

Geraint Luff

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Software engineer and mathematician with a passion for audio and signal processing, cryptography/privacy, web protocols and open standards.

Interested in opportunities to solve crunchy problems and create tools that make people happy.

Signal Processing Highlights

Audio effects

- VST3 effects (Signalsmith Audio), and command-line (C++) effects and analysis tools
- Create/maintain a popular set of JSFX (REAPER) effects (geraintluff.github.io/jsfx/) including reverbs, synths (various algorithms), harmoniser, spectral analysis/matching, modulation/FM, pitch/formant shifting, time-alignment, and some tutorial videos

Current areas of research

- An improved approach for frequency-domain reverb
- Multi-scale edge-detection and envelope-following for dynamics processing
- Non-linear multi-mic signal separation for drum kits

Other work (selection)

- 600-line header-only FFT, with good performance for its size (bit.ly/ssa-fft)
- Sample-stitching for monophonic instrument synthesis
- 1D → 2D spectral translation (bit.ly/2d-vis)

Employment

Mar 2020 - current	Signalsmith Audio Ltd. - founder / developer signalsmith-audio.co.uk I am developing a set of commercial audio effects (VST3), currently in early alpha, as well as consulting projects for algorithmic design (audio / radio)
Feb 2017 - Mar 2020	Amazon Lab126 / Evi Technologies / Ring Research Scientist (audio focus) / Software Development Engineer I worked in the platform team of Lab126's Computer Vision dept. (now part of Ring). <ul style="list-style-type: none">• Designed/implemented automated audio analysis tools, used to tune filters/AGC• Contributed to audio pipeline and other platform-level features (Linux kernel and Android-based OS) for Amazon Cloud Cam and Ring Stick-Up Cam• Worked with third-party vendor, identifying and trouble-shooting audio issues (software and acoustic) in their components for the Ring Stick-Up Cam• Wrote security review for Amazon Cloud Cam
Nov 2014 - June 2016	ARM Ltd - IoT Web Applications Engineer I worked in the Internet of Things (IoT) R&D group and business unit. <ul style="list-style-type: none">• Designed and analysed IoT cryptographic authentication and privacy protocols• Designed a dynamic information schema for configuring headless BLE/IoT devices using adaptive UIs, and contributed to iOS reference implementation• Contributed to an Objective-C runtime for low power wearable IoT devices• 15 patent applications (mainly cryptography and privacy protocols) with 11 granted as of Oct 2020 (4 UK, 4 US, 3 both, ongoing worldwide applications)
May 2012 - Nov 2014	ACTIV Financial - Web Tools Developer I maintained and developed internal web-based tools for the company. <ul style="list-style-type: none">• Created database-backed site (RESTful JSON APIs, flexible AJAX client)• Automated version control (SVN and CVS) and emails (IMAP) from PHP
Aug 2009 - April 2012	Airsource - Mobile Software Developer (Android/iOS) I developed smartphone software, both in-house and contracted. Projects included Android/iOS app development, and modifying the Android OS for a customised phone
Summers 2006 – 2008	Meridian Audio - sponsored student Culminated in research on the performance limits of dithering in fixed point FFT

Open Source

tv4 (2+ million downloads/month) npmjs.com/package/tv4
JSON Schema validator for JavaScript (Node.js/browser)
uri-templates (300k+ downloads/month) npmjs.com/package/uri-templates
construct and deconstruct URLs based on RFC 6570, for JavaScript (Node.js/browser)
JSON Schema json-schema.org
I was spec draft editor & contributor for v4 of this JSON description/validation spec
Contributed to UglifyJS
patch added support for explicit sourcemap URLs for each input
Lightning talk at Chaos Community Congress
presented 849 byte JS implementation of SHA-256 to “bookmark” JS code integrity

Ask me about my other projects/interests

Git repo parsing/manipulation
HTML+JS for static-site repo previews (bit.ly/static-git), Git-mine (bit.ly/git-mine)
Cryptography
ECC/RSA/D-H/AES, Socialist millionaire, Lamport/Merkle signature family
UI frameworks
REAPER JSFX UI library (bit.ly/jsfx-ui), schema-driven UI generation
Web protocols
OAuth2 webhook extension for HTTP POST, SMTP client & server, URI Templates, CBOR debugger (bit.ly/chor-debug), JSON Patch / Merge, JSON Schema
Small JavaScript
1.4kb Promises polyfill, 1.3kb HTML sanitiser, 849-byte SHA-256
Code generation
JSFX preprocessor, URI Template to JavaScript, JSON Schema to JavaScript
Fun with images
Monte-Carlo raytracer (bit.ly/js-ray), pencil-sketch simulation
Statistics & optimisation problems
Bayesian inference, Markov models / HMM / Viterbi, neural networks
Plotting and equations
Plotting and equation libraries for my own writeups (bit.ly/js-plot, bit.ly/js-eq)

Languages and Tools

- Completed projects in:
 - C/C++ (VST3, command-line, Linux kernel on Android, Node.js native modules)
 - JavaScript (Node.js, ES6), HTML/CSS
 - Python (NumPy/matplotlib)
 - Java (Android-based OS / apps)
 - JSFX (REAPER’s effect language)
 - Objective-C (iOS development)
 - MATLAB, Shell (bash), PHP
- Familiar with version control (Git - [see my HTML+JS client](#), SVN) and Agile SCRUM

Education

2006-2009 **Queens' College, University of Cambridge**
BA Mathematics (2:2)
Favourites include: Complex Analysis, Galois Theory, Markov Chains, Statistics, Coding and Cryptography, Number Theory, Set Theory and Logic

Music

geraintluff.bandcamp.com

I compose, record and perform my own music (piano/voice/synthesiser), and have self-released three albums (iTunes/Spotify/others), including running a successful Kickstarter.

I enjoy collaborating with other musicians, and I’ve often been a member of musical groups (including touring with Queens’ College choir, the county youth choir and orchestra). I still lead the Amazon Cambridge office choir, including custom musical arrangements.