William J. Biessman
Embedded software Consultant
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SUMMARY: Over 40 years' and hardware, software and systems development experience, involving:

- Real-time communication software and system design
- Embedded OS experience with VxWorks,Linux, and pSOS in C and various Assembly languages
- Development under UNIX, Linux, and various PC environments
- Microprocessor based system design (Intel 80x86 and Motorola 680x0, ARM, PowerPC)
- Structured design for device driver implementation
- Circuit design and system interface development
- DO178 DAL A Embedded software development

EDUCATION: Bachelor of Science Degree in Electrical Engineering (Cum Laude),
New Jersey Institute of Technology, Newark, New Jersey, May 1988.

Associate Degree in Engineering, Electrical Engineering Technology (with High Honors),
Vermont Technical College, May 1979.

Additional Training:

- Structured System Analysis and Design, with introduction to Object Oriented Design concepts
- Programming and Data Communications
- Operating System Design with Xinu
- VxWorks Operating System and Tools
- Qualcomm CDMA system
- ARM Programming

HARDWARE:

Microprocessors: Intel (8080, 8085, 8742, 8031,8051, 8086/186/188); MC (6800, 680x0, 68332. PowerPC 7447, 7410, 7450, 7457, MPC5125 ,x86: Core 2, Core i7); Zilog Z80; ARM& ARM Cortex M3,M4,M7, Hitachi SH3-DSP, SH4; Atmel AVR, Qualcomm 8K/13K Cell Site Modem (CSM) *NXP LPC1768, NXP i.MX RT1064, TMS570LC4357,TMS570LS31, STM32H745*

Busses/Interfaces: IEEE 488 GPIB, SCSI. JTAG, VME, PCI, MIL-STD-1553 USB**,I**2C (IIC), SPI, ARINC 429

SOFTWARE:*Languages:* **C** (extensive), C++, Korn-shell, Perl, Bash, PERL/Tk, Python and Python/TK, HTML, FORTRAN, Forth, Ada, Informix SQL & ACE, assemblers (Intel 8080/8085, 8051, 8086/186/188, 8742, 80960; Z80,AVR; MC680x0,SH3-DSP,SH4 PowerPC, Arm)

OSs: UNIX, AIX, XINU, Linux, MS-DOS, DESQview 386, pSOS, CP/M, RTXC, VxWorks, (5.5,6.6,6.9) VxWorks-AE653, ARINC653, ThreadX, FreeRTOS, proprietary real-time kernels, Micro-Monitor

Comm: AT&T Operations Systems Alarm Surveillance Protocols: E2, E2A, TBOS, TABS, G2 (async), Datakit, X.25, T1, FDDI, CDMA

(IS95), CDMA - PCS (J-008), IS95B, ISDN, SONET, TCP/IP,LWIP SNMP, Telnet, Ethernet MAC, ARP, ICMP, UDP, Sockets*, ARINC 429, Williamsburg III*

Other: *Operations Support Systems:* SCOTS, TCAS, TASC, TMAS, TRANSVU, TRANSVU II, E3; LADS,PMAS *Configuration Management:* Sablime, Lucent nmake, GNU Revision Control System (RCS), Concurrent Versions System (CVS), Subversion (SVN), Git Bugzilla,Jira, Microsoft SourceSafe, Dimensions *Tools:* XRAY+, PROBE+, Paradigm Debugger, Tornado, Eclipse Windview Apache, MySql, Cygwin, PowerPC JTAG Emulators, GNAT

EXPERIENCE:

6/2024to to 2/2025 "Embedded Software Consultant" Real Time Consulting On Assignment with Honeywell Space

Developed Built in test to verify configuration of a power management subsystem in DO178 DAL A Flight Management System, developed inter-core communications on an imx8 platform. Implemented tools to extract build defects from compilation logs.

7/23 to 10/23 "DO178 Specialist" RCM Technologies (USA), Inc. On Assignment with Virgin Galactic Holdings

developed a TFTP client boot loader for a Texas Instruments TMS570LC4357 and TMS570LS31 SOCs with TI Code Composer Studio. Leveraged the LWIP UDP Stack and EMAC in an OS-free configuration Implemented a layer that allowed using the tftp client to and from tftp server files to memory, a file system, or to flash regions abstracted as files.

