

Michael C. Heilemann

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SPECIALTY AREAS	Acoustics, Vibration, Signal Processing, Spatial Audio, Human-Computer Interaction, Interface Design	
CURRENT APPOINTMENT	University of Rochester, Rochester, New York, USA ▪ Assistant Professor (Instructional Faculty) Department of Electrical and Computer Engineering	2018 – Present
EDUCATION	University of Rochester, Rochester, New York, USA ▪ Ph.D. in Electrical Engineering • Thesis: Spatial Audio Rendering with Flat-Panel Loudspeakers ▪ M.S. in Electrical Engineering Canisius College, Buffalo, New York, USA ▪ B.S. in Physics • <i>Summa Cum Laude</i>	2018 2015 2013

PUBLICATIONS JOURNAL PUBLICATIONS

- [7] T. DiPassio, M. C. Heilemann, and M. F. Bocko, “Direction of Arrival Estimation of an Acoustic Wave using a Single Structural Vibration Sensor,” *J. Sound Vib.*, vol. 553, pp. 117671 Jun 2023. <https://doi.org/10.1016/j.jsv.2023.117671>
- [6] T. DiPassio, M. C. Heilemann, and M. F. Bocko, “Audio Capture Using Structural Sensors on Vibrating Panel Surfaces,” *J. Audio Eng. Soc.*, vol. 70, no. 12, pp. 1027-1037 Dec 2022. <https://doi.org/10.17743/jaes.2022.0049>
- [5] M. C. Heilemann, D. A. Anderson S. Roessner, and M. F. Bocko, “The Evolution and Design of Flat-Panel Loudspeakers for Audio Reproduction,” *J. Audio Eng. Soc.*, vol. 69, no. 1/2, pp. 27-39 Jan 2021. <https://doi.org/10.17743/jaes.2020.0057>
- [4] M. C. Heilemann, D. A. Anderson and M. F. Bocko, “Near-Field Object-Based Audio Rendering on Flat-Panel Displays,” *J. Audio Eng. Soc. Special Issue on Object Based Audio*, vol. 67, no. 7/8, pp. 531–539, Jul 2019. <https://doi.org/10.17743/jaes.2019.0034>
- [3] D. A. Anderson, M. C. Heilemann, and M. F. Bocko, “Flat-Panel Loudspeaker Simulation Model with Electromagnetic Inertial Exciters and Enclosures,” *J. Audio Eng. Soc.*, vol. 65, no. 9, pp. 722–732, Sep 2017. <https://doi.org/10.17743/jaes.2017.0027>
- [2] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Sound-source localization on flat-panel loudspeakers,” *J. Audio Eng. Soc.*, vol. 65, no. 3, pp. 168–177, Mar 2017. <https://doi.org/10.17743/jaes.2016.0066>
- [1] D. A. Anderson, M. C. Heilemann, and M. F. Bocko, “Optimized driver placement for array-driven flat-panel loudspeakers,” *Arch. Acoust.*, vol. 42, no. 1, pp. 93–104, 2017, <https://doi.org/10.1515/aoa-2017-0010>

PEER-REVIEWED CONFERENCE/WORKSHOP PUBLICATIONS

- [12] T. DiPassio, M. C. Heilemann, B. Thompson and M. F. Bocko, “Estimating the Direction of Arrival of a Spoken Wake Word Using a Single Sensor on an Elastic Panel,” *2023 IEEE Workshop on Application of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, New York, Oct 2023. <https://doi.org/10.1109/WASPAA58266.2023.10248068>.
- [11] T. DiPassio, M. C. Heilemann, B. Thompson and M. F. Bocko, “Estimating Acoustic Direction of Arrival Using a Single Structural Sensor on a Resonant Surface,” *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Rhodes Island, Greece, 2023. <https://doi.org/10.1109/ICASSP49357.2023.10095986>.
- [10] T. DiPassio, M. C. Heilemann, B. Thompson and M. F. Bocko, “Audio Capture Using Piezoelectric Sensors on Vibrating Panel Surfaces,” *154th Convention of the Audio Engineering Society*, Espoo, Helsinki, Finland, May 2023.

