

Torin Hopkins

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Research Interests

I am an interdisciplinary researcher, educator, and performer specializing in the design of complex collaborative systems using advanced computational methods and analyzing human dynamics in the context of music.

My work exists at the intersection of AI, Human-Computer Interaction, Neuroscience, Psychology, Extended Reality, Health, and Music.

I primarily publish in HCI, computer science, and engineering venues.

Keywords: AI, system/interface design, brain-computer interfaces, extended reality, healthcare, psychology, and performance.

Education

- 2019 – 2024 **University of Colorado, Boulder** – Boulder, CO
Triple Ph.D. Creative Technology & Design, Neuroscience, Cognitive Science
Dissertation: *Computer-Supported Music Improvisation*
Dissertation Committee: Ellen Yi-Luen Do, Grace Leslie, Chris Chafe, Lei Yuan, Amy Banic, Leanne Hirshfield
Advisors: Ellen Yi-Luen Do, Lei Yuan, Leanne Hirshfield, Alaa Ahmed
- 2016 – 2017 **Iowa State University** – Ames, IA
M.S. in Mechanical Engineering (Human-Computer Interaction)
- 2009 – 2013 **Southern Illinois University** – Carbondale, IL
B.S. in Pre-Medical Physiology; Minors in Music, Chemistry

Honors and Distinction

- 2025 IEEE Travel and Research Grant (\$500)
2025 Frontiers Journal Research Grant (\$1200)
2024 Bowdoin College Travel Grant (\$2000)
2024 Institute of Cognitive Science Research Grant (\$700)

2023	Institute of Cognitive Science Travel Grant (\$700)
2023	Institute of Cognitive Science Travel Grant (\$500)
2023	CU Boulder Travel Grant (\$900)
2023	Most Impactful Work, Pervasive Personalized Intelligence Conference (\$300)
2022	Artist and Black Box Performance Grant (\$500)
2022	Ericsson Research Funding (\$65,000)
2022	Institute of Cognitive Science Travel Grant (\$1000)
2022	Frontiers Journal Research Grant (\$1000)
2022	CU Boulder Travel Grant (\$900)
2022	CU Boulder Travel Grant (\$450)
2021	Ericsson Research Funding (\$60,000)
2019	Dean's Graduate Award, University of Colorado Boulder (\$30,000)
2013	Spirit of Inclusion and Diversity Award, SIUC
2013	Martin Zeeman Leadership Award, SIUC
2009	Key to the City of Highland Park, IL for Charitable Services

Funding

CONTRIBUTED TO AWARDED GRANTS (TOTAL: **\$1.6M**)

2024	Title: SLIONS: an AI-enabled platform to promote personalized Chinese language learning for adult language learners, National University of Singapore Amount: \$1,400,000 Agency: Singapore Ministry of Education PI: Ye Wang Submitted: December 2024 Contributions: Wrote grant extension for completing research.
2021 - 2022	Title: Networked Jamming with Human and AI Musicians in Extended Reality Amount: \$65,000 Agency: Ericsson Research, Inc. PI: Ellen Yi-Luen Do Submitted: February 2020 Contributions: Proposed project, wrote 100% of grant, and led research

2020 - 2021 **Title:** Augmented Reality Drum Circle
Amount: \$60,000
Agency: Ericsson Research, Inc.
PI: Ellen Yi-Luen Do
Submitted: February 2020
Contributions: Proposed project, wrote 100% of grant, and led research

Research Experience

2026 **University of Colorado, Boulder** – Research Affiliate, ATLAS Institute and Department of Psychology and Neuroscience
Lead research efforts for AI in music performance, technology, and psychology of music education

2024 – 2026 **National University of Singapore** – Postdoctoral Fellow, Department of Computer Science
AI Music Generation, AI and Music in Music Therapy, AI in Language Learning Applications

2019 – 2024 **University of Colorado, Boulder** – Ph.D. Researcher, Instructor of Record
Computer-Supported Music Improvisation, AI, brain-computer Interfaces, XR, and psychology of music