12/22 to 5/23: Smartsourcetec On Assignment with Dell,Inc

Added enhancements to the Dell UEFI/BIOS platform to increase visibility for maintenance and postmortem analysis. Programming in C with the SDK-II platform. Wrote tools to automatically generate code to support integrating the new features.

10/21to 12/22; Infotree Global Solutions on Assignment with Honeywell Space, Clearwater, Florida

Analyzed Embedded controller systems consisting of a Xilinx FPGA, ARM Cortex-M3, ARM A53, and ARM R5 cores to implement an automated regression test system. Converted the GUI-Based build procedures to scrip-based procedures suitable as the build basis for a CI/CD pipeline. Implemented tools in Bash and PERL to detect commits to SVN for triggering the automated builds. Implemented tools to capture and analyze build progress logs to allow diversion before testing. Proposed options to enhance the memory testing algorithms for the embedded system.

4/21 to 10/21 Zoom Technical staffing On Assignment with Deep Space Systems, Littleton, Co.

Worked with and mentored other engineers to develop low-level drivers(e.g UART,ADC, SPI, QSPI, ethernet) and middleware such as FreeRTOS, LFS and LWIP for an ST32Mh745xi Cortex M4/Cortex M7 dual-core processor on an evaluation board. Provided extensive mentoring to less experienced engineers.

Integrated the above into a BSP-like common Platform to be used as the basis for several boards being developed. This platform was compatible with the gdb-

based source-level debugger that is part of STMMCUBe32IDE, so that tool could still be used. .Provided an easier way to add applications and third-party code (such as LFS) without reliance on the STMMCUBe32IDE. Analyzed the initialization code produced by the STMMCUBe32IDE to develop strategies for merging the various components produced by the individual contributors. tested all of the components in the integrated platform discovering problems with the file system and TFTP implementations. Configured this platform to run on the first board produced. Added exception handlers to help debug pointer-out-of-heap problems. Reverse-engineered the schematics for the boards to understand the sofware requirements the interfaces impose. Provided feedback to the hardware team when bring up problems arose.

Evaluated strategies to best use the dual-core (Cortex M4/M7) nature of the ST32Mh745xi for the implementation of our applications

12/19 to 02/20 iStaff *On Assignment with SmartStart,Inc, Grapevine,Texas*

Analyzed Embedded C Applications targeted to Nordic nRF52840 and Kinetis K61 (ARM Cortex M4F based SOC devices) to design an AES-128 Cipher block chaining CCM layer leveraging the AES encryption engines provided by those devices. Implemented file encryption and verified inter-operation with a cloud-based server. Implemented simple test automation with Bash,PERL, and Python. Implemented and debugged with Segger Embedded Studio and JLINK debugger Analyzed system's use of GPS NMEA sentence data to devise compression algorithms tailored to the application.

5/19 to 11/19 *Patriot Technical On Assignment with Sparton Electronics,Deleon Springs, Florida*

Analyzed the pin multiplexing options available with the NXP i.MX RT1064 embedded processor to support creating pin configurations not supplied with the machine-generated code produced by the NXP Pin tool primarily to support experimental development. Analyzed the impact of operating the device from an off-frequency crystal, on the internal frequency synthesizers and peripheral drivers. Tried to gain finer control than provided by the NXP clock tool. Designed a driver and test app to assist analyzing the internal ADC for a particular purpose. Implemented test apps in C as bare metal and FreeRTOS programs implemented drivers under a C++ framework all using MCUXpresso 10.3 IDE. Developed scripts to simplify automated building and incorporation of third party source files. Developed source code control strategies to manage integration of machine generated code updates as well as NXP platform updates. . Analyzed ATTiny416 AVR code (C and Asm) to resolve incompatibility between it's TWI (I2c) implementation and our host board. Made hardware design changes to address the problems. Debugged hardware as needed.

