COLIN McCORMACK

PRINCIPAL SYSTEMS & SOFTWARE ENGINEER | EMBEDDED SYSTEMS | REAL-TIME INFRASTRUCTURE | LINUX EXPERT

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SUMMARY

Colin McCormack is a senior systems and software engineer with decades of experience in embedded systems, real-time operating systems, distributed networking, firmware development, and Linux infrastructure.

He's known for bridging hardware and software in complex environments: from satellite and telecoms systems to medical-grade infrastructure and global irrigation networks. He has deep expertise in hardware–software integration and systems-level programming. A long time Linux advocate, Colin has also contributed extensively to open source software.

He thrives on tough technical challenges where elegant design and deep thinking are key. With decades of remote work experience, he's a strong communicator who excels in collaborative, cross-functional teams. He's drawn to work that requires precision, reliability and creativity: work that matters.

Colin is available for contract, consulting, or permanent roles, especially those focused on real-time systems, low-level development, or systems architecture. He's seeking work where the impact is significant and the problems are non-trivial.

WORK STYLE & STRENGTHS

- **Exceptional debugger:** renowned for solving obscure, subtle, and high-impact issues that others can't reproduce
- **Strategic problem solver:** design-led mindset and practical implementation focus
- **Strong communicator and effective collaborator** across hardware, software and systems teams
- **Excels in high-trust environments** requiring autonomy, deep thinking, resilience
- Comfortable leading, mentoring, or working as senior developer or consultant

KEY ACHIEVEMENTS

Technical Innovation & System Architecture

- Designed and implemented ColdStore, a gigabyte-scale object store for C++ applications. Led a remote, global team.
- Ported Minix to the Motorola 68000 / Applix 1616, the only known instance of this Unix-based OS on that platform.
- Wrote a real-time operating system from scratch.
- Reverse-engineered and reimplemented Espressif's ESPNow protocol.

Critical Project Delivery

- Rebuilt essential tooling from scratch, preserving a company's most profitable hardware device line after legacy software was lost.
- Delivered a working disaster recovery system under a strict 7 day regulatory deadline: deployed and signed off on time.
- Regularly diagnosed and resolved subtle, high impact firmware and hardware faults others could not reproduce - often brought in to "save the day".
- Implemented a key part of the Vietnamese national telecommunications satellite ground station.

Cross-Domain Leadership & Integration

- Bridged hardware and software teams across industries. Respected for deep understanding of both layers and strong cross-domain communication.
- Provided expert technical testimony in telecoms litigation, clearly communicating system behaviour to legal teams and State Supreme Courts.
- Collaborated on medical infrastructure across hospitals and research institutions.
- Taken to China by Beijing Municipal Government to consult at national ministerial level on the adoption of Linux in China.

Open Source & Community Contribution

- Longstanding contributor to open source tools and ecosystems, including the Tcl language, architecting embeddable web servers, and custom system utilities.

KEY SKILLS & TECHNOLOGIES

Programming & Scripting

- **C / C++**: Extensive experience, including embedded, real-time, systems-level development
- **Tcl / Tk**: Longstanding use across web servers, tooling
- **JavaScript**: Practical use for web based tools, including firmware interfaces
- **Assembly** (ASM), **Bash**, **Make**, **CMake**
- Additional experience with **Python**, **Perl**, **SQL**, **Golang**, **Cobol** & others

Systems & Platforms

- **Linux**: Deep expertise in development, deployment, administration
- **RTOS**: Designed & implemented custom kernels; expert in real-time infrastructure
- **Linux / POSIX** environments: Daily driver since the 1990s
- **Embedded & Connected Systems**: ESP32, Raspberry Pi, CAN bus, Zigbee, Bluetooth LE, LoRa, Matter
- Microcontroller development; device drivers; low-power & memory constrained systems

Architecture & Systems Design

- **Distributed & real-time systems** (irrigation, gaming, medical, telecoms, sonar, satellite)
- **Simulation & virtualisation** of hardware for testing & debugging
- Skilled in creating fault-tolerant, efficient, resource constrained systems

Networking & Protocols

- **TCP/IP**, **DHCP**, **HTTP/REST**; deep protocol stack knowledge
- Designed & deployed secure systems across **broadband**, **satellite**, **cellular** & **radio** networks
- Familiar with **MQTT**, **I2C**, **SPI**, **UART**

Tooling & Dev Practices

- **Containerisation**: Linux containers, Docker, Kubernetes (familiar)
- **Version control & CI**: Git, shell scripting, custom toolchains
- **Agile**: Experienced in fast-moving, collaborative environments

Technical Interests

- Electronics & firmware
- IoT, edge computing, sensor integration
- Mapping (GIS), networking/ communications
- Real-time & distributed systems
- Anything interesting!

