Stanford



Chris Chafe

Duca Family Professor

Music

NIH Biosketch available Online Curriculum Vitae available Online Resume available Online

Bio

BIO

Chris Chafe is a composer, improvisor, and cellist, developing much of his music alongside computer-based research. He is Director of Stanford University's Center for Computer Research in Music and Acoustics (CCRMA). In 2019, he was International Visiting Research Scholar at the Peter Wall Institute for Advanced Studies The University of British Columbia, Visiting Professor at the Politecnico di Torino, and Edgard-Varèse Guest Professor at the Technical University of Berlin. At IRCAM (Paris) and The Banff Centre (Alberta), he has pursued methods for digital synthesis, music performance and real-time internet collaboration. CCRMA's jacktrip project involves live concertizing with musicians the world over. Online collaboration software and research into latency factors continue to evolve. An active performer either on the net or physically present, his music reaches audiences in sometimes novel venues. An early network project was a simultaneous five-country concert was hosted at the United Nations in 2009. Chafe’s works include gallery and museum music installations which are now into their second decade with “musifications” resulting from collaborations with artists, scientists and MD’s. Recent work includes the Earth Symphony, the Brain Stethoscope project (Gnosisong), PolarTide for the 2013 Venice Biennale, Tomato Quintet for the transLife:media Festival at the National Art Museum of China and Sun Shot played by the horns of large ships in the port of St. Johns, Newfoundland.

ACADEMIC APPOINTMENTS

- Professor, Music
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Director, Center for Computer Research in Music and Acoustics, (1996- present)

HONORS AND AWARDS

- Center for Digital Health Award, Stanford University (2023)
- High-Impact Technology Grant, Stanford University (2023)
- Coastal Futures Ecoacoustic Music Prize, Coastal Futures Conservatory (2022)
- Edgard Varèse Guest Professorship, Technical University of Berlin (2019)
- International Visiting Research Scholar, Peter Wall Institute for Advanced Studies, University of British Columbia (2019)
- Reisdency Scholarship, Banff Centre for the Arts (2019)
- Visiting Professor, Politecnico di Torino (2019)
- Bio-X Interdisciplinary Initiatives Seed Grant, Stanford University (2018)

- Synthetic Aesthetics Residency, AHRC / NSF (2010)
- Research Award, NSF (2008)
- iCore Professorship, Banff Centre for the Arts (2008)
- Media X Award, Stanford University (2003)
- OTL Birdseed Award, Stanford University (2003)
- Net Challenge Prize, IEEE / ACM SC2000 (2000)

PROGRAM AFFILIATIONS

- Symbolic Systems Program

PATENTS

- Chris Chafe, Josef Parvizi. "United States Patent 11471088 Handheld or Wearable Device for Recording or Sonifying Brain Signals", Leland Stanford Junior University, Oct 18, 2022
- Alexander Grant, Chris Chafe, Josef Parvizi, Jianchun Yi, Raymond Woo. "United States Patent 10849553 Systems and methods for processing sonified brain signals", CeriBell, Inc., Mar 27, 2019
- Chris Chafe, Josef Parvizi. "United States Patent 11045150 Method of Sonifying Brain Electrical Activity", Leland Stanford Junior University, Nov 27, 2018
- Chris Chafe, Josef Parvizi. "United States Patent 9,888,884 Method of Sonifying Signals Obtained from a Living Subject", Leland Stanford Junior University, Feb 13, 2018
- Chris Chafe. "United States Patent 9,354,335 Determining Location Information of Microseismic Events During Hydraulic Fracturing", Leland Stanford Junior University, May 31, 2016
- Chris Chafe. "United States Patent 14/301,270 Glitch-Free Frequency Modulation Synthesis of Sounds", Leland Stanford Junior University, Oct 23, 2014
- Chris Chafe. "United States Patent 7,522,734 Distributed Acoustical Reverberation for Audio Collaboration", Leland Stanford Junior University, May 21, 2009
- Chris Chafe. "United States Patent 6,801,939 Method for Evaluating Quality of Service of a Digital Network Connection", Leland Stanford Junior University, May 14, 2004
- Chris Chafe. "United States Patent 5,508,473 Music Synthesizer and Method for Simulating Period Synchronous Noise Associated with Air Flows in Wind Instruments", Leland Stanford Junior University,, Apr 16, 1996
- Chris Chafe. "United States Patent 5,157,216 Musical Synthesizer System and Method Using Pulsed Noise for Simulating the Noise Component of Musical Tones", Leland Stanford Junior University, Oct 20, 1992

Teaching

COURSES

2026-27

- Ensemble Sonification of Temporal Data: MUSIC 153D (Win)
- Ensemble Sonification of Temporal Data: MUSIC 153DZ (Win)
- Fundamentals of Computer-Generated Sound: MUSIC 220A (Aut)
- Research Seminar in Computer-Generated Music: MUSIC 220C (Spr)