Designed two Python programs to aid in testing. The first read a text file to read meassge definitions it then formatted them into UDP frames and transmitted them to a device under test to simulate a missing user console. The second had a Python/TK GUI and formatted messages into a proprietary 8-bit async message format and transmitted the messages to a device under test.

11/2017 to 10/2018 black Diamond Networks On Assignment with Leonardo DRS Technologies, Richardson, Texas

Analyzed and Debugged a VxWorks6.9 HCI Driver for EMMC Flash Memories

on an Intel I7 COTS Single Board Computer Analyzed and upgraded an AHCI/SATA Driver to support the Secure Erase features of Greenliant and Silicon Motion Solid State Drives to support a military “Zeroize” feature. Analyzed all non-volatile memories in the system to to determine how to “zeroize them even though they did not have native support. Designed necessary drivers and application programs to implement the Zeroize feature that removes all sensitive information from the system in the event of a security breach. Teamed with the verification test engineer to develop strategies for verification that the zeroize requirements were met developed techniques for booting the system after the boot drives have been zeroized, taking advantage of the UEFi bootstrap on the COTS board, a debug terminal, and an FTP server. This work was accomplished primarily in the C language.

Analyzed the Power-up test reports created by the UEFI bootstrap that were stored in SMBIOS records in low memory. Used PERL to prototype extracting the data from the records. Analyzed a cumulative performance problem with the system SSDs. Discovered that Trim/Discard commands were not reaching the SSDs. Discovered the file system properly generated The Discard Requests and passed them to the AHCI driver as ioctls, but the driver did not implement the Discard APIs. Implemented Discard interface and investigated use of an alternate driver that was known to support the interface. Designed SSD Performance Test Applications to exercise the drives with various driver configurations. Instrumented AHCI driver to collect low-level performance data to support performance analysis.

Analyzed memory test algorithms to determine why apparently false error reports were generated. Debugged VxWorks6.9 Software Build issues within the Wind River Workbench IDE. Used Subversion for change control an Jira for bug tracking.

12/16 to 09/17 Oxford International on Assignment with Intel Corporation, Hillsboro, Oregon

Software Maintenance of the Baseboard Management Controller (BM**C)** Analyzed and fixed defects in the drivers and features of the ARM-Cortex-A9 Linux-based system. Analysis and debug of the remote Keyboard-Video-Mouse feature involving USB keyboard and mouse emulation and video tiling and transmission. Analyzed and hardened the U-Boot process to prevent environment damage during firmware updates located and corrected errors in passing discovered network parameters from U-Boot to the linux kernel. Performed extensive analysis of the QSPI flash reprogramming in UBOOT and the Linux kernel while pursuing boot problems Analyzed the IPMI Protocols and architecture at the root of the BMC. Analyzed and proposed method to pass messages from an IPMI LAN interface and the server Host processor's KCS interface. Used git and svn for source code control. instrumented busybox network tools to help locate errors in Linux init scripts.

4/16 to 8/16 Embedded Communicating Systems,LLC Sterling Heights, Mi (undisclosed client)

Designed the Control System for a 40 element light bar(with a SPI-like interface) which provided depth perception for a vision system synchronized updates with AC line zero crossings to stabilize hum bars when ambient light included CFL and LED bulbs synchronized update with camera shutter. This as implemented on a NXP LPC1768 ARM Cortex-M3 Bare Metal Processor using a combination of the online MBED tools

(https://developer.mbed.org/code/,CMSIS, and the standard GNU gcc tools and libraries. Created a cross—development platform on Centos 7 Linux for the tasks. Prepared a design for a proposed enhancement to have the LPC1768 reprogram the flash and eeprom sections of a ATMel ATTiny26L-8SI processors (which controlled miscellaneous hardware components In-circuit to eliminate the need for a service visit and hardware disassembly for software updates and calibration trims.