PROFESSIONAL EXPERIENCE

RECENT CAREER (2012-2025)

Principal Software Engineer

Hunter Industries | San Diego, USA & Australia | 2012–2025 (permanent role)

Colin was Principal Software Engineer for several of Hunter Industries' core irrigation control systems, used globally in commercial, municipal, and golf course applications. Initially brought on as a contractor, he was later invited to join the team in San Diego as a full-time employee, ultimately working remotely from Australia for several years.

Key Contributions

- **Golf Irrigation Systems (Pilot):**
  - Designed and implemented the irrigation scheduling system, the core feature for watering precision on golf courses - a major technical challenge and key driver of sales.
  - Created Pilot FCP: a standalone application to initialise, configure, and control field controllers.
  - Built a virtual controller simulator, allowing software and firmware testing without physical hardware. This significantly improved development speed and debugging accuracy.
  - Enhanced communications protocols in collaboration with hardware engineers, reducing radio bandwidth requirements and increasing reliability - changes considered potentially patentable.
- **Commercial Irrigation Systems (IMMS):**
  - Maintained and improved Hunter's large-scale distributed control system deployed to over 6,000 sites worldwide, including:
    - Backend development for remote device management over GPRS and 5G cellular networks.
    - Interface software to bridge the public network with embedded ground-based controllers.
    - Diagnosed and resolved complex networking, firmware, and software issues across global installations.
  - Legacy System Transition:
    - Independently created and maintained a customer database for a system without formal ownership records, sourcing data across departments and third parties.
    - This initiative enabled a successful end-of-life transition, saved the company significant cost, and unlocked the ability to market next-gen systems.
- **Firmware & Embedded Systems:**
  - Collaborated closely with hardware teams to diagnose and resolve deep firmware issues, enhance performance, and optimise communication stacks.
  - Example: Diagnosed a failure in a field interface device that had baffled others. Devised a method to reproduce and demonstrate the issue, leading to resolution.
- **Emergency Systems Replacement:**
  - Recreated critical programming software for Hunter's most profitable golf field device after the original was lost (source code and system dependencies unknown), replacing a single fragile Windows XP machine, thereby preserving a key product line.
- **Cross-Functional Collaboration:**
  - Acted as a key bridge between software, firmware, and hardware teams.
  - Worked closely with product managers to troubleshoot, redesign, and optimise various components across product lines.

Tools & Technologies Used

- **Languages:** C, JavaScript, Tcl
- **Systems:** Embedded Linux, real-time operating systems
- **Technologies:** Distributed control systems, digital radio, cellular networking, in-field configuration software, and irrigation
- **Tools:** Custom built simulators

Telecommunications Expert Witness

Various Clients | NSW & Victoria, Australia | 2008–2019 (consulting, ad hoc)

- Provided expert technical analysis and testimony for telecommunications-related legal matters.
- Analysed complex networks, protocols, and deployments for use in legal and regulatory proceedings.
- Produced formal technical reports and briefings for solicitors and courts.
- Recognised for clear communication of technical subjects to legal and non-technical audiences.

MID CAREER & PROJECT HIGHLIGHTS (1999–2012)

In earlier years Colin worked as a consultant, contractor, open source contributor, and systems architect across a wide range of domains. Much of this work overlapped, and many projects were ongoing or ad hoc. Below are some key highlights.

Director of Technology, System Architect & Lead Developer

Shared Technology | Australia | 1980–2013 (ad hoc projects)

Colin was a founding principal of Shared Technology: an incubator for innovations. He provided ongoing technical leadership across numerous long term, research focused and open source software projects on an ad hoc basis. A few examples of this work include:

- Led international Free Software development teams and mentored junior developers.
- Architected and deployed ColdStore, a gigabyte-scale persistent object store for C++ - a research-oriented database alternative. Led a fully remote global team. *coldstore.sourceforge.net*
- Supported a Clinical Professor at Adelaide University and Director of Rheumatology at Royal Adelaide Hospital by making him the first medical academic with internet access in Australia.
- Involved in efforts to improve access to electronic health information for medical professionals in Australia. As part of these initiatives, he gave evidence before the House of Representatives Standing Committee on Family and Community Affairs.

Other key projects Colin worked on as part of Shared Technology include:

Chinix Project (Beijing Municipal Government)

Technical Consultant | 1998–2003

- Consulted with Beijing municipal government and nascent local tech firms to support national Linux development and Microsoft alternatives.
- Advised the PRC Minister for Technology on national strategy for OS and infrastructure independence.
- Helped optimise Linux systems for small footprint deployment across Chinese industrial and municipal applications.
- Shipped a custom-built Linux server from Sydney to Beijing within 24 hours. Operated for 5+ years with only one reboot, providing multi-level secure communications.
- Collaborated on early testing of the Godson CPU, China's first general-purpose chip, as part of long-term efforts to localise critical infrastructure.
- Project laid foundations for native Chinese Linux distributions used in public sector systems.

