

Richard Savery

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Current Appointment

Macquarie University Research Fellowships (MQRF)

MCCALL, FACULTY OF ARTS

2022+

- Full-time research position, developing new robotic musicians

Education

Ph.D. Music Technology (Minor in Human-Computer Interaction)

GEORGIA INSTITUTE OF TECHNOLOGY

2017-2021

- Dissertation: Machine Learning Driven Musical Approaches for Real-Time Human-Robot Interaction
- Advised by Gil Weinberg (Chair), Claire Arthur and Ayanna Howard
- Fully funded with stipend through Graduate Research Assistantship

M.F.A Integrated Composition, Improvisation and Technology

UNIVERSITY OF CALIFORNIA, IRVINE

2013-2015

- Masters Thesis: Algorithmic Improvisers
- Fully funded with stipend through Graduate Research/Teaching Assistantship

B.Mus (Jazz Performance)

SYDNEY CONSERVATORIUM OF MUSIC, UNIVERSITY OF SYDNEY

2008-2011

Grants & Awards

National Science Foundation - National Robotics Initiative

CREATING TRUST BETWEEN GROUPS OF HUMANS AND ROBOTS USING A NOVEL MUSIC DRIVEN ROBOTIC EMOTION GENERATOR

2019

- US\$803,892 grant for Human Robot Interaction
- Chief Investigator with advisor Gil Weinberg

Georgia Tech School of Computational Science and Engineering Nvidia Fellowship

NVIDIA JETSON TX2 MARKETING CAMPAIGN

2018

- US\$50,000 grant to develop new project for a promotional video using a Nvidia Jetson

Hyphen-Hub and Bell Labs (USA)

HOW THE LIGHT GETS IN

2018

- US\$10,000 grant to develop a new concert

Australia Council for the Arts: Art Start Grant

EARLY CAREER GRANT

2013-2015

- \$10,000 for Development of Album, Website and Music Printing

- 2020 **Guinness World Record**, First robot to participate in a rap battle
- 2020 **Best Student Paper**, International Conference on Computational Creativity
- 2019 **Jazz Denmark Prize**, Awarded for the most innovative and creative concert experience of the year
- 2019 **Guinness World Record**, Most drumbeats in one minute using a drumstick prosthetic
- 2018 **Winner Moog Hackathon**, Georgia Tech
- 2017 **Best Indie Game Audio (Nominee): Orchestrator for Gunman Taco Truck**, Game Audio Network Guild
- 2017 **Best Music in a Casual/Social Game (Nominee): Orchestrator for Gunman Taco Truck**, Game Audio Network Guild
- 2015 **Best Indie Game Audio (Winner): Orchestrator for Gathering Sky**, Game Audio Network Guild
- 2015 **Best Interactive Score (Nominee): Orchestrator for Gathering Sky**, Game Audio Network Guild
- 2015 **Best Music in a Casual Game (Nominee): Orchestrator for Gathering Sky**, Game Audio Network Guild
- 2015 **Best Handheld Audio (Nominee): Orchestrator for Gathering Sky**, Game Audio Network Guild
- 2015 **Distinguished Service Award**, Game Audio Network Guild
- 2015 **Associated Graduate Students Research Grant**, University of California, Irvine
- 2015 **Claire Trevor School of the Arts Research Grant**, University of California, Irvine
- 2013 **Creative Young Stars Program**, Ryde City Council
- 2013 **Field Recording Competition Winner**, HISS and Roar
- 2007 **Pat Corrigan Recording Scholarship**, International Association of Jazz Education

Publications

BOOK CHAPTERS

Richard Savery, Lisa Zahray, Gil Weinberg, *Shimon Sings - Robotic Musicianship Finds its Voice*
Handbook of Artificial Intelligence and Music, Springer, 2021

Richard Savery, Lisa Zahray, Gil Weinberg, *A ConvNet for Ethical Robotic Musical Generation and Interaction*
Artificial Intelligence and Creative Music Practice, Routledge, 2021

PEER REVIEWED JOURNALS

Richard Savery, Gil Weinberg, *Robots and emotion: a survey of trends, classifications, and forms of interaction*, Advanced Robotics Volume 35, 2021

Richard Savery, Lisa Zahray, Gil Weinberg, *Before, Between, and After: Enriching Robot Communication Surrounding Collaborative Creative Activities*
Frontiers in Robotics and AI: Creativity and Robotics, 2021