- [9] M. C. Heilemann and T. DiPassio, “Piezoelectric Actuators for Flat-Panel Loudspeakers,” *153rd Convention of the Audio Engineering Society*, New York, New York, Oct 2022. (**Best Paper Award**)
- [8] M. C. Heilemann, T. DiPassio and M. F. Bocko, “Audio-Source Rendering on Flat-Panel Loudspeakers with Non-Uniform Boundary Conditions,” *151st Convention of the Audio Engineering Society*, Online, Oct 2021.
- [7] S. Roessner, M. C. Heilemann, and M. F. Bocko, “Evaluating Listener Preference of Flat-Panel Loudspeakers,” *147th Convention of the Audio Engineering Society*, New York, New York, Oct 2019.
- [6] D. A. Anderson, M. C. Heilemann, and M. F. Bocko, “Optimal Exciter Array Placement for Flat-Panel Loudspeakers Based on a Single-Mode, Parallel-Drive Layout,” *145th Convention of the Audio Engineering Society*, New York, New York, Oct 2018.
- [5] S. Crawford, M. C. Heilemann, and M. F. Bocko, “Perception of stereo noise bursts with controlled interchannel coherence,” *145th Convention of the Audio Engineering Society*, New York, New York, Oct 2018.
- [4] M. F. Bocko, S. Crawford, and M. C. Heilemann, “Prediction of Binaural Lateralization Percepts from the Coherence Properties of the Acoustic Wavefield,” *145th Convention of the Audio Engineering Society*, New York, New York, Oct 2018.
- [3] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Equalization of localized sources on flat-panel audio displays,” *143rd Convention of the Audio Engineering Society*, New York, New York, Oct 2017. <http://www.aes.org/e-lib/browse.cfm?elib=19268>
- [2] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Source rendering on dynamic audio displays,” *2017 IEEE Workshop on Application of Signal Processing to Audio and Acoustics (WASPAA)*, New Paltz, New York, Oct 2017. <https://doi.org/10.1109/WASPAA.2017.8170050>
- [1] R. Selkowitz, M. C. Heilemann, J. Mrowczynski, “Jim: a platform for affective A.I. in an interdisciplinary setting,” *Fifth Symposium on Educational Advances in Artificial Intelligence (EAAI-14) (AAAI-14)*, Quebec City, Quebec, pp. 3052–3054, Jul 2014. <https://doi.org/10.1609/aaai.v28i3.19042>

ABSTRACT-REVIEWED CONFERENCE PRESENTATIONS/PUBLICATIONS

- [7] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Quantifying Listener Preference of Flat-Panel Loudspeakers with Objective Measures,” *145th Convention of the Audio Engineering Society*, New York, New York, Oct 2018
- [6] D. A. Anderson, M. C. Heilemann, and M. F. Bocko, “Impulse and radiation field measurements for single exciter versus exciter array flat-panel loudspeakers,” *143rd Convention of the Audio Engineering Society*, New York, New York, Oct 2017. <http://www.aes.org/e-lib/browse.cfm?elib=19330>
- [5] A. Ramanathan, M. C. Heilemann, and M. F. Bocko, “Real-time multichannel interfacing for a dynamic flat-panel audio display using the MATLAB Audio Systems Toolbox,” *143rd Convention of the Audio Engineering Society*, New York, New York, Oct 2017. <http://www.aes.org/e-lib/browse.cfm?elib=19339>
- [4] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Driver placement for selective modal excitation in flat-panel loudspeakers,” *J. Acoust. Soc. Am.*, vol. 139, pp. 2013 May 2016. <https://doi.org/10.1121/1.4949922>
- [3] D. A. Anderson, M. C. Heilemann, and M. F. Bocko, “Measures of vibrational localization on point-driven flat-panel loudspeakers,” *Proceedings of Meetings on Acoustics*, vol. 26, pp. 065003 May 2016. <https://doi.org/10.1121/2.0000216>
- [2] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Vibrational analysis of vintage planar loudspeakers,” *139th Convention of the Audio Engineering Society*, New York, New York, E-brief 229, Oct 2015. <http://www.aes.org/e-lib/browse.cfm?elib=17905>
- [1] M. C. Heilemann and M. F. Bocko, “Modal response of a simply-supported plate driven by a single, asymmetric piezoelectric actuator for use as a flat-panel loudspeaker,” *J. Acoust. Soc. Am.*, vol. 137, pp. 2234 May 2015. <https://doi.org/10.1121/1.4920148>

