and this coming winter will be hosting a joint workshop with Project Music to build DIY DI boxes.

Phi Mu Alpha - National Music Fraternity

Nov 2017 - May 2022

Alumni Relations Officer

Phi Mu Alpha is a national fraternity dedicated to advancing music in America. We regularly volunteer with Crescendo Detroit, a Detroit youth music program, where we teach music lessons, lead workshops, and perform for the members. In Winter 2021 we recorded and published a virtual concert featuring the musicians of Phi Mu Alpha as well as many other acts from STMD.

Grants & Awards

Rackham Graduate Student Research Grant, UMich Rackham **2024**
& Arts Integrative Interdisciplinary Research Grant, UMich ArtsEngine **2023**

Awarded \$3500 total to develop the *Electromagnetically Actuated Instruments<->Interfaces Lab*, a research project investigating haptics, musical instrument design, and the reciprocal embodiment of craft knowledge within bodies, communities, and tangible artifacts.

Arts Initiative Collaborative Project Grant, UMich ArtsEngine **2023**

Awarded \$10,000 to develop *Asking Alice* with SinYu Deng, Kara Roseborough, Tao Chou, and Jessica Carlson.

Best Work-in-Progress Short Paper at New Interfaces for Musical Expression, Mexico City **2023**

Arts Initiative Theme Semester Project Support, UMich Arts Initiative **2023**

Awarded \$20,000 to organize the *Artificial Horizons Robotic Art Exhibition* with Talia Y. Moore, Abhishek Narula, and T. Renay Hutchinson.

Arts Integrative Interdisciplinary Research Grant, UMich ArtsEngine **2022**

Awarded \$3000 to develop my *Hummellaphone* project.

EXCEL Enterprise Fund, EXCEL Lab @ UMich SMTD **2022**

Awarded \$1000 to develop my *Hummellaphone* project.

EXCEL Enterprise Fund, EXCEL Lab @ UMich SMTD **2022**

Student Microgrant, UMich ArtsEngine

Organizer and Performer.

Awarded \$1000 by EXCEL and \$1000 by ArtsEngine to produce *[RE]Wilding*, an immersive media experience hosted and performed by University of Michigan Digital Music Ensemble led by Alvin Hill.

EXCEL Enterprise Fund, EXCEL Lab @ UMich SMTD **2022**

Student MicroGrant, ArtsEngine

Lead Roboticist. Collaboration with Juliet Schlefer and Noah Tappen.

Awarded \$1000 by EXCEL and \$1000 by ArtsEngine to prototype robotics for Juliet Schlefer's production of *Robot Show* at the University of Michigan.

Student Microgrant, ArtsEngine **2021**

Awarded \$500 towards the development of novel guitar string harmonic control technology.

Student Organization Grant, UMich Central Student Government **2019**

Awarded funds to foster the creation of regularly occurring practical electronics design workshops hosted by Project Music at the University of Michigan.

Notable Coursework at the University of Michigan

PAT 515: Electronic Chamber Music - <i>Dr. Michael Gurevich</i>	Winter 2024
PAT 515: Engineering Applications of Media Tech. - <i>Dr. Sile O'modhrain</i>	Fall 2023
PAT 513: Interdisciplinary Collaboration - <i>Dr. A. Kirshner & J. Cogswell</i>	Fall 2023
ARTDES 500: Metalcraft in Robotic Art - <i>Susan Hoge (ind. study)</i>	Winter 2023
ARTDES 307: Metal Casting - <i>Susan Hoge</i>	Winter 2023
PAT 510: Media Arts - <i>Dr. Andy Kirshner</i>	Fall 2022
PAT 515: Digital Music Ensemble - <i>Alvin Hill</i>	Fall 2022
PAT 452: Interactive Media Design II - <i>Dr. Michael Gurevich</i>	Winter 2022
EECS 452: Digital Signal Processing - <i>Dr. Alfred Hero II</i>	Winter 2022
PAT 432: Studio Production II - <i>Professor Jeremy Edward</i>	Winter 2022
EECS 498: Power Electronics - <i>Professor Al Avestruz</i>	Fall 2021
EECS 461: Embedded Control Systems - <i>Dr. James Freudenberg</i>	Fall 2021
PAT 431: Studio Production 1 - <i>Professor Eric Wojahn</i>	Fall 2021
EECS 351: Digital Signal Processing - <i>Dr. Fatemeh Arbabjolfaei</i>	Winter 2021
PAT 422: Technical Ear Training - <i>Dr. Jason Corey</i>	Winter 2021
PAT 462: Digital Sound Synthesis - <i>Dr. John Granzow</i>	Fall 2020
EECS 311: Analog Circuits - <i>Dr. Michael Flynn</i>	Fall 2020
PAT 454: Digital Fabrication for Acoustics - <i>Dr. John Granzow</i>	Winter 2020
PAT 204: Creative Coding for Music - <i>Dr. Anil Çameci</i>	Winter 2019