1/16 to 4/16 Envisage, Inc on Assignment with Elbit System America, Merrimack,NH

Designed the control 'C-language' software for the proof-of concept platform for a Laser Rangefinder on the ARM Cortex-M3 portion (bare metal C and CMSIS) of the Microsemi/Actel SmartFusion2 FPGA. worked with FPGA engineer during FPGA design finalization and software/ FPGA integration. Worked with Electrical and Optical Engineers during final module integration. Identified firmware issues and proposed enhancements to support detailed out-of lab algorithm verification. Adjusted software design to accommodate unexpected system behavior. Developed methods for removing spurious returns from the measured data. Handed prototype software platform off to finalization team for integration into existing range finding system.

11/14 to 12/15 Infotree Service, On Assignment with General Dynamics Land Systems. Sterling Heights,Mi

BSP support for VxWorks6.6 and 6.9 for PowerPC and X86 targets. Ported special-purpose FTP servers from Linux to VxWorks6.9. Studied the feasibility of simultaneous support of both OHCI and EHCI USB drivers in the same BSP to support conditionally populated boards. Adjusted kernel configuration with both Workbench and the VxPrj command-line interface optimized build procedures to shorten built time to 30% for typical changes. Analyzed build warnings and errors in existing code base and proposed changes.

RHEL7/CENTOS7 Linux embedded BSP support. Designed a diagnostic test server around the Intel Processor Diagnostic Test (IPDT)package. Investigated and implemented methods to divorce the IPDT source from the Intel compilation package required to build it and instead build it with the standard gcc package available on Centos7 Expanded diagnostic scope to include the EDAC Linux Module for the Core i7 target EDAC can be used to provide continuous performance monitoring of the ECC DRAM. Designed bash/awk/PERL scripts scripts to collect raw performance data from sysfs and system logs to convert the recorded events into JSON records. Designed a test definition language using JSON structures for defining test type and parameters. Designed a PERL test manager to execute the tests.

·10/13 to 8/14 Envisage, Inc, On Assignment with Avionics Instruments, LLC Avenel, NJ

DO178 DAL A embedded software Verification. Designed DO178B Low-Level Requirements based Test Procedures For a Digital Starter-Generator control unit (DGCU) for a commuter jet aircraft. Developed, manual, automatic and semi-automatic procedures with the SEHAU/NOHAU EMUL-51 Emulator. Analyzed, debugged and tested 8051 assembly- and Keil C-Language software components as needed to develop the emulator-based test procedures. Developed Bash scripts to aid in designing SEEHAU Emulator macros for test setup.

12/12 to 7/13 Tandel Systems, Inc On Assignment with GE Aviation Pinellas Park, Fl

DO178 DAL A embedded software Development.

Developed High level and Low-level designs from requirements for the Cockpit Voice Recorder Interface for the Data Link Manager for an avionics system. Used Structured Analysis and design techniques. Analyzed **ARINC429 Williamsburg III** Bit-Oriented Protocol for the Implementation. Implemented a portable Williamsburg III library. Ported to the **VxWworks AE653** platform. Implemented an out of lab unit test environment over the MinGW32 'C-language' tools for unit testing the CVR subsystem. Mentored newhires.

10/12 12/12 Ciber,Inc on assignment with HGST,Rochester,Mn.

Design Verification testing of a Solid State Drive (SSD) design using Hewlett Packard **Psuite** Test System. Wrote **Perl**, **Bash**, and **TCL** programs to automate test administration and results report analysis. Analyzed existing and designed new Psuite scripts for new test cases. Reported test progress to project leadership. Configured Psuite Systems for subsequent test Phases.
In Preparation, Analyzed C++ Solid State Drive (SSD) code to locate source of suspected defects. Analyzed legacy TCL tools to investigate changes required to accommodate new features of new drives.

1/12 to 10/12-Black Diamond Networks on assignment with Medrad, Inc., Indianola,Pa.

