Amit Rogel

Robotic Musicianship · Human Robot Interaction

arogel3@gatech.edu | www.amro42.org | amro125

Research Overview

My research focuses on high level communication between humans and robots. I do this by generating lo-fi music as a sonification tool to generate sounds that do not distract users from their task, and conveys information about robots in an intuitive, non-disruptive way that minimizes alarm fatigue and attention deafness. Additionally, I build and program robots that use gestures to communicate information about music to humans.

I also build and program robotic musicians including marimba-playing robots, guitar-playing robots, dancing robots, and assistive robots. These robots have been used for teaching music, accessibility, and interactive exhibitions.

Keywords: Human-robot interaction (HRI), Robotic Safety, Robotic design, Robotic Musicianship, Multimodal Communication, Nonverbal Communication, Interactive Installations, Co-Design, Design Education, Assistive Robots,

Education

PhD in Robotic Musicianship — *Atlanta, GA*

Georgia Institute of Technology — *July 2026*

- Dissertation: Safe and Sound, using music based sonification to improve safety and fluency in human robot interaction
- Fully funded stipend through NSF grant research assistanship
- Presidential Scholar, GT fellow

MS in Robotic Musicianship — *Atlanta, GA*

Georgia Institute of Technology — *July 2023*

- Masters Thesis: Music and Movement Based Dancing for NonAnthropomorphic Robots
- Fully funded stipend through NSF grant research assistanship

BS in Mechanical Engineering and Minor in Music Technology — *Rochester, NY*

Rochester Institute of Technology — *May 2020*

- Deans list honors

Grants & Awards

Grants

2023	**NSF FRR: $422,254.00** , Data Driven Predictive Auditory Cues for Safety and Fluency in HRI
2025	**GTAI: $50,000**, Spherephones: Fully spatial 3D audio headphones for robots
2025	**GT Seed Grant: $2,000**, MI-blocks: Designing and building music interactive modules for education

Awards

2022-26	**Presidential Fellowship: $28,000**, Georgia Tech Fellowship for top 1% graduate research
2022-26	**GT Institute Fellowship: $10,000**, Additional award for to Presidential Fellowship recipients
2023-24	**Herbert P. Haley Fellowship: $4,000**, Fellowship for one graduate student in each college

Publications

Book Chapters

Amit Rogel, Richard Savery, Gil Weinberg, Robotic dancing, emotional gestures and prosody: a framework for gestures of three robotic platforms, Sound and Robotics, 2023

Richard Savery, Amit Rogel, Lisa Zahray, Gil Weinberg, How Happy Should I be? Leveraging Neuroticism and Extraversion for Music-Driven Emotional Interaction in Robotics, Sound and Robotics, 2023

Amit Rogel, Richard Savery, Gil Weinberg, Augmenting a Group of Task-Driven Robotic Arms with Emotional Musical Prosody, Sound and Robotics, 2023

Amit Rogel, Jiahe Qian, Ripken Walker, Nicollete Cash, Emily Liu, Hope Phan, Hannah Schlisky, Tristan Al-Haddad, Gil Weinberg, Medusai: A Multi-modal Large-Scale Robotic Musician, Cultural Technologies, 2025

Peer Reviewed Journals

Ning Yang, Amit Rogel, Gil Weinberg, Design of an expressive robotic guitarist, IEEE Robotics and Automation Letters 8 (11), 2023

Xuedan Gao, Amit Rogel, Raghavasimhan Sankaranarayanan, Brody Dowling, Gil Weinberg, Music, body, and machine: gesture-based synchronization in human-robot musical interaction, Frontiers in Robotics and AI 11, 2024

Peer Reviewed Conferences

Richard Savery, Amit Rogel, Gil Weinberg, Emotion musical prosody for robotic groups and entitativity, 2021 30th IEEE International Conference on Robot & Human Interactive Communication, 2021

Amit Rogel, Music and movement based dancing for a non-anthropomorphic robot, 2022 17th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2022

Amit Rogel, Richard Savery, Ning Yang, Gil Weinberg, Robogroove: Creating fluid motion for dancing robotic arms, Proceedings of the 8th International Conference on Movement and Computing, 2022

