

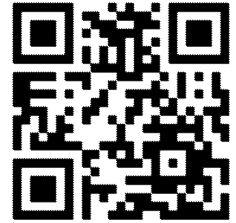
Cale Jamison McCollough

Software and Computer Engineer

Portfolio: <https://calemccollough.github.io>

Email: cale.mccollough@gmail.com

Phone: [541-653-6966](tel:541-653-6966)



Summary:

8+ years of experience programming, designing electronics, testing, and running a startup company that makes AI productivity software, touchscreen music/DJ hardware and software, internet technologies, and other products below. I'm good with everything from design to PCB layout, prototype assembly, testing, repair, troubleshooting, IT, web, technical writing, firmware, IoT, AI, app programming, administrative tasks, and other startup and corporate tasks.

Education:

BS Computer Engineering, Portland State University, Portland Oregon (2010 – 2013, 2016 –2017, 201?-Current)

AS Associates of Science, Lane Community College, Eugene Oregon (2010)

Experience:

Please note this is only some of my experience that I think is my preferred life direction. I'm API and technology flexible.

The A-Startup

2014 and 2018–Current: AI-powered democratized startup platform with social networking platform and hybrid pen-and-paper and IoT productivity app that helps maximize the chance of success of your startup by minimizing costs and maximizing rewards with the power of the pen, positive psychology, neuroscience, and AI.

- Hung around a business accelerator for about a year designing products and writing a book on using documentation to maximize flow state time that then turned into the A-Startup.
- Created I am You Language (IMUL) based on the Chinese Room Abstract Stack Machine (Crabs) for low-resistance rapid documentation using a document scanner to optimize your A* A-startup Stack Machine using pen-and-paper push-down automata.
- Developed hybrid pen-and-paper and Internet-of-Things productivity system based on IMUL and Script2 that leverages neuroscience to maximize learning rate and productivity through the Hour of Seconds (HoSe).
- Developed simple prototype app using Test-driven Development by converting Use case scenarios into console tests with a mocked FluidUI GUI.
- Managed site content with WordPress CMS.

Puff Algorithm

2017–Current: World's fastest Integer-to-String algorithm with half the division instructions of prior algorithms.

- Designed and tested 5 different methods of Integer-to-String algorithms in a wiki with warts publicly exposed.
- Used divide-by-conquer technique to eliminate half of the division instructions.
- Used bit shifting and a table of ranges of each bit to find a faster way to find the length of the converted string and print the Most Significant Decimal.
- Utilized flywheel design pattern to reduce code size with safe goto statements.
- Utilized a single C++ templated algorithm to print 32-bit and 64-bit integers in UTF-8/ASCII, UTF-16 or UTF-32.
- Used benchmarks to improve algorithm in special cases.
- Optimized a single division instruction from the Grisu2 algorithm.
- Created Open-source Research Paper template to develop innovations in Wikis.

Script² and the SCRIPT Specification

2015–Current: Serial Chinese Room, Interprocess, and Telemetry (SCRIPT) Specification and Script² Embedded-C++11 IoT and Seam Tree Test Nanoframework.

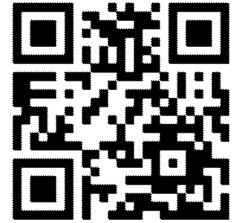
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- Developed Machine-to-Machine Interface (MMI) and Console Human-machine Interface (HMI) using artificial intelligence philosophy and ASCII C0 control codes mimicry that allows a virtual table or jump table to work as an MMI or Console HMI using a simple call by index or name system that can be used to create a variety of languages using a simple set of configurable tokenization parsing rules.
- Developed embedded-friendly Seam Tree Tests Nanoframework for enumerated trees of seams with custom debug code for each seam node and leave that allows for easy mocking of servers and faster code iterations of higher index seams through the easy blocking out of prototype code with macros.
- Automaton Standard Code for Information Interchange Data Specification supports all C++ data primitives, contiguous JSON-like objects, input sanitation, fast data compression using varints similar to UTF-8 encoding with full range, and seamless operation across assembly line boundary using the AsciiFactory.
- Developed Determinate Finite Automaton to interpret and sanitize ASCII Data Types suitable for embedded systems. Format structure was proven mathematically to be a Group Structure by Group Automata Theory.
- Developed faster method to align pointers using 2's complement math and proof by induction.

Kabuki Toolkit

2016–Ongoing: A modern embedded-C++ toolkit for making intelligent connected technologies, apps, plugins, games, servers, firmware, and art with Script2.