2025-26

- Fundamentals of Computer-Generated Sound: MUSIC 220A (Aut)
- NMP CODE Ensemble: ARTSINST 141, MUSIC 153A (Win)
- NMP CODE Ensemble: MUSIC 153AZ (Win)
- Research Seminar in Computer-Generated Music: MUSIC 220C (Spr)

2024-25

- Ensemble Sonification of Temporal Data: COMM 153D, MUSIC 153D (Win)

- Ensemble Sonification of Temporal Data: MUSIC 153DZ (Win)
- Ensemble Sonification of Temporal Data: PSYCH 153D (Win)
- Fundamentals of Computer-Generated Sound: MUSIC 220A (Aut)
- Research Seminar in Computer-Generated Music: MUSIC 220C (Spr)

2023-24

- Ensemble Sonification of Temporal Data: COMM 153D, MUSIC 153D (Win)
- Ensemble Sonification of Temporal Data: MUSIC 153DZ (Win)
- Fundamentals of Computer-Generated Sound: MUSIC 220A (Aut)
- Research Seminar in Computer-Generated Music: MUSIC 220C (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Luna Valentin, Andrew Zhu

Postdoctoral Faculty Sponsor

Hassan Estakhrian

Doctoral Dissertation Advisor (AC)

Celeste Betancur, Kimia Koochakzadeh-Yazdi

Master's Program Advisor

Niccolo Abate, Conner Farrell, Tao-Tao He, Jeremy Hsiao, Calvin McCormack, Auralee Walmer

Doctoral Dissertation Co-Advisor (AC)

Calvin Van Zytveld

Doctoral (Program)

Celeste Betancur, Simon Kanzler, Soohyun Kim, Kimia Koochakzadeh-Yazdi, Nicholas Shaheed, Walker Smith, Alexander Wu

Publications

PUBLICATIONS

- **The Ensonification Interface: A Comprehensive Toolkit for Ensemble Sonification of Temporal Data** *JOURNAL OF THE AUDIO ENGINEERING SOCIETY*
  Peng, T., Choi, H., Chafe, C., Ram, N.
  2026; 74 (3): 141-150
- **Perceiving Slope and Acceleration: Evidence for Variable Tempo Sampling in Pitch-Based Sonification of Functions** *IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS*
  Fan, D., Smith, W., Fujioka, T., Chafe, C., O'Modhrain, S., Deutsch, D., Follmer, S.
  2026; 32 (1): 221-231
- **A Comprehensive Evaluation of Networked Music Performance Using LEO Satellite Internet: The Starlink Use Case** *IEEE TRANSACTIONS ON NETWORK AND SERVICE MANAGEMENT*
  Borgianni, L., Adami, D., Bosi, M., Giordano, S., Chafe, C.
  2025; 22 (5): 3947-3963
- **Global Net Equity: The Role of LEO Satellites Towards 6G Connectivity Landscape**
  Borgianni, L., Adami, D., Giordano, S., Chafe, C., IEEE
  IEEE.2025: 414-419

- **Democratizing Networked Music Performance with a RL-Based SD-WAN** *IEEE COMMUNICATIONS MAGAZINE*
  Borgianni, L., Giordano, S., Chafe, C.
  2024; 62 (12): 26-32
- **A Content Adaptive Learnable Time-Frequency Representation for Audio Signal Processing** *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*
  Verma, P., Chafe, C.
  2023
- **Web-Based Networked Music Performances via WebRTC: A Low-Latency PCM Audio Solution** *JOURNAL OF THE AUDIO ENGINEERING SOCIETY*
  Sacchetto, M., Gastaldi, P., Chafe, C., Rottondi, C., Servetti, A.
  2022; 70 (11): 926-937
- **Experiencing Remote Classical Music Performance Over Long Distance: A JackTrip Concert Between Two Continents During the Pandemic** *JOURNAL OF THE AUDIO ENGINEERING SOCIETY*
  Bosi, M., Servetti, A., Chafe, C., Rottondi, C.
  2021; 69 (12): 934-945
- **Temporal Coordination in Piano Duet Networked Music Performance (NMP): Interactions Between Acoustic Transmission Latency and Musical Role Asymmetries.** *Frontiers in psychology*
  Washburn, A., Wright, M. J., Chafe, C., Fujioka, T.
  2021; 12: 707090
- **A GENERATIVE MODEL FOR RAW AUDIO USING TRANSFORMER ARCHITECTURES**
  Verma, P., Chafe, C., IEEE
  IEEE.2021: 230-237
- **Improved Real-Time Monophonic Pitch Tracking with the Extended Complex Kalman Filter** *JOURNAL OF THE AUDIO ENGINEERING SOCIETY*
  Das, O., Smith, J. O., Chafe, C.
  2020; 68 (1-2): 78–86
- **A Deep Learning Approach for Low-Latency Packet Loss Concealment of Audio Signals in Networked Music Performance Applications**
  Verme, P., Mezza, A., Chafe, C., Rottondi, C.
  edited by Balandin, S.
  IEEE.2020: 268–75
- **Delayed feedback embedded in perception-action coordination cycles results in anticipation behavior during synchronized rhythmic action: A dynamical systems approach.** *PLoS computational biology*
  Roman, I. R., Washburn, A. n., Large, E. W., Chafe, C. n., Fujioka, T. n.
  2019; 15 (10): e1007371
- **Detecting silent seizures by their sound** *Epilepsia*
  Parvizi, J., Gururangan, K., Razavi, B., Chafe, C.
  2018; 59 (4): 877-884
- **Op 1254: Music for Neutrons, Networks and Solenoids using a Restored Organ in a Nuclear Reactor**
  Handberg, L., Elblaus, L., Chafe, C., Canfield-Dafilou, E., ACM
  ASSOC COMPUTING MACHINERY.2018: 537–41
- **Don't Be Alarmed: Sonifying Autonomous Vehicle Perception to Increase Situation Awareness**
  Gang, N., Sibi, S., Michon, R., Mok, B., Chafe, C., Ju, W., Assoc Comp Machinery
  ASSOC COMPUTING MACHINERY.2018: 237–46
- **Mobile Music, Sensors, Physical Modeling, and Digital Fabrication: Articulating the Augmented Mobile Instrument** *APPLIED SCIENCES-BASEL*
  Michon, R., Smith, J., Wright, M., Chafe, C., Granzow, J., Wang, G.
  2017; 7 (12)