Amit Rogel, Qiaoyu Yang, Jack Hayley, Gil Weinberg, Do Re Mi Fa So Pass the Tool: Using Melodic Prediction to Improve Human-Robot Fluency, 2025 34th IEEE International Conference on Robot and Human Interactive Communication, 2025

Amit Rogel, Jack Hayley, Richard J. Savery, Gil Weinberg, What Sounds Dangerous? Establishing Correlations Of Musical Features and Perceived Safety in HRI, 2025 20th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2025

Presentations and Articles

HRI Pioneers 2022, Attendee

HRI Pioneers 2023, Program Chair

Supercomputing Conference 2025, Shimon demonstration and performance

SMPS 2023, Robotic Dancing performance

AI Artistic Human Performance Workshop 2024, Speaker and presenter

Papers/Journals in Publication Process

Amit Rogel, Jack Hayley, Qiayou Yang, Richard Savery, Gil Weinberg, Robot Musification: Using Music-Based Sonification to Communicate Robot Safety Information, IEEE International Conference on Robot and Human Interactive Communication (RoMan), 2026

Amit Rogel, Qiayou Yang, Gil Weinberg, Keep Calm and Robot on: Applying Calm Computing Techniques in Robot Sonification for HRI, IEEE Robotics and Automation Letters 11 (14), 2026

Amit Rogel, Brody Dowling, Gil Weinberg, It's Here, There, Everywhere! Design and Construction of immersive 3D spatial audio headphones, Spherephones, Frontiers in Virtual Reality

Amit Rogel, Donghoon Seu, Mikhail Titov, Elain Teng, Gil Weinberg, Lets make a Show: Co-Creating a multimodal interactive exhibit and performance on a large scale robotic installation medusai, IEEE Robotic Automation Magazine

Workshops

Organizer Amit Rogel, Raghavasimhan Sankaranarayanan, Richard Savery, Gil Weinberg, "Notes and Bolts: A workshop on Robotic Musicianship," IEEE International Conference on Robotics & Automation 2026

———————————————

Teaching

Research Advisor and Instructor

Veritcally Integrated Program *2021 - Present*

- Project Studio Course where undergraduates work with graduate students or independently on robotic musicianship projects
- Supervised 5 research teams and a total of 25 students
- Created grading rubric, syllabus and lesson plans
- Outcome for students included published papers, concerts on campus, and invitation for students to present/perform their research off campus

PhD Teaching Practicum

Interactive music *2022, 2024*

- Created curriculum, taught lectures for the semester-long course
- Developed final project assignment
- Class included 35 mixed undergraduate and graduate students

Guest lectures and Tutorials/Workshops

Georgia Institute of technology *2022-2026*

- 3D printing Basics: taught in 3 classes
- Research with Human interactive systems introduction: taught in 2 classes
- Arduino and building interactive robots tutorial: taught annually for 4 years
- Working with robotic musicians: every semester since 2022
- Georgia Tech Music Technology Summer Camp Lab visits: Run demos and interactions for high schoolers
- Georgia Tech Jam session coordinator: 2 semesters

Research Labs

Robotic Musicianship Lab- Research | PI Gil Weinberg

Safe and Sound Grant, Forest, Prosody, Shimi the robot, Shimon the robot *2020 - PRESENT*

- Lead programmer for musical interactions with robots for five different robots
- Head researcher for human robot interaction studies for NSF grant involving safety in HRI
- Created system to generate non-distracting lo-fi music that communicate safety information
- Created system to leverage predictive musical melodies to improve fluency between humans and robots
- Responsible for coordinating and creating all robotic performances since 2022
- Mentored and advised 32 masters students
- Co-wrote $400,000 grant and two $50,000 grants
- Built a platform to convert human movement (either motion capture or vision) to robotic arm movements for collaborative dancing
- Researched and developed framework to communicate musical information for people who are deaf and hard of hearing