2022 **Ericsson Research**, Santa Clara, CA – Research Intern
Designed and tested AR application for networked improvisation with AI-driven musician

2015 – 2019 **SolJAMM LLC** – Research Director
Lead music research. Contracted with National University of Singapore, Studios Education, University of Colorado, Bowdoin College among others. Directed R&D in augmented instruments for learning and led workshops and education for thousands of students (guitar, voice, piano, bass, uke, drums, music tech)

2013 – 2017 **Northshore University HealthSystem**, Evanston, IL – Neuroscience Research Assistant
fMRI studies on consciousness, music, learning, memory (PI: Douglas Burman)

2010 – 2013 **Southern Illinois University School of Medicine**, Carbondale, IL – Research Assistant
Cellular/molecular developmental neurobiology and endocrinology (PI: Buffy Ellsworth)

Refereed Publications

I author conferences in primary computer science, human-computer interaction (HCI), engineering, neuroscience, and music venues (~25% or less acceptance rates).

- 2026 **Hopkins, T.**, et al. “CrowdForge: Effects of Audio and Visual Audience Participation Modalities on Agency, Collaboration, and Engagement in AI-Mediated MR Performances”, Internet of Sounds, Cannes, France.
- 2026 **Hopkins, T.**, Yuan, L. “Embodied Symbol Systems: How Visual Features Shape the Symbol-Perception-Action Loop in Musical Notation” (Under Review).
- 2026 Pang S., et al. “Exploring the Role of Music Therapy in Stroke Recovery: A Qualitative Study of Stakeholder Views” (Under Review).
- 2026 **Hopkins, T.**, et al. “AI-Driven Musicians as a Tool for Musical Collaboration” (In Preparation).
- 2026 **Hopkins, T.**, et al. “AI-Enabled Music Therapy for Stroke Rehabilitation” (In Preparation).
- 2025 Ou, L., Zhao, J., Wang, Z., Xia, G., Liang, Q., Ma, X., **Hopkins, T.**, Wang, Y. “Unifying Symbolic Music Arrangement: Track-Aware Reconstruction and Structured Tokenization.” *NeurIPS 2025*, San Diego, California.
- 2025 Liang, Q., Ma, X., **Hopkins, T.**, Wang, Y. “LivePoem: Enhancing Text-Based Learning Using AI.” *IJCAI 2025*, Montreal, Canada. (4% acceptance rate)
- 2025 **Hopkins, T.**, et al. “BrAIn Jam: Neural Signal-Informed Adaptive System for Drumming Collaboration with an AI-Driven Virtual Musician.” *Frontiers in Computer Science*, 7:1570249.
- 2025 **Hopkins, T.**, et al. “MRDAW: Towards Digital Audio Workstations in Mixed Reality.” *IEEE International Symposium on the Internet of Sounds*, L’Aquila, Italy
- 2025 Weng, S.C.C., **Hopkins, T.**, et al. “Effects of Limited Field of View on Musical Collaboration.” *IEEE International Symposium on the Internet of Sounds*, L’Aquila, Italy
- 2025 Oogjes, Doenja, et al. “Knitting with unknown trees: assembling a more-than-human practice.” *Proceedings of the 2025 ACM Designing Interactive Systems Conference*. 2025.
- 2024 **Hopkins, T.** “Computer-Supported Music Improvisation” *ProQuest Dissertation*, University of Colorado, Boulder CO, USA. 2024