China Agri-Business

Technical Director & Co-Founder | 2000–2013

- Board member of China Agri-Business, focused on improving China's national herd through Australian livestock genetics.
- Supported Australian agricultural experts on field visits to build strategic relationships with Chinese agricultural institutions.
- Oversaw all technical aspects of the project, including animal tagging, data systems, and genetics tracking infrastructure in collaboration with Chinese universities and breeding specialists.
- Involved in the commercial and operational strategy of the business over a 13-year period.

Consulting Developer - Medical & Emergency Systems

LCM Technologies Pty Ltd | Sydney, Australia | 2002-2004 (consulting)

- Developed a Linux-based nurse call system for hospitals and aged care.
- Integrated multiple hardware types (DECT, radio, pagers, displays, etc.) into a unified, medical-grade emergency platform.
- Supported real-time alarm and messaging systems across heterogeneous systems.

System Architect & Technical Lead

AAP (Australian Associated Press) | Sydney & Melbourne, Australia | 2000-2001 (contracting)

- Led the architecture and development of the Elink system: a national VPN for publication workflows.
- Built a mesh/star network of remotely managed Debian Linux boxes across broadband, satellite, ISDN and dial-up links.
- Enabled secure, large volume PDF delivery between publishers, printers, and arthouses.
- Delivered a full system using only open source software and protocols.
- Provided mentorship to a standout graduate engineer, contributing to their long term success and strengthening the project's technical depth.

EARLY CAREER & PROJECT HIGHLIGHTS

Colin's early career encompassed pioneering work in telecommunications, embedded systems, medical informatics, defence technology, and network infrastructure. Highlights include:

Embedded & Real-Time Systems

- Ported Minix to the Applix 1616: a significant achievement and the only known port of its kind at the time, with full kernel reimplementation.
- Designed and implemented a high performance message passing real-time kernel for embedded use.
- Developed an embedded nanokernel for multitasking applications.
- Built system level modules (memory management, timing, error reporting) for fine grained, parallel animation systems (Occam / Transputer architecture).

Networking & Infrastructure

- Created a WAN multicasting system for OTC, enabling efficient real-time data distribution using ISO protocols - a forerunner of modern web-like architectures.
- Led the design team for Westpac's SNA to OSI protocol conversion system, enabling real-time banking network interoperability.
- Designed networking infrastructure for flight information display systems and fibre-to-curb telecoms networks.

Medical & Public Sector Systems

- Brought in by the Australian Taxation Office to fix a broken workflow automation system. Rewrote the entire system, then implemented and deployed it nationwide.
- Was a Research Fellow at the Royal Adelaide Hospital and University of Adelaide, working on public policy and medical informatics.
- Developed medical research support systems and co-ordinated global medical research infrastructure.
- Supported Linux systems used in hospitals and research institutions.

Telecommunications & Defence

- Developed and led software for satellite transmit power monitoring systems (OTC / AWA), supporting the establishment of Vietnam's telecoms network.
- Diagnosed and fixed faults in the Royal Australian Navy's sonar systems.
- Worked on EFTPOS and ATM systems for Unisys and NCR.

Open Source & Innovation

- Presented on ColdStore object store at *linux.conf.au* (2001).
- Developed early Tcl-based web servers, contributed extensively to Tcl ecosystem tools and libraries.
- Built custom Linux toolchains and remote systems maintenance solutions ahead of industry adoption.

EDUCATION

- 2nd year entry to **Computer Science at University of NSW** out of high school (chose to commence professional software engineering career instead)
- **Mathematics, University of Sydney** (non-degree study)
- **Medical Research Fellow, Adelaide University & Royal Adelaide Hospital** (medical informatics)
- Decades of high-level experience and self-directed learning as an autodidact.

PERSONAL & PRO BONO PROJECTS

Colin has supported not-for-profit, community, open source, and personal projects through voluntary and self-initiated work. Highlights include:

- Self-taught **electronics enthusiast** with practical experience in circuit board design, prototyping, and hardware debugging. Pursues electronics to support embedded development work and explore new technologies, IoT, and home automation.
- High level mapping assistance provided to the **Australian Conservation Foundation** (ACF) in 2018, involving importing and analysing demographic data with GIS. Described by ACF as "game changing".
- Wiki developer and maintainer for the **Tcl Community Association** (TCA) from 2008-2016. Colin was wholly responsible for the provision of the wiki. He designed and wrote the wiki service application.
- Server specialist for **Scouts Australia** at the 2010 Scout Jamboree as an adjunct to Colin's 15 years as a Scout Leader. Tasks included design, implementation and remote admin of Debian campus-scale network control systems (dual high availability DHCP, DNS, SMTP, network monitoring, etc.).
- Developer for **The Ethics Centre** from 2006-2008, a not-for-profit in Sydney, Australia. Worked on a pro bono basis to develop an advanced content management and delivery system.
- In the **Year of Indigenous People**, Colin undertook a project to refurbish and transport surplus computers to remote Indigenous communities to facilitate communications between children and Elders.