

BENJAMIN R. THOMPSON

CONTACT

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EDUCATION

Ph.D. in Electrical and Computer Engineering <i>University of Rochester</i> Rochester, New York (Expected May 2027; concentration in acoustics and signal processing)	2021-2027
- Dissertation: "Physically Informed Modeling of Historical Audio Systems and Processes" - Advisors: Michael C. Heilemann and Mark F. Bocko	
M.S. in Electrical Engineering <i>University of Rochester</i> Rochester, New York	2023
B.S. in Science Education, concentration in Physics <i>Colorado State University</i> Fort Collins, Colorado (cum laude)	2013

RESEARCH & ENGINEERING

Graduate Researcher <i>Department of Electrical and Computer Engineering, University of Rochester</i> Rochester, New York	2021-present
- Develop circuit-informed and differentiable models of analog audio systems - Design measurement methods and datasets for evaluating audio models using both control signals and audio signals - Develop signal-processing methods for accurate digital realization of continuous-time audio filters and historical playback equalization systems - Design and conduct hardware measurements spanning analog audio circuits, control-voltage systems, and synchronized multichannel audio acquisition	
Embedded Acoustics and Machine Learning Consultant <i>ADVIS</i>	2024-present
- Develop low-power embedded acoustic monitoring systems for machine-health applications - Implement real-time audio acquisition, adaptive analog gain control, local data logging, and infrastructure for embedded machine-learning inference on STM32 systems	

PUBLICATIONS

B. R. Thompson and M. C. Heilemann (2026a). "Evaluating Dynamic Range Compressor Models Using Control-Voltage Measurements: an Approach and Dataset". In: *Proceedings of the 29th International Conference on Digital Audio Effects (DAFx-26)*. Forthcoming.

B. R. Thompson, T. DiPassio, J. Rutowski, M. F. Bocko, and M. C. Heilemann (2025). "Active Acoustic Sensing for Determining Touch Location on an Elastic Surface". In: *Journal of Sound and Vibration* 594, p. 118667.

Rutowski, J., T. DiPassio, **B. R. Thompson**, M. F. Bocko, and M. C. Heilemann (2025). "Methods for Beamforming Using Structural Sensors on an Elastic Panel". In: *IEEE Sensors Letters*.

B. R. Thompson, T. DiPassio, J. Rutowski, and M. C. Heilemann (2024). "A Survey of Methods for the Discretization of Phonograph Record Playback Filters". In: *157th Convention of the Audio Engineering Society*. 10191.

Rutowski, J., T. DiPassio, **B. R. Thompson**, M. F. Bocko, and M. C. Heilemann (2024). "Estimating Direction of Arrival in Reverberant Environments for Wake-Word Detection Using a Single Structural Vibration Sensor". In: *The Journal of the Acoustical Society of America* 156.4, pp. 2619-2629.

DiPassio, T., M. C. Heilemann, **B. R. Thompson**, and M. F. Bocko (2023a). "Audio Capture Using Piezoelectric Sensors on Vibrating Panel Surfaces". In: *154th Convention of the Audio Engineering Society*.

DiPassio, T., M. C. Heilemann, **B. R. Thompson**, and M. F. Bocko (2023b). "Estimating Acoustic Direction of Arrival Using a Single Structural Sensor on a Resonant Surface". In: *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*.

DiPassio, T., M. C. Heilemann, **B. R. Thompson**, and M. F. Bocko (2023c). "Estimating the Direction of Arrival of a Spoken Wake Word Using a Single Sensor on an Elastic Panel". In: *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*.

DATASETS

B. R. Thompson and M. C. Heilemann (2026b). *SSL Bus Compressor Control Voltage Dataset*. DOI: 10.60593/ur.d.31892026.

PATENTS

Heilemann, M. C., M. F. Bocko, J. DiPassio III, J. Rutowski, and **B. R. Thompson** (2026). *Systems and Methods for Acoustic Beamforming with Structural Sensors*. U.S. Patent Application 19/226,766.

SOFTWARE & PRODUCT DEVELOPMENT

Owner and Developer

Obscure Signals LLC | Rochester, New York

2024-present

- Develop playBackEQ, a cross-platform audio plugin for digital phonograph playback equalization and archival restoration
- Implement high-accuracy playback-filter realization, oversampled audio DSP, arbitrary first-order playback curves, automatic inter-channel time and level alignment, and automated DSP validation and multi-format release infrastructure

SELECTED PRESENTATIONS

Digital Playback Equalization for Phonograph Records: Theory, Practice, & playBackEQ

2026

Association for Recorded Sound Collections Annual Conference | Memphis, Tennessee

SELECTED AUDIO ENGINEERING

- Building a Guitar Amplifier: Accessible, Engaging, and Project-Based Audio Instruction for Students of All Academic Backgrounds** 2024
Meeting of the Acoustical Society of America | Ottawa, Ontario
- Sensing Touch Location on an Elastic Surface by Monitoring Structural Vibrations** 2024
Meeting of the Acoustical Society of America | Ottawa, Ontario

TEACHING

- Owner and Chief Engineer** 2006-present
Alphabet Electrical / Alphabet Recording Studio
- Design, build, modify, and repair analog audio equipment, including equalizers, compressors, reverberation systems, phono electronics, and recording-console subsystems
 - Reverse engineer undocumented and legacy audio hardware and develop replacement, restoration, and expanded control circuitry; provide professional recording, mixing, mastering, and studio systems engineering services
- Curriculum Consultant** 2022
University of Rochester | Rochester, New York
- Designed a guitar amplifier circuit and PCB as a first-year teaching platform and rebuilt four laboratory exercises around the system
- Adjunct Professor** 2019-2021
Community College of Aurora | Aurora, Colorado
- Taught music production and audio engineering in a concurrent-enrollment program, including advanced production and critical-listening coursework
- Teacher and Music Production Pathway Leader** 2013-2021
Northeast Early College, Denver Public Schools | Denver, Colorado
- Designed and led a four-year Music Production and Audio Engineering career pathway, developed district-level curriculum, and built a teaching production lab, control room, and live recording room

AWARDS

- Awards**
- Best Student Paper Award, 157th Audio Engineering Society Convention, 2024
 - Give a Note Foundation Music Education Innovator Award, 2019

TECHNICAL SKILLS

- Programming** MATLAB, C++, C, JUCE, Python, JAX
- DSP** Audio DSP, differentiable signal processing, filter design, dynamic range processing, system identification, audio measurement
- Embedded** STM32, ARM Cortex-M, real-time audio acquisition, DMA, I²S/SAI, SDMMC, low-power embedded systems
- Electronics** Analog audio electronics, circuit analysis, PCB design, hardware reverse engineering, audio test and measurement