- 2024 **Hopkins, T.**, et al. “XR Jam: Design Considerations for Music Networking with AI in XR.” *IEEE AIxVR 2024*, Los Angeles, CA, USA, pp. 97–101. doi:10.1109/AIxVR59861.2024.00021.
- 2023 Vanukuru, R., Weng, S.C.C., Ranjan, K., **Hopkins, T.**, Banic, A., Gross, M., & Do, E.Y.L. “DualStream: Spatially Sharing Selves and Surroundings using Mobile Devices and Augmented Reality.” *IEEE ISMAR 2023*, Sydney, Australia, pp. 138–147. doi:10.1109/ISMAR59233.2023.00028.
- 2023 **Hopkins, T.**, et al. “Stringesthesia: Dynamically Shifting Musical Agency Between Audience and Performer Based on Trust in an Interactive and Improvised Performance.” *Audio Mostly 2023*, pp. 9–16. doi:10.1145/3616195.3616209.
- 2023 **Hopkins, T.**, et al. “Virtual AI Jam: AI-Driven Virtual Musicians for Human-in-the-Loop Musical Improvisation.” *AI Music Creativity (AIMC 2023)*, Brighton, UK.
- 2023 **Hopkins, T.**, et al. “Rhythmic Conversations: Musical Performance with Improvising AI Drummers.” *AI Music Creativity (AIMC 2023)*, Brighton, UK.
- 2023 **Hopkins, T.** “Computer-Supported Musical Improvisation.” Graduate Consortium, *New Interfaces for Musical Expression (NIME 2023)*.
- 2022 **Hopkins, T.**, et al. “Augmented Reality Drum Circle: Real-Time Collaboration in AR.” *Frontiers in Virtual Reality*, 2022. <https://doi.org/10.3389/frvir.2022.84728>.
- 2022 **Hopkins, T.**, et al. “Studying the Effects of Network Latency on Audio-Visual Perception During an AR Musical Task.” *IEEE ISMAR 2022*, Singapore, pp. 26–34. doi:10.1109/ISMAR55827.2022.00016.
- 2020 Beemer, S., Boston, Z., Bukoski, A., Chen, D., Dickens, P., Gerlach, A., **Hopkins, T.**, et al. “Linguist vs. machine: Rapid development of finite-state morphological grammars.” In *Proceedings of the 17th SIGMORPHON Workshop on Computational Phonetics, Phonology, and Morphology*, pp. 162–170.
- 2020 **Hopkins, T.**, Do, E.Y.L. “JAM TABS: A COLOR BASED NOTATION SYSTEM FOR NOVICE IMPROVISATION.” *International Conference on Technologies for Music Notation and Representation (TENOR 2020)*.
- 2019 Burman, D.D., **Hopkins, T. (Data Analyst)**. “Hippocampal connectivity with sensorimotor cortex during volitional finger movements: Laterality and relationship to motor learning.” *PloS One*, 14(9): e0222064.

- 2018 Burman, D.D., **Hopkins, T. (Data Analyst)**. “Hippocampal connectivity with sensorimotor cortex during volitional finger movements. II. Spatial and temporal selectivity.” *bioRxiv*, 479436.
- 2015 Rosenzweig, S., Freeman, A., **Hopkins, T.** “Annals Graphic Medicine – 50 Shades of Gray Matter.” *Annals of Internal Medicine*, 162(9): GM1.
- 2014 Jasurda, J.S., Jung, D.O., Froeter, E.D., Schwartz, D.B., **Hopkins, T.D.**, Farris, C.L., McGee, S., Narayan, P., Ellsworth, B.S. “The forkhead transcription factor, FOXP3: a critical role in male fertility in mice.” *Biology of Reproduction*, 90(1): 4–1.
- 2012 Gumbel, J.H., Patterson, E.M., Owusu, S.A., Kabat, B.E., Jung, D.O., Simmons, J., **Hopkins, T.**, Ellsworth, B.S. “The forkhead transcription factor, Foxd1, is necessary for pituitary luteinizing hormone expression in mice.” *PloS One*, 7(12): e52156.

