



**Senior professional engineer** with over 35 years of industry experience.

My career has spanned a broad range of roles in electronics R&D including project management, hands-on design engineering (hardware and embedded software), marketing support, manufacturing support and customer liaison. My experience has involved all facets of the product development life-cycle, including QA system, EMC and safety standards compliance.

During the course of my career, I have contributed to the market success of many electronic products and systems. Some of these products incorporate patented innovations. All of my previous job roles have necessitated the fast uptake of new concepts, technologies and tools.

I am also highly skilled in embedded firmware development using 'C' and assembly languages, in real-time multi-tasking environments. I have experience with a wide variety of target platforms (e.g. AVR, ARM, MC9Sxx, M68K, PIC). I pride myself on producing well structured, efficient, stable and reliable code, richly annotated for ease of maintenance and extensibility.

I am comfortable working as part of a team, or as a team leader. I believe my communication skills, both written and oral, are excellent.

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## Qualifications

- Degree in Electrical/Electronics Engineering, Deakin University
- Certificate IV in Training & Assessment (TAE 40110) - 2011

## Skills summary

- **Project Management** – Planning, scheduling, budgeting, supervision
- **Electronics design** (esp. industrial control, instrumentation, human interface)
- **Embedded software / firmware** development ('C', assembler, RTOS)
- **Technical documentation, Presentations and Training**
- **Theatre technology** – Stage machinery automation and controls
- **Safety engineering** – Hazard & risk assessment, FMEA, safety-critical systems
- **Design QA systems** (ISO 9001), Standards compliance (esp. IEC 61508)

## Publications and Patents:

### "Functional Safety of a Theatre Stage Machinery Control System"

Australian Computer Society Inc, 2002. Paper presented at the ACS 7th Annual Workshop on Safety-Critical Systems & Software, Adelaide S.A. 17-18 October 2002.

### "Control System for Controlling Plural Electrical Devices"

US Patent #6297610, Issued October 2, 2001. For Bytecraft's proprietary "Medusa" motor-drive automatic patch technology, as applied to theatre stage automation systems.

### "Electrical Energy Analyser"

US Patent #4978971, Issued December 18, 1990. For Nilsen "smart" kWh meter, energy measurement technique and software algorithm, plus various signal conditioning innovations.

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## Career Highlights

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**Employer**                    **Axxin Pty Ltd**

Employment period    Feb 2012 – July 2015 (3½ years)

Industry sector        Bio-medical analytical instrument design &amp; manufacture

**Job Title**                    **Firmware Engineer**Responsibilities        Embedded software development for “point-of-care” bio-medical analytical instruments and related production test equipment.  
Design review of electronic circuit designs.

Technologies         Opto-electronics and software algorithms for molecular spectrometry.

Tools                     Microchip MPLAB.X development environment (for PIC32MX mcu family).

This was a challenging and satisfying role. The R&D environment placed a serious emphasis on standards compliance, version control, documentation and quality assurance. A highlight of my time with Axxin was to do the complete software implementation for a new instrument prototype.

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**Employer**                    **Agilent Technologies (formerly Varian Australia)**

Employment period    Aug 2007 – June 2010 (3 years)

Industry sector        Scientific analytical instrument design &amp; manufacture

**Job Title**                    **Senior Electronics Engineer**

Responsibilities        Instrument controller electronics design, software development (in C) for design verification testing, RoHS &amp; standards compliance, specification and process documentation for PWB manufacturing acceptance testing.

Technologies         UV-Vis. spectrometry, ARM7 (AT91SAM7) microcontroller, USB TMC/488

Tools                     Altium Designer, GNU-ARM-GCC toolchain, MS Project, MS Office.

The role involved a complete re-design of the instrument electronics, development of automated test software and manufacturing test procedures for the instrument microcontroller circuit board. A major challenge was to improve on the performance of the instrument being superseded.

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**Employer**                    **Bytecraft Automation Pty Ltd (now State Automation Pty Ltd)**

Employment period    August 1992 – March 2004

Industry sector        Theatre technology – stage machinery automation, lighting control.

Products, services    Specialised industrial control systems and theatrical lighting equipment.

**Job Title (1)**                **Product Engineer**Responsibilities        Project management, hazard & risk analysis, functional safety requirements.  
Control system architectural design, requirements specifications, hardware and software design verification methodologies and standards compliance.

Technologies         Cause-Consequence (risk) Modelling (CCM), Fault-Tree Analysis (FTA), reliability prediction (MTBF, FMEA, etc).

Tools                     MS Project, Excel, Word. Auto-CAD,  
Rational Unified Process (Requisite-Pro, Clear-Case)

This was a leading role in the development of Bytecraft’s “next-generation” stage machinery control system. The team consisted of about six engineers (hardware and software) plus technical and CAD support staff. A key objective was to comply with an international safety standard (IEC61508) covering the complete safety lifecycle of “Programmable Electronic Systems”.

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**Job Title (2) Senior Design Engineer**

Responsibilities Project management, product specification, conceptual design, supervision of a small team of design engineers, plus substantial "hands on" involvement in electronics design and firmware development. Mentor to junior engineers.

Technologies VME-bus (embedded OEM computer products), Motorola 68K, 68HCxx. CPLD (Altera MAX2), Ethernet (IEEE802.3), RS-485 (Profibus).

The team generated several highly successful products for theatre automation, incl. "Wincon III & V" axis controllers, "Status 600/900" operator console and the "Medusa" automatic motor/drive patch. The "patch" system (patented worldwide) and other Bytecraft products incorporated many innovative design concepts which I am proud to have contributed.

**Job Title (3) Project Engineer (Projects and Systems Dept.)**

Responsibilities Project management, systems engineering, supervision of installation, on-site commissioning and trouble-shooting of theatre stage machinery control systems. Marketing support and customer liaison.

Technologies Variable-speed drives and motors, motion control, industrial controls. Bytecraft proprietary automation control system components.

Theatre automation projects engineered and commissioned under my supervision:

- Opera de Lyon (France), scenery flying system (1992-93)
- Hong Kong Cultural Centre (Kowloon), scenery flying system (1993-94)

Some of the many other projects involving my participation in systems engineering:

- Malaysian National Theatre (Kuala Lumpur, 1996-2000)
- Victorian Arts Centre, State Theatre (Melbourne, 1994-95)
- Sydney Opera House, stage machinery automation (1995-97)
- Chatelet Theatre (Paris, France) stage machinery automation (1999)

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**Employer Nilsen Electrical Industries Pty Ltd, Heidelberg W., Vic.**

Products, services Metering, instrumentation, switchgear, circuit breakers, etc.

**Job Title Design Engineer / Software Engineer**

Responsibilities Conceptual design and firmware development of a low-cost microcontroller-based ("smart") AC kilowatt-hour meter. Automated testing methodology.

Technologies A/D conversion, analog and digital signal conditioning.

The meter reached a level of performance exceeding that of traditional electro-mechanical devices, with new capabilities including load control, "time-of-use" metering and remote billing. The prototype design has since been refined for high-volume commercial manufacture.

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Freelance consulting engagements (2010+)

**Boonton Electronics (WTG), New Jersey, USA**

USB TMC reference design (firmware), including USB TMC/488 device communications "stack".

**Step Global Pty Ltd (2011, 5 months part-time/casual)**

Custom firmware extension for GPS "asset tracking" device (STM32, ARM7, eCos, GNU-GCC).

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For complete career history and other details, see my website: [www.mjbauer.biz](http://www.mjbauer.biz)