

Tianyu Ge

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Curriculum Vitae

EDUCATION

- Doctor of Philosophy in Computer Science** | Virginia Tech 2021 - expected 2027
Dissertation: Affective Computing for Live Performance
Data acquisition complete; analysis in progress; part-time from May 2026
Member, Phi Kappa Phi Honor Society
- Master of Science in Computer Science** | Virginia Tech 2021 - August 2026
HCI focus
- Master of Fine Arts in Creative Technologies** | Virginia Tech 2018 - 2021
MFA Thesis: Encyclopaedia Mundi — a full-stack, ML-generated interactive encyclopedia exploring trust and authenticity in AI-generated knowledge
- Bachelor of Science in Computer Science** | Virginia Tech 2012 - 2017

RESEARCH INTERESTS

Human-computer interaction, affective computing, and creative technology — physiological and biosignal sensing, embedded and networked interactive systems, and the design of interfaces that make generative, data-driven, and sensor-driven systems legible to the people using them.

RESEARCH EXPERIENCE

- Graduate Research Assistant** | Institute for Creativity, Arts, and Technology (ICAT), Virginia Tech 2018 - May 2026
- Designed an empathic interface for live virtual performances that captures audience electrodermal activity (EDA) via EmotiBit and communicates affective states to performers in real time, bridging the perceptual gap created by remote performance contexts. Switched to EmotiBit after an initial Empatica EmbracePlus attempt hit inconsistent data egress; EmotiBit's adjustable, higher EDA sampling rate (15Hz vs. EmbracePlus/E4's fixed 4Hz) was also a material analysis-quality improvement.
 - Designed and conducted an IRB-approved within-subject study (n=38, IRB #24-135) examining whether EDA-driven generative music increases emotional congruence between performers and audiences; deliberately over-recruited participants to preserve statistical power against known real-world EDA-measurement failure rates. Data collection complete; currently analyzing across intra-participant, inter-participant, and cross-role (audience-performer) dimensions using NeuroKit2 (Python).
 - Presented study design and problem framing at an HCI International 2025 workshop (not published in the proceedings).
 - Collaborated across Computer Science, Human Development and Family Sciences, and Performing Arts Medicine on a related longitudinal study (The Beat Goes On, see Selected Projects below), resulting in a peer-reviewed publication (ArtsIT 2025).

TEACHING EXPERIENCE

- Substitute Instructor** | Creative Code (ART-3504/5604), Virginia Tech Spring 2019
- Delivered course instruction for a mixed undergraduate/graduate creative-coding class, substituting for the primary instructor.

SELECTED PROJECTS

- The Beat Goes On** | Virginia Tech ICAT 2024 - Ongoing
- Modified open-source InfiniTime firmware (C++) on PINE64 Pinetime smartwatches to build a single-task heart rate recording interface for a 45-member intergenerational community choir (majority college students and general community members, including 3 participant-caregiver pairs experiencing mid-to-late-stage dementia); removed all stock apps and reduced the interaction flow to a start/stop button and live HR counter, deliberately hardening the stop action against accidental interruption, to keep the interface usable across a wide range of technology familiarity and mobility levels.

- Managed a fleet of 30+ modified smartwatches deployed across biweekly and weekly rehearsals across 3 seasons; oversaw device assignment, data extraction, and quality control for the longitudinal, IRB-approved study; built crash-resilient data recovery procedures that preserved all data through multiple mid-rehearsal OS crashes.
- Conducted preliminary heart rate data analysis across 2 seasons of rehearsals (n=45+); found consistent cardiovascular elevation during active singing phases, with a response arc mirroring a structured music therapy session. Published: Ge, T., et al., ArtsIT 2025, Springer LNICST 696.

Dear Younger Me | Virginia Tech ICAT (Strategic Initiative)

2023 - 2024

- Built the biosignal data-processing pipeline for Dear Younger Me, a video piece pairing recorded testimony with physiological data: downloaded and processed Empatica E4 wearable data (heart rate, raw EDA) from three performers' recording sessions, decomposed EDA into phasic and tonic components, and synchronized data timestamps with spliced video timecodes so a collaborating composer could translate participants' real-time emotional responses into the video's background music. Built a Python-based (Jupyter, pandas, Matplotlib) visualization charting EDA response over time, then composited a rolling chart-over-video sequence (ffmpeg, imagemagick) to visually validate the EDA-to-composition correspondence.

Celestial Garden | Smithsonian National Museum of American History

2022 - 2023

- Developed the software systems for an interactive art installation exhibited at the Smithsonian National Museum of American History (ACcelerate 2022) — one of a 7-person cross-departmental team (ICAT, Computer Science, School of Visual Arts); built firmware (extending attributed reference code from collaborators; Arduino SAMD, FastLED, MPU6050, OSC) for 16 networked sensor nodes, including an automatic MAC/IP network-provisioning system keyed to each board's hardware serial number and an experimental over-the-air firmware update path; designed the OSC-based interactivity API, and built a remote diagnostics front-end in Max/MSP for real-time facility monitoring. Also served as an exhibit docent.
- During the 4-day live public exhibit run, observed real-time visitor interaction behavior and shipped a same-cycle software fix — cut the interaction cooldown period from 2000ms to 50ms after the original timing read as unresponsive to visitors, deployed before the next day's opening. Provided live production support across the deployment, including remote and manual device recovery and networking-quirk diagnosis.