Executed test protocols to verify software fixes on an electro-mechanical Medical device. Analyzed a persistent **VxWorks 5.5 Renaeses** SH-4 Processor Work Queue Panic problem in the device. Analyzed the ESMC **LAN91C111** network driver to determine why it had runaway interrupts which triggered the Panics, made modifications to prevent the situation and the related panics.
. Instrumented existing application and kernel code to capture data relevant to the panic that was not available with **Windview**. Implemented software (**Bash** and **PERL**)tools to aid in automation of the analyses. .Analyzed the mixed C and C++ system to localize potential causes of the panics. Rewrote portions of the **LAN91C111** driver to detect occurrence of the failure that was leading to the Work Queue Panic. and reset the device prevent the panic from occurring. Redesigned portions of the driver to prevent the problem in the first place

9/11 to 11/11: Zoom Technical Services On Assignment with Lockheed Martin, Owego, NY

- maintained, designed, and executed unit tests for portable device drivers for **PowerPC**-based **BSPs.**
- Designed a portable device driver for a Data Concentrator that translated analog and Digital I/O to **ARINC 429** messages terminating in an **ARINC653** processor.
- Digested the incoming messages and provided the application parsed data structures to offload the parsing function.
- Developed a generic **ARINC 429** driver Architecture. Maintained source with **TortoiseSVN** and **cygwin svn**. Used Eclipse and **Wind River Workbench** IDEs.
- Generated parsing information with PERL scripts.

7/11 to 9/11: Technisource, Fort Lauderdale, Florida

- Analyzed bug fixes in 68hc11 controller code for a electro-hydraulic medical system for
- incorporation in a similar system used **TortoiseSVN** for change management

5/11 to 6/11 Consultant, Teknavigators Corporation,
On Assignment with Parker Aerospace, Fort Worth, Texas

- Verification of Do178B Requirements Based test results data for the rudder control system of a business jet.
- DO178 DAL A embedded software Verification.
- Required parsing of logged **ARINC429** messages for the relevant Labels and fields for the test.
- Wrote several PERL programs to aid in locating the desired data in the voluminous logs. Stored analysis artifacts in
- **MKS Source Integrity a**nd processed Problem Reports in **MKS Integrity.**

9/10 to 12/10 Consultant, Advanced Technology Innovation Corporation, On

Assignment with Goodrich, Corporation, Vergennes Vermont

- Software design of a Wireless Remote Data Concentrator using an **MPC5125** PowerPC
- with the 'C-language' **MQX** Operating system and the **RTCS** protocol stack.
- Ported the **TWR-MPC5125 MQX BSP** to support the actual target processor board
- Developed C code in **Code warrior** as well as with Cygwin makefiles.
- Analyzed and reviewed the project hardware, software and system issues.
- Interfaced with **MPS430** processor on **802.15.4** MAC card.

2/10 to9/10: Technisource, Grand Rapids, Michigan

- Analysis of changes to Requirements-based test case **DOORS** Modules and test applications(RBTs) necessary due to changes in linked **HLRs** and **LLRs** For C130 Avionics Modernization Program (C130-AMP)
- Performed DO178 reviews of same and proposed changes to same.
- Executed formal test procedures as part of the C130AMP Certification process.

11/08 to 11/09: Consultant, Advanced Technology Innovation Corporation, On Assignment with GE Aviation, Grand Rapids, Michigan

- participate in review of requirements based tests (HLR and LLR)
- DO178 DAL A embedded software Development.
- Ported test application from one aircraft platform to another for certification effort.
- Made C Source Code modifications to address Problem reports against the Software Common Operating Environment (SCOE) as part of the 787 Common Core System(CCS) development.
- Created Documentation in Support of developing System Integration Scenarios and
- Control Coupling Analysis
- designed boundary test cases for C code using the RTRT tool

4/2008 to 11/08: Consultant, Coast To Coast Temporary Services, Phoenix, Arizona;On Assignment with Ascent Healthcare Solutions, Phoenix,Arizona

Reverse Engineering:

- Analyzed a medical device's internally stored data to determine the algorithm the manufacturer used to prevent the device from being used more than once
- so that the original data could be restored, making the device look “new”
- designed several C, Perl, and Perl/TK programs to read, display and manipulate the stored data
- Evaluated several methods to drive the memory's **IIC** interface from a Personal computer on the factory floor
- Designed a prototype hand held instrument to read the device's memory in the hospital, so the data could be sent to the factory The base for the design was an **Atmel USBKEY** reference design with the **AT90USB1287 (AVR)** single-chip processor.
- Analyzed the implementation of a position detection sensor for a medical catheter for the purposes developing a factory functional test for the devices.
- Designed test fixtures for analyzing the position sensor system.
- Reverse engineered the three-channel Preamplifier board for the medical
- device for the purpose of developing requirements for interconnection with
- laboratory and factory instruments