Richard Savery, Lisa Zahray, Gil Weinberg, *Emotional Musical Prosody for the Enhancement of Trust: Audio Design for Robotic Arm Communication*
Paladyn Journal of Behavioral Robotics, 2021

Richard Savery, *An interactive algorithmic music system for EDM*
Dancecult: Journal of Electronic Dance Music Culture 10 (1), 2018

PEER REVIEWED CONFERENCES (PROCEEDINGS PUBLISHED)

Richard Savery, Amit Rogel and Gil Weinberg, *Emotion Musical Prosody for Robotic Groups and Entitativity*
30th IEEE International Conference on Robot & Human Interactive Communication, 2021

Richard Savery, Gil Weinberg, *Machine Learning Driven Musical Improvisation for Mechanomorphic Human-Robot Interaction*
ACM/IEEE International Conference on Human-Robot Interaction, 2021

Nic Farris, Brian Model, Richard Savery, Gil Weinberg, *Musical Prosody-Driven Emotion Classification: Interpreting Vocalists Portrayal of Emotions Through Machine Learning*
18th Sound and Music Computing Conference, 2021

Naveen Ram, Tanay Gummadi, Rahul Bhethanabotla, Richard J Savery, Gil Weinberg, *Say What? Collaborative Pop Lyric Generation Using Multitask Transfer Learning*
Proceedings of the 9th International Conference on Human-Agent Interaction, 2021

Richard Savery, Lisa Zahray, Gil Weinberg, *Shimon the Rapper: A Real-Time System for Human-Robot Interactive Rap Battles*
International Conference on Computational Creativity, 2020

Richard Savery, Lisa Zahray, Gil Weinberg, *Emotional Musical Prosody for the Enhancement of Trust in Robotic Arm Communication*
Trust, Acceptance and Social Cues in Human-Robot Interaction, Ro-MAN 2020

Richard Savery, Gil Weinberg, *A Survey of Robots and Emotion: Broad Trends and Models of Emotional Interaction*
29th IEEE International Conference on Robot Human Interactive Communication, 2020

Lisa Zahray, Richard Savery, Liana Syrkett, Gil Weinberg, *Robot Gesture Sonification to Enhance Awareness of Robot Status and Enjoyment of Interaction*
29th IEEE International Conference on Robot & Human Interactive Communication, 2020

Richard Savery, Lisa Zahray, Gil Weinberg *Emotional Musical Prosody: Validated Vocal Dataset for Human Robot Interaction*
Joint Conference on AI Music Creativity, 2020

Ning Yang, Richard Savery, Raghavasimhan Sankaranarayanan, Lisa Zahray, Gil Weinberg, *Mechatronics-Driven Musical Expressivity for Robotic Percussionists*
New Interfaces for Musical Expression, 2020

Richard Savery, Gil Weinberg, *Long-Term Interaction and Persistence of Engagement for Musical Interaction using a Genetic Algorithm*
Proceedings of the 8th International Conference on Human-Agent Interaction (HAI '20)

Richard Savery, Ryan Rose, Gil Weinberg, *Establishing Human-Robot Trust through Music-Driven Robotic Emotion Prosody and Gesture*
28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Dehli, India, 2019

Richard Savery, Madhukesh Ayyagari, Keenan May, Bruce Walker, *Soccer Sonification: Enhancing Viewer Experience*
The 25th International Conference on Auditory Display, UK, ICAD 2019

Richard Savery, Benjamin Genchel, Jason Smith, Anthony Caulkins, Molly Jones, Anna Savery, *Learning from History: Recreating and Repurposing Sister Harriet Padberg's Computer Composed Canon and Free Fugue*
New Interfaces for Musical Expression, Porto Alegre, Brazil, 2019

Richard Savery, Ryan Rose, Gil Weinberg, *Finding Shimi's Voice: Fostering Human-Robot Communication With Music And a NVIDIA Jetson TX2*
17th Linux Audio Conference (LAC-19), CCRMA, Stanford University, USA, 2019

Richard Savery, Benjamin Genchel, Jason Smith, and Molly Jones, *Harriet Padberg: Computer-Composed Canon and Free-Fugue Renaissance* Society for Music Theory 42nd Annual Meeting, Ohio, USA, 2019

Richard Savery, Gil Weinberg, *Shimon the Robot Film Composer and DeepScore*
Computer Simulation of Musical Creativity, Dublin, Ireland, 2018

DISSERTATION AND THESIS

Machine Learning Driven Emotional Musical Prosody for Human-Robot Interaction
Georgia Tech, PhD Dissertation
Committee: Dr Gil Weinberg (Advisor), Dr Claire Arthur, Dr Jason Freeman, Dr Ayanna Howard

