

COLIN McCORMACK

PRINCIPAL SYSTEMS ENGINEER | EMBEDDED LINUX | REAL-TIME SYSTEMS | C/C++ | SYSTEMS ARCHITECTURE

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SUMMARY

Colin McCormack is a principal level systems and software engineer with decades of experience in embedded systems, embedded Linux, real-time operating systems, distributed systems, and low-level C/C++ development.

He's known for bridging hardware and software in complex environments: from satellite and telecommunications systems to medical-grade infrastructure and globally deployed irrigation control platforms. A long-time Linux practitioner and open source contributor, Colin also brings decades of remote work experience.

Colin thrives on technically demanding problems where deep debugging, architectural clarity, and long-term reliability matter. He is drawn to work that requires precision, creativity, and durable system design.

He is available for contract, consulting, or permanent roles focused on embedded systems, real-time platforms, low-level development, or systems architecture - particularly where the problems are complex and the impact is significant.

WORK STYLE & STRENGTHS

- **Exceptional debugger:** renowned for solving obscure, subtle, high-impact system failures
- **Strategic problem solver** with a design-led mindset and strong implementation skills
- **Bridges hardware & software** domains to resolve complex integration problems
- Effective working independently or within small, highly skilled engineering teams
- Comfortable leading, mentoring, or acting as principal engineer or consultant

KEY ACHIEVEMENTS

Selected technical achievements from a long and varied systems engineering career:

Technical Innovation & System Architecture

- Designed and implemented ColdStore, a gigabyte-scale persistent object store for C++ applications, eliminating the need for external databases.
- Ported Minix to the Motorola 68000 / Applix 1616 - the only known Unix implementation on that platform.
- Led server architecture design for BigWorld's MMO platform, supporting 100,000+ concurrent players.

Critical Project Delivery

- Rebuilt essential tooling from scratch, preserving the company's most profitable device line after legacy software was lost.
- Delivered a fully operational disaster recovery system under a strict 7-day regulatory deadline.
- Diagnosed and resolved subtle firmware and hardware faults others could not reproduce - frequently brought in to "save the day".
- Designed the core scheduling engine for a global golf irrigation system used across elite courses.

Cross-Domain Leadership & Integration

- Bridged hardware, firmware, and software teams across multiple industries.
- Provided expert technical testimony in telecoms litigation, explaining complex system behaviour to legal teams and State Supreme Courts.
- Collaborated on medical infrastructure across hospitals and research institutions.

Open Source & Community Contribution

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

KEY SKILLS & TECHNOLOGIES

Programming & Scripting

- **C / C++:** Extensive experience in embedded, real-time and systems-level development
- **Tcl / Tk:** Longstanding use across web servers and engineering tooling
- **JavaScript:** Practical use in web based tooling and firmware management interfaces
- **Build systems & tooling:** Make, CMake and custom development tooling
- Additional experience with **Python, Perl, SQL** and other languages

Architecture & Systems Design

- **Distributed systems** and **real-time** platforms
- **Hardware-software integration** across embedded and networked systems
- **Simulation and virtualisation** of hardware for testing and debugging
- Design of efficient, resource constrained and fault tolerant systems

Systems & Platforms

- **Linux & Embedded Linux:** Deep expertise in development, deployment and system integration
- **Real-Time Operating Systems (RTOS):** Design and implementation of custom kernels
- **POSIX Systems:** Daily driver since the 1990s
- **Embedded & Connected Systems:** ESP32, Raspberry Pi, CAN bus, Zigbee

Networking & Communications

- Extensive networking experience including **TCP/IP**-based systems
- Designed and deployed distributed systems over **broadband, satellite, cellular** and **radio** comms networks
- Deep understanding of **protocol stack** behaviour and optimisation

Technical Interests

- Real-time & embedded systems
- Distributed infrastructure & networking
- Electronics & firmware development
- IoT & edge systems
- Mapping (GIS)
- Unusual or challenging problems

PROFESSIONAL EXPERIENCE

COLIN McCORMACK
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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 cellular communications 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)

Earlier in his career Colin worked as a consultant, contractor, open source contributor, and systems architect across a wide range of domains. Much of this work overlapped; selected highlights below.

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Director of Technology, System Architect & Lead Developer

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

Colin was a founding principal of Shared Technology, an innovation incubator supporting numerous long-term research and open source software projects. Highlights include:

- Led international Free Software development teams and mentored junior developers.
- Architected and deployed ColdStore, a gigabyte-scale persistent object store for C++; led a fully remote global development team. coldstore.sourceforge.net
- Enabled the first Australian medical academic internet access for a Clinical Professor at the University of Adelaide and Royal Adelaide Hospital.
- Contributed to early national efforts to improve electronic health information access, including giving evidence before a House of Representatives Standing Committee.

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 local firms on national Linux development and alternatives to Microsoft systems.
- Advised the PRC Minister for Technology on strategy for OS and infrastructure independence.
- Helped optimise Linux systems for small footprint deployment across Chinese industrial and municipal applications.
- Deployed a custom-built Linux server in Beijing within 24 hours; operated 5+ years with only 1 reboot.
- Collaborated on early testing of the Godson CPU, China's first general-purpose chip, as part of long-term efforts to localise critical infrastructure.
- Work contributed to early foundations of native Chinese Linux distributions.

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 in building relationships with Chinese agricultural institutions.
- Oversaw technical systems including animal tagging, genetics tracking, and data infrastructure with Chinese universities.
- 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) 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 the 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.

Senior Technical Architect - R&D

Clockworks Entertainment | Sydney, Australia | 1999-2000 (permanent)

- Lead Architect on BigWorld, a massively multiplayer online game (MMORPG) targeting 100,000+ simultaneous users.
- Designed novel server scaling architecture using tiled portal space and dynamic load balancing.
- Solved 'flash party' scalability problems via dynamic tiling.
- Worked remotely with international team members.

EARLY CAREER & PROJECT HIGHLIGHTS

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

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 reimplementations.
- 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*.
- 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 & ACADEMIC

- Offered second-year entry to **Computer Science at the University of NSW** directly from high school
- **Mathematics studies, University of Sydney** (non-degree)
- **Medical Research Fellow, Adelaide University & Royal Adelaide Hospital** (medical informatics)
- Decades of professional practice and self-directed learning across systems engineering and computing

PERSONAL & PRO BONO PROJECTS

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

- **Electronics enthusiast** with practical experience in circuit design, prototyping, and hardware debugging supporting embedded development work.
- 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.