

16+ years of experience developing, testing, and maintaining code for a wide variety of applications/clients.

Core competencies in software engineering, scientific computing, skunkworks & experimental design.

Recent *Fellow* at Recurse Center f.k.a. Hacker School:

- Released an extensive open source library for spectral modeling and transformation of arbitrary digital audio signals into compositionally-controllable synthesis objects. [python, numpy]
- Implemented an open source, browser-based bandcamp GUI using asynchronous crawling/scraping to provide an improved music recommendation and discovery UX workflow. [python, javascript, django, Docker, PostgreSQL, requests, HTML, CSS, Bootstrap5, d3.js, celery, Redis, daphne, websockets]
- Prototyped a machine-learning software tool for learning arbitrary computer synth parameters for approximating arbitrary input audio files using genetic-algorithm/gradient descent. [python, Csound]
- Prototyped a 3D audio ray-tracer for generating reverberant/reflective impulse responses & HRTFs based on traversal of virtual architecture. [python, Blender]
- Obtained Google Cloud Leader & AWS Certified Cloud Practitioner (CLF-C01) certifications.

PhD/post-doctoral work in Neuroengineering (developing electrical therapeutics for brain tumors) & Bioinformatics:

- Developed custom software/hardware control systems for administering and monitoring multi-animal implantable electrical stimulation experiments. For this project, I architected and was awarded a \$1.8M R01 grant from the National Institutes of Health. [python, C, embedded systems, 3D printing]
- Designed/developed/maintained numerous custom multiphysics modeling, data processing, analysis, and visualization software/pipelines for applied computer vision of cell and tissue analyses, munging, statistical analysis, and visualization of numerous high throughput molecular/next-gen sequencing assays, included in several peer-reviewed scientific publications. [python, numpy, scipy, pandas, matplotlib, R, Matlab, COMSOL, various bioinformatics tools]
- Intern at Takeda Pharmaceuticals, where I developed chemical simulation and optimization GUI framework for industrial inertization protocols which led to major protocol innovations. [Matlab]
- Kept on as consultant at Takeda to advise on initiation of a computational team for next-generation sequencing; Developed a library for simulation and analysis of mutated reads and prototyped strategies for novel sequence identification and hierarchical classification of next-gen sequencing data. [python, Matlab]
- During this period, I co-ran an independent firm (*Lunging Bull*) specializing in providing web presence solutions for early stage startups; Developed iterative designs, planning, and implementation of full-stack development, interface designs for web & mobile, and information architecture. [php, MySQL, HTML, CSS, javascript, JQuery]

Masters/Undergraduate work in Computer Science w/ emphasis on digital audio signal processing & machine learning/AI in the context of computational neuroscience and robotics.

- Developed virtual reality and humanoid robotic systems controlled by brain-computer interfaces. Ran experiments and adapted machine-learning algorithms for data analysis of patient EEG/ECoG data for these systems including use of hierarchical classification models of spatial time-series data, and online reinforcement learning with partially observed markov decision processes. [C, C++, Matlab]
- Implemented a communication platform to allow flexible networked control of our robotic systems. [C, C++]
- Provided algorithmic improvements to software tools and DSP algorithms for spectral/spatial manipulation of sound, including granular and envelope interpolation libraries, algorithmic speed-ups for spectral analysis, and swarm/granular control system for spatial sound. [Csound, Lisp, C, python, MaxMSP]

- Simultaneously employed in the nascent Digital Arts & Experimental Media (DXARTS) dept. where I designed, and managed the IT infrastructure and provided technical design and software development for myriad art installation and performance projects:
- Led technical arm for several experimental music concerts/installations (quadraphonic, ambisonic, diffusion, HRTF, and surround based formats), 3D soundfield & binaural recordings for several experimental film and audio projects, a dance performance with interactive 3D projection and sound elements, and a telematic 3D-audio spatial feedback installation where listeners in Cleveland & Seattle were able to share simultaneous sonic space.
- Designed, funded, built-out and operated department multi-platform server infrastructure (Linux, Apple, Windows), custom render farm, and multiple digital arts computing laboratories including a 24.4-array, 3D-capable soundlab with matched performance rig, and 10.1 mixing/master room. [Java, sysadmin]
- Developed and maintained custom software for equipment purchasing, inventory, and rental. [php, MySQL]

Ph.D., Georgia Institute of Technology & Emory University, Biomedical Engineering, 2017

M.S., University of Washington, Computer Science, 2010

B.S., University of Washington, Computer Science, 2009

B.F.A., University of Washington, Digital Arts & Experimental Media (DXARTS), 2006

B.S., University of Washington, Digital Signal Processing for Computer Audio (General Studies), 2006

Fellow	Recurse Center	Jan-Mar 2023
Scientist	Emory University Dept. of Biology	2021-2022
Research Scientist	Duke University Biomedical Engineering	2017-2021
Instructor/Associate	Duke University Initiative for Science & Society	2019-2021
Research Assistant	Georgia Institute of Technology	2010-2017
Intern/Consultant	Takeda Pharmaceuticals: Comp. Modeling & Sequencing	2015-2016
President	Graduate Student Government, Georgia Inst. of Tech	2014-2015
Full-Stack Engineer	Lunging Bull	2012-2014
Research Assistant	University of Washington Computer Science	2008-2010
Sr. Comp. Specialist	University of Washington DXARTS	2007-2009
Technical Staff	University of Washington DXARTS	2005-2007

Selected Journal Articles & Conference Proceedings

Mokarram N, Denend L, Lyon JG, Rait DS, Brinton TJ, Makower J, Yock P. "Need Statements in Healthcare Innovation" *Annals of Biomedical Engineering*, 49(7):1587-1592, 2021.

Enam SF, Kilic CY, Huang J, Kang BJ, Chen R, Tribble CS, Betancur MI, Ilich E, Blocker SJ, Owen S, Lyon JG, Bellamkonda RV. "Cytostatic hypothermia and its impact on glioblastoma and survival" *Science Advances*, 8(47), eabq4882, 2022.

Park EA, Lyon JG, Betancur M, Alvarado-Velez M, Shin J, Bellamkonda RV "Immunomodulation-mediated neuroprotection by electrical stimulation on the acute phase of traumatic brain injury in male rats", *Journal of Neuroscience Research*, 00:1-21, 2021

Lyon JG, Carroll SL, Mokarram N, Bellamkonda RV "Electrotaxis of Glioblastoma and Medulloblastoma Spheroidal Aggregates" *Scientific Reports*, 9(1):5309, 2019

Lyon JG & Bellamkonda RV "Recent Progress in Manipulating Brain Cancer with Electric Fields" *Nature: Engineering Biology for Medicine*, Durham, NC, 2019

(Lyon JG, Mehta N)*, Patil K, Mokarram N, Kim C & Bellamkonda RV "Bacterial Carriers for Glioblastoma Therapy" *Molecular Therapy – Oncolytics*, 4:1-17, 2017 [* co-first authors]

Scherer R, Chung M, Lyon JG, Cheung W, Rao RPN "Interaction with Virtual and Augmented Reality Environments using Non-Invasive Brain-Computer Interfacing" *First International Conference on Applied Bionics and Biomechanics*, Venice, Italy, 2010

Chung M, Scherer R, Lyon JG, Cheung W, Rao RPN "Towards Hierarchical BCIs: Combining Motor Imagery and Evoked Potentials for Robotic Control" *Fourth International BCI Meeting*, Pacific Grove, CA, 2010