Posters and Extended Abstracts

- 2023 **Hopkins, Torin**, et al. “Networking Virtual AI-Driven Musicians for Collaborative Jamming with Human and AI Musicians” ISMAR’ 23
- 2023 Weng, Suibi, **Hopkins, Torin**, “Investigating the Effects of Limited Field of View on Jamming Experience in Extended Reality” ISMAR ’23
- 2023 **Hopkins, Torin**, et al. “Stringesthesia: Dynamically Shifting Musical Agency Between Audience and Performer Based on Trust in an Interactive and Improvised Performance”. (NIME ’23)
- 2023 Suibi Weng, **Hopkins, Torin**. “How Field of View Affects Awareness of an Avatar During a Musical Task in Augmented Reality”. IEEEVR ’23 Poster Session. 2/01/2023
- 2022 **Hopkins, Torin**, et al. “How Late is Too Late? Effects of Network Latency on Audio-Visual Perception During AR Remote Musical Collaboration.” 2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW). IEEEVR, 2022.
- 2022 **Hopkins, Torin**, et al. “Stringesthesia: Interactive Musical Improvisation Using Functional Near-Infrared Spectroscopy”. Front Range Neuroscience. Poster Session. 12/05/2022 Hopkins, Torin, et al. “Augmented Personification of Intelligent Music Tools for Creativity and Collaboration.” (2022).

- 2021 **Hopkins, Torin**, Peter Pascente, Wayne Seltzer, Kellie Masterson, and Ellen Yi-Luen Do. "The Jam Station: Gamifying Collaborative Musical Experiences Through Algorithmic Assessment." In Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction, pp. 1-6. 2021.
- 2015 **Hopkins, Torin** & Burman, Douglas D. "Hippocampal Connectivity with the Visual and Motor Systems Reflects the Cognitive Requirements of the Task." Society for Neuroscience, Chicago 2015

Book Chapters

- 2021 **Hopkins, T.**, Bae, S.S., Uhr, J., Banić, A., Zheng, C., Do, E. "User Interfaces in Smart Cities." In *Handbook of Smart Cities*. Springer.

Teaching

- 2022 Instructor of Record, Creative Technology (Masters, ATLAS)
- 2021 Instructor of Record, Sound (50+ students)
- 2020 Teaching Assistant, Sound (ATLAS)
- 2014 Teaching Assistant, Neurobiology (University of Chicago)

Invited Talks, Keynotes, and Workshops

- 2026 Guest Lecture, Building Brain-Computer Interfaces, Rochester Institute of Technology, NY
- 2024–25 Workshop Organizer, AI and Music, School of Music, CU Boulder
- 2024–25 Guest Speaker, Music, Minds, and Machines, School of Music, CU Boulder
- 2024 Opening Keynote, AI and Music Conference, Bowdoin College, ME
- 2024 Guest Lecture, AI, Music, and the Brain, Bowdoin College, ME
- 2024 Workshop Organizer, AI and Music, School of Music, CU Boulder
- 2024 Guest Speaker, Music Tech Hackathon, NCK University, Taiwan

2023	Guest Speaker, Advances in AI and Neurotech for Music, Tainan Univ.
2019-2020	Hopkins, T. & Survey of Music Technology for Teaching, Performance, and Creative Technology. (10 Workshop Series)
2015	Panelist, “Music: There’s a Science to That!”, Chicago C-STEM, SAIC

Mentorship

Name	Degree	Year	Context
Xichu Ma	Postdoctorate in Computer Science (National University of Singapore)	2024-2025	Research project
Qihao Liang	Ph.D. in Computer Science (National University of Singapore)	2024-2025	Research project
Nicole Chen	Ph.D. in Medicine (National University of Singapore)	2024-2025	Research project
Shiyu Wang	Ph.D. in Medicine (National University of Singapore)	2024-2025	Research project
Sharmaine Pang	Ph.D. in Medicine (National University of Singapore)	2024-2025	Research project
Che-Chuan Weng	Ph.D. in Creative, Tech. & Design (CU Boulder)	2020-2025	10 Research projects
Rishi Vanukuru	Ph.D. in Creative, Tech. & Design (CU Boulder)	2020-2025	8 Research projects
Larissa Schwartz	Ph.D. in Computer Science (CU Boulder)	2021-2024	Master’s thesis
Shih-Yu Leo Ma	Ph.D. in Computer Science (CU Boulder)	2022-2026	6 Research projects
Lucy Vleugels	Ph.D. in Psychology & Neuroscience (CU Boulder)	2020-2025	Research project
Nic Wong	Ph.D. in Computer Science (National University of Singapore)	2024-2025	2 Research projects
Sasha Novack	Ph.D. in Creative, Tech. & Design (CU Boulder)	2020-2024	3 Research projects
Darren Sholes	Ph.D. in Creative, Tech. & Design (CU Boulder)	2020-2021	Research project
Chang See Ying	M.S. in Medicine (National University of Singapore)	2024-2025	Research project
Rohan Nalla	M.S. in Computer Science (CU Boulder)	2023-2024	Research project
Ruoja Sun	M.S. in Creative Tech. & Design (CU Boulder)	2021-2024	3 Research projects
Peter Pascente	M.S. in Creative Tech. & Design (CU Boulder)	2019-2021	Research project
Siwei Luo	M.S. in CS (National University of Singapore)	2024-2025	Research project