2/2007 to 4/2008 Medical Leave

3/2006 to 1/2007: Consultant – Technisource, Kalamazoo, Michigan; On assignment with Smiths-Aerospace in Grand Rapids, Michigan, C-130 Aircraft Modernization Program and 7E7 Tanker programs

- DO178 DAL A embedded software Development.
- Reverse-engineered a PC-based software tool (implemented in Microsoft C++) used to control a JTAG In-Circuit Emulator automatically with scripted commands.
- Created program documentation and a user manual required to satisfyDO178B certification requirements for the qualification of test tools

- Prototyped a **Perl-TK** replacement for the tool.
- Wrote a Lint-Like syntax checker in PERL to analyze existing scripts to find obscure undocumented language errors
- Analyzed crashes of the **VxWorks AE653** based application The problem originated with an exception at the application level and caused a cascade of processor exceptions which corrupted kernel memory and led to a Work Queue Panic.
- Developed core dump and analysis tools needed to support the failure analysis to gather data outside of the scope of **Windview**
- Assumed the support role for the structural coverage test scripts for the built-in –test (BIT) Feature
- Participated in the implementation of a software download Feature for the VxWorks AE653-based application

•Assisted others in various tasks related to BSP and Driver Development

8/2005 to 3/2006: Consultant – Tropaion, Mountainside, New Jersey; On assignment with Sarnoff Corporation on a **Software-Defined Radio** project.

- Advanced a prototype system to implement a MAC bridge allowing Ethernet
  - frame forwarding over the air. Reconstituted configuration management for the suspended project with CVS on Linux
  - Selected software development tools to support changes
  - Analyzed the current hardware C++/C ARM controller code, the C DSP code
  - Studied the application for use in **UAV** and other battlefield applications
  - Designed a MAC layer state machine that compensated for errors over the air
  - Optimized the **ThreadX** C++ ARM code to increase throughput
  - Designed a simple FLASH file system for storing operating parameters
  - Multi-threaded the system to increase throughput
  - Implemented an ARP Cache for both the Ethernet and RF interfaces to
  - support bridging
  - Implemented processing of incoming ARP messages from the Ethernet (C++)
  - Implemented generation of ARP requests to support outbound frames(C++)
  - Implemented processing of incoming IP messages from the Ethernet interface (C++)
  - Implemented processing of incoming ICMP PING messages from the Ethernet interface (C++)
  - Implemented forwarding from Ethernet to RF based upon contents of
  - RF ARP Cache
  - Implemented incoming UDP messages, provided a port subscription
  - mechanism to support UDP sockets by threads
  - Implemented PERL/Tk GUIs under Xwindows on Linux laptops as well as laptops running Cygwin X to support setting radio parameters from
  - either Windows or Linux hosts
  - Implemented radio log capture tool for both Windows and **Linux** over **PCAP**
  - Ported **MicroMonitor** to the ARM radio platform and used it to download software updates
  - ARM development with the aid of **Green Hills compiler** and **JTAG** emulator
  - Analog Devices Blackfin ADSP-BF533 development with the aid of
  - Analog Devices VisualDSP++ compilers and APEX USB Ice Emulator
  - Software maintenance with Cygwin and Linux tool kits including Bash, Vi, X-Windows, TightVNC, CVS, WinMerge

5/2004 to 8/2005: Consultant – Technisource, Kalamazoo, Michigan

On assignment with Smiths-Aerospace in Grand Rapids, Michigan, C-130Aircraft Modernization Program and 7E7 Tanker program

- DO178 DAL A embedded software Development.
- Participated in requirements process for synchronizing time and **ARINC653** partitions schedules on multiple PowerPC **VME** modules.