- **An Overview on Networked Music Performance Technologies** *IEEE ACCESS*
  Rottondi, C., Chafe, C., Allocchio, C., Sarti, A.
  2016; 4: 8823-8843
- **Synthetic Sound from Synthetic Biology** *SYNTHETIC AESTHETICS: INVESTIGATING SYNTHETIC BIOLOGY'S DESIGNS ON NATURE*
  Chafe, C., Leguia, M., Ginsberg, A., Calvert, J., Schyfter, P., Elfick, A., Endy, D.
  2014: 219–30
- **Sound synthesis for a brain stethoscope.** *journal of the Acoustical Society of America*
  Chafe, C., Caceres, J., Iorga, M.
  2013; 134 (5): 4053-?
- **Internet rooms from internet audio.** *journal of the Acoustical Society of America*
  Chafe, C., Granzow, J.
  2013; 133 (5): 3347-?
- **JackTrip/SoundWIRE Meets Server Farm** *COMPUTER MUSIC JOURNAL*
  Caceres, J., Chafe, C.
  2010; 34 (3): 29-34
- **Effect of temporal separation on synchronization in rhythmic performance** *PERCEPTION*
  Chafe, C., Caceres, J., Gurevich, M.
  2010; 39 (7): 982-992
- **JackTrip: Under the Hood of an Engine for Network Audio** *JOURNAL OF NEW MUSIC RESEARCH*
  Caceres, J., Chafe, C.
  2010; 39 (3): 183-187
- **Tapping into the Internet as an Acoustical/Musical Medium** *CONTEMPORARY MUSIC REVIEW*
  Chafe, C.
  2009; 28 (4-5): 413-420
- **Analysis of Flute Control Parameters: A Comparison Between a Novice and an Experienced Flautist** *ACTA ACUSTICA UNITED WITH ACUSTICA*
  de la Cuadra, P., Fabre, B., Montgermont, N., Chafe, C.
  2008; 94 (5): 740-749
- **Neural dynamics of event segmentation in music: Converging evidence for dissociable ventral and dorsal networks** *NEURON*
  Sridharan, D., Levitin, D. J., Chafe, C. H., Berger, J., Menon, V.
  2007; 55 (3): 521-532
- **Cyberinstruments via physical modeling synthesis: Compositional applications** *LEONARDO MUSIC JOURNAL*
  Kojs, J., Serafin, S., Chafe, C.
  2007; 17: 61-66
- **Oxygen flute: A computer music instrument that grows** *JOURNAL OF NEW MUSIC RESEARCH*
  Chafe, C.
  2005; 34 (3): 219-226
- **Physical model synthesis with application to Internet acoustics** *IEEE International Conference on Acoustics, Speech, and Signal Processing*
  Chafe, C., Wilson, S., Walling, D.
  IEEE.2002: 4056–4059
- **DREAM MACHINE 1990** *COMPUTER MUSIC JOURNAL*
  CHAFE, C.
  1991; 15 (4): 62-64
- **TOWARD AN INTELLIGENT EDITOR OF DIGITAL AUDIO - RECOGNITION OF MUSICAL CONSTRUCTS** *COMPUTER MUSIC JOURNAL*
  CHAFE, C., MONTREYNAUD, B., Rush, L.
  1982; 6 (1): 30-41