PATENTS

- [8] M. C. Heilemann and M. F. Bocko, and D. A. Anderson, “Method, System and Devices for Selective Modal Control for Vibrating Structures,” US 11,743,657, Aug 2023

- [7] D. A. Anderson, M. F. Bocko, and M. C. Heilemann, “Systems and Methods for Controlling Plate Loudspeakers Using Modal Crossover Networks,” US 11,729,552, Aug 2023
- [6] M. C. Heilemann and M. F. Bocko, and D. A. Anderson, “Method, System and Devices for Selective Modal Control for Vibrating Structures,” CN 112,956,212A, Jun 2023
- [5] M. C. Heilemann, D. A. Anderson, and M. F. Bocko, “Planar Loudspeakers Constructed of Panels with Viscoelastic Damping Material,” US 11,463,804, Oct 2022
- [4] M. C. Heilemann and M. F. Bocko, and D. A. Anderson, “Method, System and Devices for Selective Modal Control for Vibrating Structures,” US 11,438,704, Sep 2022
- [3] D. A. Anderson, M. F. Bocko, and M. C. Heilemann, “Systems and Methods for Controlling Plate Loudspeakers Using Modal Crossover Networks,” US 11,076,231, Jul 2021
- [2] M. C. Heilemann and M. F. Bocko, “Method and device for force concentration to enhance sound from flat panel loudspeakers”, US 11,012,784 B2, May 2021
- [1] M. C. Heilemann and M. F. Bocko, “Method for Rendering Localized Vibrations on Panels”, US 10,966,042 B2, Mar 2021

RESEARCH FUNDING

- Development of a Low-Cost, Low-Power Integrated Machine Health Monitoring Sensor 07/2022 - 12/2025
 - ONR STTR Phase II: ADVIS Inc., \$300,000 (*Awarded, Expected Start: 12/2023*)
 - ONR STTR Phase I Option: ADVIS Inc. Unrestricted Gift, \$30,000 (08/2023)
 - ONR STTR Phase I: ADVIS Inc. Unrestricted Gift, \$42,000 (08/2022)
 - NYS CoE in Data Science at U. of R. Matching Funds, \$59,899 (07/2022 - 06/2024)
 - PI: Michael C. Heilemann (Total of All Project Awards: \$431,899)
- Flat-Panel Loudspeakers/Microphones for First Responder Handheld Devices 07/2021- 08/2022
 - Project Sponsor: L3Harris
 - PI: Mark F. Bocko (\$40,000)
 - (*note that I was not PI for this to comply with NSF eligibility for CRII program*)
 - New York State Center for Emerging and Innovative Sciences (CEIS) Matching Funds
 - PI: Michael C. Heilemann (\$20,000)
- CRII : HCC : Smart Acoustic Surfaces as Multimodal Interfaces 06/2021- 08/2023
 - National Science Foundation - CISE Research Initiation Initiative (CRII) Award #2104758
 - PI: Michael C. Heilemann (\$174,824)
- Integrating Flat-Panel Loudspeaker Technology on OLED Panels 03/2020 - 05/2021
 - U.R. Ventures Technology Development Fund
 - PI: Michael C. Heilemann (\$44,360), Co-PI: Mark F. Bocko
- Establishing an Audio Signal Processing Laboratory 2019
 - Wadsworth C. Sykes Engineering Faculty Award
 - PI: Michael Heilemann (\$13,600)
- Student Course Development Project Grant 2019
 - PI: Michael C. Heilemann (\$2,760)

AWARDS

- ECE Award for Excellence in Graduate Teaching 2023
 - University of Rochester Department of Electrical and Computer Engineering
- Best Paper Award 2022
 - M.C. Heilemann and T. DiPassio, “Piezoelectric Actuators for Flat-Panel Loudspeakers”, *153rd Convention of the Audio Engineering Society*, New York, New York, Oct 2022
- Professors’ Choice Award (As Research Advisor) 2022
 - Tianwei Jiang and Zilin Zeng, ”Singing Glasses”, University of Rochester Undergraduate Research Expo
- Harman Scholar 2017 – 2018
 - Audio Engineering Society Educational Foundation (\$5,000)
- Hajim Dean’s Award 2013 – 2015
 - University of Rochester Graduate Student Fellowship
- V. A. Ruskiewicz Memorial Prize for Distinction in Physics 2013
 - Canisius College Award for Highest GPA in Department of Physics