Robotic Musicianship Lab- Robots Built | PI Gil Weinberg

medusAI robot, Guitar Playing Robot, Shaia robot, Spherephones *2020 - PRESENT*

- Primary mechanical engineer for building and upgrading all robots
- Designed and manufactured guitar playing robot
- Designed, programmed, and manufactured robotic installation medusAI; an interactive robotic musician using displayed at ICRA 25 and night of ideas
- Maintenance and mechanical upgrade of marimba playing robot and programmed new path planning algorithm
- Mechanical upgrade of robotic prosthetic drumming arm
- Upgraded and built social robot to allow people who are deaf and hard of hearing experience music with haptics, lyrics, and generated dance gestures
- Designed, built, and programmed desktop xylophone and drumming robot for music education
- Designed and built 3D spatial audio headphones. Patent filed 2026

Microfluids Droplets Lab | PI Michael Schertzer

Microfluid Droplet Manufacturing — *2018*

- Undergraduate assistant helping design microfluid manufacturing mounts

Industry

Yamaha Music — *Hamamatsu, Japan*

Mechanical Engineer for Home Audio — *Mar. 2019 - Aug. 2019*

- Used FEA simulation software to simulate and research various speaker drivers
- Designed new speaker drivers for Yamaha audio products
- Created training guides to teach employees speaker simulation software
- Prototyped and tested Yamaha speakers, keyboards, and subwoofers
- Products with my designs: NS-BP401 and TSX-B235

Taylor Made Systems — *Gloversville, NY*

New Product Development Engineer — *Jan. 2019 - May 2019*

- Designed and manufactured marine products for various boats
- Products designed: ergonomic door handle, new sliding door mechanism, transducer to turn windshield into a speaker
- Explored and adapted new technologies to current systems to improve products and workflow
- Built bending dies and manufacturing rigs for process improvement
- Trained employees on Creo 5 and effective CAD features
- Ran 3D printing lab

QuEST Global — *Windsor, CT*

Design Engineer — *Jan. 2018 - Jun. 2018*

- Created and edited Broach Tool and Jet Engine drawings in NX
- Analyzed defective parts and determined if they were safe for engine use - created a process to automate this
- Set jet engine limits using ANSYS and proprietary crack growth analysis
- Created training documents for future employees and templates to improve productivity

Sailbot by AllSail — *Rochester, NY*

Project Manager, CEO — *Sep. 2019*

- Designed and built robot to allow sailors with disabilities to steer a boat with their wheelchair inputs
- Fundraised from investors
- Filed patent for device

RIT Tech Crew — *Rochester, NY*

General Technician, Shop Technician — *Sep. 2016 - Present*

- Managed and supervised employees to set up sound, power and lighting systems for various on-campus events
- Speaker, light, amplifier, and microphone repairs
- Extensive knowledge in sound flow and properties of sound signal
- Power distribution required multiphase load balancing

Sonos — *Boston, MA*

Intern — *Jul. 2015 - Aug. 2015*

- Speaker repairs
- Evaluation of speaker feet design

Performances and Dissemination

ICRA (International Conference on Robotics and Automation) — *Atlanta, Georgia*

MedusAI Interactive Exhibition — *2024*

- Presented hour-long MedusAI interactive event to over 160 conference attendees
- Conducted series of workshops demonstrating human-robot musical interaction
- Featured interactive exhibit using strings, drums, and robotic arms with vision and audio input

Festival De Las Ideas — *Puebla, Mexico*

Live Performance with Shimon - Trombone — *2024*

- Performed trombone with Shimon to audience of 3,000 people
- Featured two songs with AI-generated lyrics by Shimon
- Demonstrated real-time musical improvisation based on human input

Supercomputing Conference (SC24) - Georgia Tech Booth

Atlanta, Georgia

Shimon Interactive Demonstrations *2024*

- Presented Shimon's capabilities for learning and performing song covers
- Conducted interactive demonstrations allowing conference attendees to play with Shimon
- Showcased real-time human-robot musical interaction

Democracy Festival

Athens, Greece

Live Concert Performance with Shimon - Trombone *2023*

- Performed hour-long concert with Shimon and international musicians
- Overcame logistical challenges with customs for international robot transport
- Demonstrated cross-cultural human-robot musical collaboration

Trilith Studios/Lux Machina

Georgia

MedusAI Premiere Exhibition *2023*

- Premiered MedusAI at 3D theater facility where Loki and The Mandalorian were filmed
- Collaborated with professional animators for enhanced visual animations
- Showcased integration of robotic music performance with cinematic visualization