Entomo3D | Virginia Tech University Libraries

2020 - 2022

- Built and ran the digitization pipeline for a CLIR-funded project (Virginia Tech University Libraries, Entomology, School of Visual Arts) creating 3D models of insects from the Virginia Tech Insect Collection via photogrammetry; wrote a Python script for automated background removal and focus/quality triage that caught unusable photo sets before manual work began, maximizing throughput under a fixed grant budget; wrote a second script to schedule and batch photogrammetry jobs, extending automation originally built for SourceForm. Processed 300+ specimens; ~150 reached production quality.

SourceForm | SIGGRAPH 2019

2018 - 2019

- Built the front-end touchscreen interface (rapid-prototyped from a given brief, full-screen browser-based kiosk UI) for an on-demand 3D-printing kiosk that reconstructs physical objects from crowdsourced web images; forked and customized an open-source on-screen keyboard to match the interface's visual design. On the backend, rewrote legacy MATLAB image-retrieval code in Python and folded it into a watcher process that services HTTP requests from the UI machine and integrates with a colleague-built 3D printer control API to drive prints. Tuned COLMAP's reconstruction parameters so the photogrammetry pipeline could adapt across a wide range of user-requested object types. Presented at SIGGRAPH 2019.

Live Action VR | Virginia Tech ICAT

2018 - 2021

- Implemented the Unity-side pipeline for a live-action VR project: integrated two Blackmagic Micro Studio cameras as a stereoscopic capture source, built the Unity scene across multiple story environments, and developed custom Unity shaders (ShaderLab) for real-time chroma keying and compositing of the live camera feed into the scene — mapping left/right camera input to the left/right eye of an HTC Vive Pro headset to preserve stereoscopic depth.

Encyclopaedia Mundi | MFA Thesis

2019 - 2021

- Built a full-stack ML-powered interactive encyclopedia as MFA thesis: forked and extended jdan/98.css (open-source Windows 98 UI library, properly attributed) as the interface shell, porting it into Electron and fixing shading, font-kerning, and off-by-one-pixel rendering bugs in the original; extended it with authentic Win32 window-icon interaction behavior via custom Electron IPC calls. Flask backend (prototyped on Google Cloud Platform; production runs on a remote personal machine), fine-tuned GPT-2 model for content generation from a Wikipedia corpus, with ffmpeg and imagemagick for media processing.

- Measured real-world generation latency (30+ seconds on non-GPU hardware) and redesigned from local, on-device generation to a server-offloaded stateless REST architecture, cutting average response time to 3-7 seconds; built a character-by-character text-streaming UI, inspired by dial-up BBS/MUD-era progressive text loading, to mask the remaining wait.

BarkLight | Virginia Tech Spring Research Symposium 2019

2018 - 2019

- Advised an undergraduate HCI capstone team building a biophilic tangible interface (Arduino-embedded poplar bark); provided technical guidance on interactivity implementation. Team won 1st place at the 2019 Virginia Tech Spring Research Symposium.

PUBLICATIONS & PRESENTATIONS

- Ge, T., et al. "The Beat Goes On: Accessible Biosignal Measurement for Empathetic Immersive Experience." ArtsIT 2025, Springer LNICST 696, pp. 289-306. DOI: 10.1007/978-3-032-26999-7_19
- "Empathic Interface for Performers in Virtual Environments: An EDA-Based Approach." Presented at HCI International 2025 (workshop talk; not published in proceedings).
- Winter, P., et al. "The Beat Goes On: Interdisciplinary Research on Intergenerational Choral Singing." Poster, 13th European Music Therapy Conference, 2025.

GRANTS & HONORS

- Member, Phi Kappa Phi Honor Society (Virginia Tech chapter)
- Entrepreneurial Lead, NSF Innovation Corps (I-Corps) cohort — \$50,000 NSF grant award, Spring 2016
- 1st Place, Capstone Awards, Virginia Tech Spring Research Symposium 2019 — as graduate advisor, BarkLight
- Contributor, CLIR (Council on Library and Information Resources)-funded digitization initiative — Entomo3D, Virginia Tech University Libraries

CERTIFICATIONS

- CITI Program (Virginia Tech): Biomedical Research; Good Clinical Practice (GCP) for NIH-Funded Clinical Trials; Information Privacy and Security (IPS)

SERVICE & OUTREACH

- Exhibit docent, Celestial Garden installation, Smithsonian National Museum of American History (ACCElerate 2022) — engaged directly with museum visitors
- K-12 outreach performer, Linux Laptop Orchestra (L2Ork) — gestural-interaction performances at area high schools (2015-2016)
- Undergraduate capstone advisor, BarkLight HCI capstone team (2018-2019) — see Selected Projects

OTHER EXPERIENCE

SWAT Technician | College of Engineering, Virginia Tech

2013 - 2017

- Provided IT support for engineering students as part of Virginia Tech's Software Assistance Triage (SWAT) team; specialized in macOS and Linux troubleshooting, routinely handling escalated issues that generalist technicians could not resolve.

TECHNICAL & DESIGN SKILLS

Languages: Python, JavaScript, Java, C, C#

Design & Research Methods: Interaction design, human factors, accessible design (WCAG, WAI-ARIA), mixed-methods user research, IRB protocol design, physiological/biosignal sensing (EDA, HR), statistical analysis

Design Tools: Figma, Sketch, Adobe Creative Suite, Affinity Suite, Final Cut Pro, Framer, Webflow

Development: Flask, Electron, Git, Unity, Google Cloud Platform (GCP, prototyping)

Systems & Hardware: Linux (Arch Linux), Arduino (C++), EmotiBit, BLE, OSC, Max/MSP

LANGUAGES

- Mandarin Chinese (fluent, native); English (fluent); Wu Chinese / Shanghainese (fluent)