RESEARCH POSITIONS	University of Rochester, Rochester, New York, USA	2013 – 2018
	<ul style="list-style-type: none"> ▪ Research Assistant, Department of Electrical and Computer Engineering 	
	Canisius College, Buffalo, New York, USA	2010 – 2013
	<ul style="list-style-type: none"> ▪ Undergraduate Research Assistant, Department of Physics 	
TEACHING EXPERIENCE	COURSES DESIGNED	
	[6] ECE 470: Digital Audio Effects <i>Instructor</i> , University of Rochester • Rochester, New York **Adapted for online/hybrid teaching	Fa2020 - Present
	[5] AME/ECE/PHY 233: Musical Acoustics <i>Instructor</i> , University of Rochester • Rochester, New York **Adapted for online/hybrid teaching	Sp2019 - Present
	[4] ECE 489: MS Research Seminar on Audio/Acoustics <i>Instructor</i> , University of Rochester • Rochester, New York	Fa2018 - Fa2019
	[3] AME 387: Senior Design II <i>Instructor</i> , University of Rochester • Rochester, New York **Adapted for online/hybrid teaching	Sp2018 - Present
	[2] AME 386: Senior Design I <i>Instructor</i> , University of Rochester • Rochester, New York **Adapted for online/hybrid teaching	Fa2018 - Present
	[1] AME 294: Audio DSP Portfolio <i>Instructor</i> , University of Rochester • Rochester, New York **Adapted for online/hybrid teaching	Fa2014 - Present
	DOCTORAL THESIS ADVISING	
	[4] Jenna Rutowski, ECE, University of Rochester	<i>expected 2028</i>
	[3] Benjamin Thompson, ECE, University of Rochester	<i>expected 2027</i>
[2] Joseph DiPassio, ECE, University of Rochester <ul style="list-style-type: none"> • Co-Advisor with Dr. Mark Bocko • Thesis title: <i>Interacting with Smart Audio Devices Using Induced Structural Vibrations</i> • Best Poster, University of Rochester Graduate Research Fair, 2023 • Best Poster, Center for Emerging and Innovative Sciences Showcase, 2023 • Current Appointment: Research Assistant Professor, University of Rochester 	Ph.D. 2023	
[1] Stephen Roessner, ECE, University of Rochester <ul style="list-style-type: none"> • Co-Advisor with Dr. Mark Bocko • Thesis title: <i>Non-Linear Characteristics and Subjective Listening Studies of Flat-Panel Loudspeakers</i> • Current Appointment: Teaching Assistant Professor, University of Rochester 	Ph.D. 2023	
MASTER'S THESIS COMMITTEES		
[3] Senyuan Fan, ECE, University of Rochester <ul style="list-style-type: none"> • Thesis title: <i>Integrating Vibrato Into Artificial Reverberation</i> 	2022	
[2] Rose McDonogh, ECE, University of Rochester <ul style="list-style-type: none"> • Thesis title: <i>Improving Detection of Cache Side Channel Attacks in Noisy Environments Using Machine Learning</i> 	2022	
[1] Ziqi Chen, ECE, University of Rochester <ul style="list-style-type: none"> • Thesis title: <i>Optimization of Force Exciter Designs for Flat-Panel Loudspeakers</i> 	2020	
MASTER'S STUDENT RESEARCH ADVISING		
[15] Jenna Rutowski, ECE, University of Rochester, NSF #2104758	Su2023	
[14] Benjamin Kevelson, ECE, University of Rochester, NSF #2104758	Fa2022 - Sp2023	
[13] Augustus Standeven, ECE, University of Rochester	Fa2022	
[12] Joseph Bumpus, ECE, University of Rochester, NSF #2104758	Fa2022 - Sp2023	
[11] William Bellows, ECE, University of Rochester	Fa2022 - Sp2023	
[10] Alex Mancuso, ECE, University of Rochester	Fa2022 - Sp2023	
[9] Jongwoo Lee, ECE, University of Rochester, NSF #2104758	Su2022 - Fa2022	
[8] Jacob Melchi, ECE, University of Rochester	Sp2021	
[7] Evan Lo, ECE, University of Rochester	Sp2021	
[6] Luke Nash, ECE, University of Rochester	Sp2021	