Cox Communications - Nasdaq Building

Times Square, New York

Corporate Performance with Shimon *2023*

- Demonstrated Shimon's original AI-composed songs for corporate event
- Performed at iconic Times Square Nasdaq building location
- Showcased commercial applications of robotic musicianship

Georgia Aquarium

Atlanta, Georgia

Forest Robotic Dance Performance *2022*

- Debuted automatic dance generation system for building construction conference
- Demonstrated Forest system with twelve dancing robotic arms
- Showcased integration of robotic movement with music in aquarium setting

Jimmy Kimmel Live with band Coin

Hollywood, California

Shimon Television Performance *2022*

- Shimon performed "Chapstick" with band Coin on national television
- Demonstrated robotic musicianship to mainstream television audience
- Showcased real-time collaboration between robot and professional musicians

Disney+ "The World According to Jeff Goldblum"

Los Angeles, California

Shimon and xArms Performance *2022*

- Shimon performed rap collaboration with Jeff Goldblum
- Featured xArms dancing robots in background - their debut performance
- Demonstrated robotic musicianship for streaming television production

Terminal West

Chicago, Illinois

Call and Response Improvisation Debut *2021*

- Premiered new gesture system and code for musical call and response
- Implemented musically informed rules using Markov models for improvisation
- First public demonstration of enhanced human-robot musical interaction system

Press

2025 **Feature Article**, ARTS ATL - ”Dancing with Robots: IEEE Fuses Automation and Fine Arts”
2024 **Featured Article**, Scientific American - ”Want to Get Humans to Trust Robots? Let Them Dance”
2024 **Featured Research**, IEEE Spectrum - ”Robot Videos: Happy Birthday ICRA”
2024 **Lead Coverage**, Georgia Tech Center for Music Technology - MedusAI Feature
2024 **Press Coverage**, Multiple Mexican Media Outlets - Festival de las Ideas Coverage
2023 **Journal Publication**, IEEE Robotics and Automation Letters - Featured Research
2023 **Feature Coverage**, Georgia Tech Research - ”Robot Guitarist Plays With Human Expressivity”
2022 **Television Feature**, Disney+ ”The World According to Jeff Goldblum” Season 2
2022 **Featured Research**, IEEE Spectrum - ”Video Friday: Guitar Bot”
2022 **Feature Story**, MathWorks - ”Building Human-Robot Trust Through Dance”
2021 **Feature Article**, IEEE Spectrum - ”Building Human-Robot Relationships Through Music and Dance”
2021 **Press Coverage**, Newswise - ”Finding Their Groove” NSF-funded FOREST Project
2021 **Press Coverage**, Atlanta Patch - ”GA Tech Dancing, Rapping Robots Showcase Saturday On Campus”
2021 **Feature Article**, Georgia Tech - ”Finding Their Groove”

Services

Chair Committees

2023,24 **Program Chair**, HRI Pioneers
2026 **Workshop Organizer**, ICRA

Reviewer

2026 **CUI**, Meta Reveiwer
2024+ **HRI LBR**, Meta Reveiwer
2024+ **HRI** , Reveiwer
2024+ **ICRA**, Reveiwer
2023+ **IEEE RA-L,RA-M**, Reveiwer
2024+ **IEEE Transactions of Robotics**, Reveiwer
2024+ **Robotics and Automation Conference**, Reveiwer

Skills

Programming Python, ROS/2, DSP, OpenCV, Unity, Max MsP, KRL, MATLAB, PyTorch, Motion Capture, OpenCV
CAD/CAE Software Solidworks, PTC Creo, NX, ANSYS Workbench, ANSYS Classic
Fabrication 3D printing, Drill press, Lathe, Vertical mill, CNC Prototrak, CNC mill, Welding, Angle grinding
Robots xArm, Franka Emica Panda, universal Robot, Kuka, Hello Robot Stretch, TurtleBot, Pepper
Music Technology Trombone, Piano, Bass, Logic Pro, Ableton, Digital/Analog Sound Boards, FineCone, Audio Engineering Recordings