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

AWARDED (TOTAL: **$**168,750)

2026 IEEE Travel and Research Grant ($2,000)

2026 ATLAS Institute Research Grant ($1,100)

2025 IEEE Travel and Research Grant ($500)

2025 Frontiers Journal Research Grant ($1,200)

2024 Bowdoin College Travel Grant ($2,000)

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 ($1,000)

2022 Frontiers Journal Research Grant ($1,000)

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

2015 – Present

SolJAMM LLC – Founder

Music education technology company. Lead music research and direct R&D in augmented instruments for learning. Clients include National University of Singapore, Studios Education, University of Colorado, and Bowdoin College, among others. Lead workshops and music education, having taught thousands of students (guitar, voice, piano, bass, uke, drums, music tech)

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

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 Pang, S., et al. "Music-Based Interventions in Stroke Rehabilitation: Stakeholder Perspectives from a Qualitative Study in Singapore." *Neurological Sciences*, 2026.

2026 **Hopkins, T.**, Yuan, L. "Embodied Symbol Systems: How Visual Features Shape the Symbol-Perception-Action Loop in Musical Notation" (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

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