Algorithmic Improvisers
Committee: Chris Dobrian (Chair), Simon Penny, Kojiro Umezaki
2015, University of California, Irvine, Master's Thesis

INDUSTRY EVENTS

Richard Savery, *Deep Learning Applications for Video Game Music*
GameSoundCon, Los Angeles, USA, 2018

PRESENTATIONS AND ARTICLES

HRI Pioneers, 2021
ICCC 2020, Doctoral Consortium
OzCHI 2020, Doctoral Consortium

Santiago Guisasola, Richard Savery, *Listening in Improvisation*
Ethnomusicology Review 20, 2017

Richard Savery, *Interactive Artificial Voice*
Presented by Hypen Hub, Theater at New Museum, New York, NY, 2019

Richard Savery, *Artificial Intelligence Film Composition*
Museo de la Ciencia y el Cosmos, Tenerife, Canary Islands , 2018

Richard Savery, *Interactive Computer Musicianship and Artificial Improvisers*
Eureka Music conference (UCSC), Santa Cruz, 2015

Teaching

QUALIFICATIONS

Associate Level Certificate: Foundations of Teaching and Learning

CENTER FOR THE INTEGRATION OF RESEARCH, TEACHING, AND LEARNING (CIRTL)

2018-2019

- Foundational level courses in higher education pedagogy

Tech to Teaching Certificate

GEORGIA TECH, CENTER FOR TEACHING AND LEARNING

2019-2020

- A multi-semester, future faculty program that includes pedagogy training and practice for higher education

EXPERIENCE

Research Advisor and Instructor

VERTICALLY INTEGRATED PROJECTS

2017-2021

- Supervised 5-10 undergraduate students each semester
- Led undergraduates as software team,
- Outcomes for undergraduate students included published papers

Instructor of Record

GEORGIA INSTITUTE OF TECHNOLOGY

2020

- GT 1000: First Year Undergraduate Research Seminar

Teaching Assistant

UNIVERSITY OF CALIFORNIA, IRVINE AND GEORGIA INSTITUTE OF TECHNOLOGY

2013-2021

- Interactive Music: 32 Students Mixed Graduate and Undergraduate Class
- Music Theory Fundamentals 1: 20 students, led weekly lab sessions
- Music Theory Fundamentals 2: 20 students, led weekly lab sessions
- Music Theory Fundamentals 3: 20 students, led weekly lab sessions
- Music Appreciation: 2 semesters of an Online Summer Class with 200 Students
- Jazz History: General Education Class with 150 Students
- Jazz Theory: 15 Students, led weekly lab sessions

Educational Software Developer and Pedagogy Creator

EARSKETCH - TEACHING COMPUTER SCIENCE THROUGH MUSIC WITH OVER 300,000 USERS

2017

- Rewrote the curriculum for JavaScript and Python for school students to improve readability and usability for students
- In collaboration with the Center for Education Integrating Science, Mathematics, and Computing developed a new curriculum for high school teachers to use Earsketch in the classroom, while matching Georgia, USA state requirements
- Taught a summer program to Atlanta based high school teachers on class-room use of Earsketch

Primary and Secondary Education

PART-TIME INSTRUCTOR FOR: JAZZ WORKSHOP AUSTRALIA, SHORE, NORTH SYDNEY BOYS, BAULKHAM HILLS HIGH SCHOOL

2010-2013

- Private and group lessons in Saxophone, Clarinet and Flute, Jazz Ensembles and Big Bands
- Private students accepted into Bachelor of Music and Bachelor of Education programs

Research Labs

Robotic Musicianship Lab; led by Gil Weinberg

Georgia Institute of Technology

ROBOTICS AND PROSODY, SHIMON THE ROBOT, SHIMI THE ROBOT, PROSTHETIC DRUMMING ARM

2017-2021

- Primary research lab from 2017-2021
- Lead developer of musical interactions for robotic platforms
- Grant writer for successful \$669,912 NSF Grant
- Funded to develop a system using an embedded Nvidia Jetson TX2

Gassman Research Lab; led by Chris Dobrian

University of California, Irvine

GASSMAN RESEARCH ASSISTANT

2013-2015

- Assistance with creation of the MaxMSP Cookbook, a collection of 700 examples and explanations of techniques of computer music programming using Max