- Developed Kabuki Touch library to create predictive and participant HCI interfaces (i.e. UX design).
- Developed MIDI and DMX controller firmware drivers in hardware and software.
- Developed software debounced control panel IO driver that combines digital input pins and SPI shift register IO to run multiplexed RGB LED and shift register logic on the same interrupt, increasing CPU efficiency and reducing RAM usage and programming complexity by using a unified packed bit field.
- Wrote simple 2D and 3D graphics engines and GUI toolkit; but most of that code is gone and replaced with existing wheels.
- Tried to clean up, integrate, and refactor large libraries into the Google C++ Style Guide, but this turned out to be a nightmare when third-party APIs update so I'm creating an automation tool for this job called the #Sloth, which turns out to be a very complicated problem to solve.
- Developing a DLL and RTOS-friendly Virtual Machine with dynamic functional programming environment based on mbed OS and Script2.

Symmetry Live Universal Instrument Controller

2010–Current: Hybrid touchscreen DJ, MIDI, and DMX Unicontroller with integrated USB audio interface, USB 3.0 hub, and iMX7 CPU with real-time Cortex-M4.

- Designed PCBs in DipTrace, performed 5 product iteration cycles, optimized costs, and integrated part ordering metadata into PCB CAD software for auto-exporting BOMs and EDA files for manufacture.
- Developed USB audio interface with Cirrus Logic converters, TPA6120A2 headphone amplifiers, TI PGA2500 preamps, and three variant configurations to hit price points and for lifestyle branding.
- Developed low-cost low-noise DC-in split rail power supply for high-performance AD/DA converters.
- Multiplexed hundreds of RGB and monochrome LEDs with super clean PCB layout.
- Assembled electronics prototypes with 0402 SMD and fine pitch (0.5mm) components.
- Designed professional-looking prototype electronics cases in Sketchup (CAD software) using layered colored acrylic plastics and RGB LED backlighting.
- Developed embedded motherboard schematics in Altium Designer for ARM and Intel Atom processors but have not laid out PCBs yet and might not because of a cheaper premade solution.
- Developed MIDI and DMX controller/editor GUI library with heads-up display in C++ in WinForms and Qt.

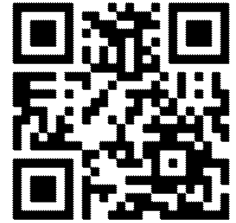
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AnyLED Universal LED Controller

2013–Current – LED light controllers for controlling analog and digital RGB+/-White LEDs (i.e. Neopixles).

- Designed 10 iterations of PCBs in DipTrace, built very large prototype light installations, broke them, then finally developed a marketable solution from months of failures.
- Implemented DMX-512 Protocol in software and firmware by adjusting the RS-485 Mark-after-break timing to generate an interrupt signal to load 512-bytes of data.
- Prototyped what later became the SCRIPT Bus that allows two RS-485 connections using a single 9-conductor CAT6 cable.
- Designed DC-DC power supplies with linear regulators and buck converters in MS Excel.
- Soldered thousands of solder joints attempting to make homemade RGB LED rope light; that didn't go so well.
- Designed high-current 12V car battery LED uninterruptible power supply with LT3790, SLA battery charger, and load dump protection.
- Designed professional schematics in Altium Designer and DipTrace with part metadata and BOM auto export.
- Created VRML model for LED lighting installation to invent and calculate costs of parts using Excel.

For more open-source software goodies, visit <https://calemccollough.github.io/>

Technical Skills:

Technologies

- **Languages*:** C/C++, Markdown, ASM, Java, Python, Matlab, C#, PHP/SQL/HTML/CSS.
- **EDA:** Altium Designer, DipTrace, and Eagle.
- **Primary Utilities:** Microsoft Office, Visual Studio, Atom, Eclipse, Pencil Project, **StarUML**, Sketchup.
- **Actively Learning:** OpenCV, PyTorch, HCI, JavaScript, React, WordPress, and BuddyPress.
- **Next to Learn*:** Fusion360, Julia, and Rust.

* means in order of most-to-least skilled or first-to-last order.

Soft Skills

- Founder and pitcher of products.
- Father.
- Organizer of events.
- Author of documentation.
- Creator of institutionalized knowledge.
- Collaborator of projects.
- Tracker of issues.
- Design thinker.
- Philosopher.
- Musician.
- Conversationalist.
- Foo.

Extracurricular and Volunteer:

CoderDojo: Taught kids engineering using Legos, and how to program computers in C++, C#, XAML, and Scratch.

College: Student government, OSPIRG, small jazz combos, Portland State University MCECS Student Ambassador.

High School: Jazz band (lead trumpet), marching band, symphonic band, track, wrestling.