- [5] Albert Peyton, ECE, University of Rochester Sp2019
- [4] Ryan Bhular, ECE, University of Rochester Sp2019
- [3] Steven Belitzky, ECE, University of Rochester Sp2019
- [2] Arvind Ramanathan, ECE, University of Rochester Su2017
- [1] Victor Ronchetti, ECE, University of Rochester Sp2016

UNDERGRADUATE STUDENT RESEARCH ADVISING

- [14] Erin Nguyen, Mech. E., University of Rochester Fa2023
- [13] Yutong (Cooper) Wen, AME, University of Rochester Sp2023
- [12] Paula Sedlacek, AME, University of Rochester Fa2022 - Fa2023
- [11] Tianwei Jiang, AME, University of Rochester, UR Discover Grant Fa2021 - Sp2022
- [10] Zilin Zeng, AME, University of Rochester, UR Discover Grant Fa2021 - Sp2022
- [9] Julia Weinstock, AME, University of Rochester Fa2021 - Sp2022
- [8] Seth Roberts, AME, University of Rochester, NSF #2104758 Su2021
- [7] Geoffrey Kulp, AME, University of Rochester, NSF #2104758 Su2021
- [6] Benjamin Kevelson, AME, University of Rochester, L3Harris Su2021 - Sp2022
- [5] Adam Meltzer, AME, University of Rochester Sp2020
- [4] Evan Lo, AME, University of Rochester Su2019
- [3] Daniel Kannen, AME, University of Rochester Fa2016 - Sp2017
- [2] Nicholas Bruno, AME, University of Rochester Fa2016 - Sp2017
- [1] Wendy Snyder, Mech. E., University of Rochester Su2016

INVITED TALKS

- [3] *Smart Acoustic Surfaces - New Dimensions in Human-Computer Interaction* November 2022
IEEE Western New York Image and Signal Processing Workshop - Rochester, NY
- [2] *Audio Displays - New Dimensions in Sound Reproduction* June 2019
Light and Sound Interactive Conference - Rochester, NY
- [1] *Audio Displays - New Dimensions in Sound Reproduction* March 2019
Canisius College Department of Physics - Buffalo, NY

PROFESSIONAL AFFILIATIONS & ACTIVITIES

- Institute of Electrical and Electronics Engineers (IEEE)
 - Signal Processing Society Member 2023 – Present
 - Member 2019 – Present
 - Student Member 2017 – 2019
- Audio Engineering Society (AES)
 - Member 2021 – Present
 - Associate Member 2019 – 2021
 - Student Member 2015 – 2019
- Acoustical Society of America (ASA)
 - Associate Member 2019 – Present
 - Student Member 2015 – 2019
- LGBTQ+ Safe Space Training
 - Completed at University of Rochester 2021

ACADEMIC SERVICE

UNIVERSITY SERVICE

- ABET Coordinator, University of Rochester Audio and Music Engineering Program 2020 – 2022
 - Prepared self-study for first time accreditation of AME Program (w/ Sarah Smith)
- Audio and Music Engineering Majors Class of 2021 Academic Advisor 2018 – 2021
- M.S. E.E. (Acoustics and Signal Processing Concentration) Academic Advisor 2020 – Present
- ECE Department Graduate Committee 2021 – Present
 - Co-Chair
- ECE Department Diversity Equity and Inclusion Committee 2020 – Present
 - Co-Chair
- Faculty Advisor of the AES Rochester Student Section 2018 – Present

PROFESSIONAL SERVICE

- Audio Engineering Society Conventions Paper Session Chair

PAPER REVIEWS

- Audio Engineering Society Conventions
- Journal of the Acoustical Society of America
- Journal of the Acoustical Society of America Express Letters
- University of Rochester Journal of Undergraduate Research

PRESS

- University of Rochester News Center 05/28/2022
“Smart acoustic devices: coming soon to a screen near you?” by Jim Mandelaro
- University of Rochester News Center 10/29/2019
“The art and science of sound” by Bob Marcotte
- University of Rochester News Center 09/08/2017
“Designing a world of immersive sound” by Bob Marcotte
- Rochester Democrat and Chronicle 12/23/2016
“Now hear this: UR builds a better loudspeaker” by James Goodman