Industry - Technology

Senior Machine Learning Engineer: Music Tech Start-Up (USA), research under NDA

FILM MUSIC TECHNOLOGY AI GENERATION

2021

- Lead developer of end to end system, taking audio as an input and generating new midi files

Researcher: Elastic Audio

MUSIC TECH STARTUP GRANT APPLICATIONS

2020

- Developed a 2 year research plan, analyzing Elastic Audio's innovative new audio programming language
- Author of \$256,000 NSF Small Business Innovation Research (Status Pending)

Software Engineer: Computational Music for All; led by Jason Freeman

EARSKETCH SOFTWARE AND PEDAGOGY

2019

- Updated the built in curriculum for better readability and usability for all students
- Developed a curriculum for teachers to use EarSketch in classrooms

Audio Software Engineer: Expressive Machinery Lab; led by Brian Magerko

GROOVE MACHINE, SOUND HAPPENING

2018

- Project lead for Sound Happening, an interactive installation featured in many exhibits, including at the Smithsonian in Washington DC
- Sound Designer and Programmer for Groove Machine, a tabletop interface designed to teach programming fundamentals

Data Engineer: Sonification Lab; led by Bruce Walker

SOCCER AND VIDEO GAME SONIFICATION

2017

- In collaboration with a world leading soccer club developed methods to sonify soccer player movement and ball data

Technical Director and Composer: MacArthur "Genius" Trimpin

Orange County, USA

PHILHARMONIC SOCIETY OF ORANGE COUNTY

2014

- Developed software to control Red Hot, an automated piano equipped with hacksaws, motors and music boxes
- After a 2-week installation in Orange County, piano moved to display in San Jose Tech Museum of Innovation

Technical Director: Voyager by George Lewis

Orange County, USA

COLUMBIA UNIVERSITY

2016

- Telematic Concert between the University of Pittsburgh, University of California, Irvine and the San Francisco Jazz Center
- Featuring George Lewis and Voyager, Geri Allen, Nicole Mitchell, Michael Dessen, Francis Wong
- Developed and ran the server to host the concert, and controlled Voyager for the concert

Audio Technology Consultant: Peter Brown Studios

Los Angeles, USA

TECHNOLOGY CONSULTING

2015 - 2017

- Optimisation of studio, featuring a wide collection of analog and digital synths
- Developed custom tools for workflow
- Creation of IOT demonstration installations

Producer: ICTUS Records

Long Beach, USA

AVANT-GARDE JAZZ RECORD LABEL FOUNDED IN 1976 BY ANDREA CENTAZZO

2016 - 2017

- Label created by Andrea Centazzo featuring Derek Bailey, Andrew Cyrille, Steve Lacy
- Producer for album LA Strictly Confidential
- Remixed, remastered and organized the new release of archived recordings

Director of Events and Communications: Game Audio Network Guild

Los Angeles, USA

WORLD'S LEADING GAME AUDIO COMMUNITY

2014 - 2017

- Implemented new forms of handling communication, leading to more efficient, streamlined member and sponsor communication
- Manage annual award show voting and nominations
- Work recognized with a GANG Distinguished Service Award in 2015

Industry - Multimedia

SELECTED SCREEN COMPOSITION AND SOUND DESIGN

2019	How the Light Gets In , Presented by Hypen Hub, Theater at New Museum, New York	Composition
2018	Like Walking on Mars , Museo de la Ciencia y el Cosmos, Tenerife, Canary Islands	Composition
2016	Fast Four Tennis NSW Promo , Featuring Roger Federer and Lleyton Hewitt	Composition
2015	Yang , <i>Festivals: A Night of Horror Film Festival 2015</i> , Made In The West Film Festival 2016	Composition
2014	Shading , <i>Funded by: Diversity Australia, VIP Films. Festivals: Made In The West Film Festival 2018</i> , Sydney World Film Festival 2019	Composition
2014	Window , <i>Awarded: Best Short Film (Olympus Filmmaker Challenge)</i> , St Kilda Film Festival 2016.	Composition
2013	Zombie Birds , Directed by Vonne Patiag	Composition
2013	The Botanist , Winner of Metroscreen Jumpstart Grant	Sound Design
2012	How to Destroy the Internet , Directed by Ben Claremont	Sound Design
2012	Who Killed Our Nico , <i>Funded by UpsideDown Productions</i>	Composition
2011	Deep Sleep , Directed by Paul Murphy	Composition
2011	Heavy Suitcase , Directed by Paul Murphy	Composition
2011	The Dead Man's Face Was My Own , <i>Awarded: Best Film, Best Cinematography, Best Editing, Best Actress - Made In The West Film Festival</i>	Composition