Name	Degree	Year	Context
Derrek Chow	M.S. in Creative Tech. & Design (CU Boulder)	2022-2024	Research project
Weiliang Albert Jin	M.S. in Creative Tech. & Design (CU Boulder)	2019-2021	Research project
Qiuxin Du	M.S. in Optical Engineering (Beijing Inst. Tech)	2024	Research project
Anyan Zhou	M.S. in CS (Imperial College London)	2019-2020	Research project
Matt Corones	M.S. in Creative Technology & Design (CU Boulder)	2021-2024	Research project
Zander Trafton	B.S. in Engineering & Music (CU Boulder)	2026	Research project & Grant
Wang Hejin	B.S. in CS (National University of Singapore)	2025	Research project
MinJee Kim	B.S. in CS (National University of Singapore)	2025	Research project
Chad Tobin	B.S. in Creative Tech. & Design (CU Boulder)	2020-2024	4 Research projects
Emma Wenzel	B.S. in Computer Science (CU Boulder)	2020-2022	3 Research projects
Tianle Lyu	B.S. in CS (National University of Singapore)	2024-2025	Research project
Jiaen Sun	B.S. in Computer Science (CU Boulder)	2024	Research project
Allison Palmer	B.S. in Computer Science (CU Boulder)	2020-2022	2 Research projects
James Ryan	B.S. in Computer Science (CU Boulder)	2019-2020	Research project
Colin Soguero	B.S. in Computer Science (CU Boulder)	2019-2022	2 Research projects
Jenna Rothe	B.S. in Computer Science (CU Boulder)	2020	Research project

Public Service

2025–26	Paper Chair, IEEE Internet of Sounds, MuseMet
2024–Present	Board Director of Technology, Studios Education Platform (SC)
2022–25	Reviewer, CHI Conference 2026 ACM
2025	Reviewer, TEI Conference 2026 ACM
2024	Reviewer, TEI Conference ACM
2024	Reviewer, UbiComp Conference
2021–24	Student Grant Representative, ATLAS Institute (CU Boulder)
2019–23	Co-Organizer, Boulder Experiments in Art and Tech
2023	Reviewer, AI Music Creativity Conference
2021–24	Reviewer, DIS Conference ACM

2018–19	Volunteer, Chicago Innovation
2016–19	Volunteer, Design Museum of Chicago
2009–13	President, Musicians United (SIUC)
2009–13	President & Treasurer, SIUC Hillel
2009–13	Volunteer, Highland Park Hospital (E.R. and Cancer Treatment approx. 4000 hours)

Performances and Exhibitions

2026	Performer, CrowdForge: AI and Mixed Reality-Mediated Audience Participation in Improvised Performance (IEEE Internet of Sounds, Cannes, France; CU Boulder)
2026	Performer, Quantum Music: music generated by quantum circuits built with IBM's Qiskit and performed live through Ableton (Northeastern University)
2023	Performer, Rhythmic Conversations (Brighton, UK; CU Boulder)
2022	Performer, Stringesthesia (Neurofeedback Guitar, Boulder)
2021	Exhibitor, Convivial Machines "Galaga's Ghost: A Collaborative Musical Instrument", Museum of Boulder
2020	Exhibitor, MakerMade Selection "The Jam Station: A Collaborative Musical Instrument", Boulder
1997-Present	Performing musician, guitar, voice, music technology