SELECTED VIDEO GAME AUDIO

2020	Counter Strike: Global Offensive , Gunman Taco Truck Music Kit	Orchestration
2018	Thrill of the Fight , VR game for Vive and Oculus	Sound Design
2017	Gunman Taco Truck , Best Indie Game Audio (Nominee), GANG Awards	Orchestration
2016	Mok , Available iPhone, Android	Composition
2016	Indoctra , Windows, built in Unreal, audio implemented with WWise	Composition
2015	Condense , Available iPhone, Android	Composition
2015	Gathering Sky , Best Indie Game Audio (Winner), GANG Awards	Orchestrator
2014	Kube , Windows, built in Unity	Composition
2014	Heart Race , IEEE GameSIG Special Appreciation Award	Sound Design

Industry - Music Performance

ADDITIONAL STUDY

American Composers Orchestra - Jazz Composers Orchestra Institute

HERB ALBERT SCHOOL OF MUSIC, UCLA

Los Angeles, USA

August, 2015

- Gained expertise in penetration testing areas, especially targeted on web application and software.

Banff International Workshop for Jazz and Creative Music

LED BY DAVE DOUGLAS

Los Angeles, USA

2010

- Funded by Opera and Arts Support Group

MUSIC PERFORMANCE

Over 15 years professional experience with 1000+ performances on saxophone, clarinet and flute. Performed and recorded with Nicole Mitchell, Alan Cumming, Lance Horne, Amanda Palmer. Over 30 Musical Theatre Shows, including over 100 performances with Jersey Boys, Sydney. Tours around Australia, USA, Europe and the Caribbean. Radio broadcasts on ABC, album recordings with LIE, Marianna and many guest appearances.

Selected Press

Due to air **The World According to Jeff Goldblum Season 2**, Disney+, (episode featuring my robotic hip hop and jazz generations)

Dec 2020 **This Robot Can Rap—Really**, Scientific American

Apr 2020 **It's Robot Versus Human as Shimon Performs Real-Time Rap Battles**, IEEE Spectrum

Apr 2020 **Can a Robot Really Freestyle?**, Freethink Media

Mar 2020 **Bob Dylan: Singer-songwriter robot called Shimon can write its own lyrics after studying tens of thousands of words penned by the musical greats - and has an album out in the Spring**, Daily Mail

Mar 2020 **Shimon: Singer, songwriter, robot**, National Science Foundation

Mar 2020 **Singer-Songwriter Robot is Heading Out on Tour**, Futurity

Mar 2020 **There really is a robot releasing music on Spotify**, Music All

Mar 2020 **Musical Robot Learns to Sing, Has Album Dropping on Spotify**, IEEE Spectrum

Feb 2020 **Shimon the Singing Robot Is Both Creepy and Captivating**, Gizmodo

Oct 2019 **Robot plays jazz with Danish musicians: It improvises in a completely different way**, DR DK

Sep 2019 **Bigband spiller koncert med avanceret Marimba-robot**, TV2 Ostjylland

Mar 2019 **Shimi Will Now Sing to You in an Adorable Robot Voice**, IEEE Spectrum

Feb 2019 **Together, Man and Robot Write Film Score**, Georgia Tech's Presidents Update

Dec 2018 **Review: Like Walking on Mars**, Studio International

Service

POSITIONS

2022 **Human Robot Interaction Pioneers Program Chair**,

2020 + **AI Music Creativity (CSMC + MUME)**, Technical Program Committee

2018 + **Game Audio Network Guild Advisory Board**,

REVIEWER

2021 **Creativity and Cognition, Transactions of the International Society for Music Information Retrieval, Journal of the Audio Engineering Society, Frontiers: Creativity and Robotics Journal, Journal of Creative Music Systems**,

2020 + **International Conference on Human-Agent Interaction, OzCHI, MUME + CSMC, IEEE International Conference on Robot & Human Interactive Communication**,

2018 - 2021 **President's Undergraduate Research Awards - Georgia Tech**,

2013 + **Game Audio Network Guild Annual Awards**,

2015 - 2017 **MAGFest Audio Competition**,

2013 - 2016 **IndieCade Festival 2020**,

Skills

Programming Languages Python, C++, Javascript
Libraries TensorFlow, Scikit-learn, Numpy
Systems and Software Git, Linux, AWS, LaTeX
Audio Software MaxMSP, Logic Pro, Ableton Live, Sibelius