- Designed device driver to distribute timing from a timing master to timing slaves.
- Debugged driver and executed tests as part of a DO178B process.
- Debugged problems associated with the VxWorks AE653 operating
- system configuration and with application configuration.
- Designed and built and configuration tools to augment the Wind River AE653 Tornado tool chain using Bash, PERL, and PERL/Tk
- Participated in the configuration management and build processes for the
- project.
- Mentored other developers with respect to VxWorks development processes.
- Debugged problems associated with the interfaces between the automated test system and the VME chassis.
- Analyzed **VME** and **PCI** bus problems in the **Tundra/Universe** and
- **Marvel/Galileo** implementation. Proposed solutions to bandwidth problems.
- Integrated a SeaWeed OpenGl Device Driver for the 3Dlabs P9 graphics processor to the VxWorks AE653 environment. The driver served a PMC Mezzanine card on the PowerPC host VME card.

11/2000 to 3/2003: Senior Software Engineer - Jedai Broadband Networks, Inc. Red Bank, NJ

Jedai was a start-up company that develops IP/voice access network elements for the cable TV industry

- Led software architecture team for the Alpha products. Directed the work of and contributed to the team developing the Alpha ONU product (a simple OC48 **DWDM** to OC12 multiplexer).
- Worked with a technology partner developing the software for an OC12/100BaseT access device
- Worked with an outside contract design firm for an OC12/OC3 multiplexer. Prepared the common portions of the OC48/OC12 multiplexer for use on the OC12/OC3 multiplexer.
- Solved software tools issues for the above products due to multiple development platforms (Sun, Windows), multiple compiler and build tools. Set up a web based software documentation library so that all necessary schematics, data sheets, and specifications were available from all locations. Encapsulated all information for each project on dedicated pages so that new hires could be brought up to speed easily without taxing the time of the veteran developers.
- Worked with system architecture teams for the Alpha access, aggregation, head end terminals, and Element Management System using my experience in software, electronic, system, mechanical, and system management design. Continued participation in the later products as the teams expanded.
- Designed and implemented the source code control system for all embedded software products. This involved configuring and maintaining the **CVS** client/server control system with a Windows 2000 server and a Linux server and Windows NT and Windows 2000 clients. Added an Apache server and many **CGI** programs to generate reports of CVS source change activity. The tools aided generating reports for deliveries to system test.
- Applied the **Bugzilla** bug-tracking software for change management on a **Linux** server. Customized the tool for our methodology. Integrated the Bugzilla **MySql** bug database with CVS using Bash and SQL scripts. This integration required developers to indicate which bug was associated with the changes, verified that the bug was assigned to the developer attempting to commit the change (and preventing the commit if necessary), and annotated the Bugzilla bug report with the list of changed files, the file revision numbers, and the commit comment entered by the developer.
- Developed software build systems for both developers and the production environment for all projects. This entailed makefiles, wrapper scripts, automatic build daemons triggered from CVS commit activity, as well as the packaging

required for delivering the software to the factory. Integrated build systems provided with purchased software components. Evaluated a number of GPL software development tools (code browsers, editors, debuggers, code generators, cross-compilers, network analyzers) to reduce the purchased license costs for Jedai, and to reduce the management overhead of purchased licenses.

- Designed a web-based Element Management System prototype around the **Net-SNMP**, Cygwin, and **Apache** products. This product would include an **SNMP MIB browser** and simple graphical representations of the customer network and network element configurations. Special CGI programs provided for provisioning Jedai element features that were not easily configured with the MIB browser.
- Designed a number of Web-base CGI tools to manage miscellaneous development databases (prototype inventory and allocation, MAC address allocation, etc).

11/98 - 11/2000: Senior Consultant - Tropaion Inc., Matawan, NJ: On assignment at Elemedia/Lucent Technologies, Holmdel, NJ

Software-only Modem Development. Responsibilities and contributions include:

- Direct modifications of the development of a V.34/V.17 software modem to be more readily distributed in a binary software library form.
- Defined and implemented the split between the modem library code and sample user code. Prepared sample applications for delivery to customers.
- Assisted product management in product definition, feature delivery plans, configuration planning, and negotiation support.
- Defined and executed configuration and build processes to control the quality of deliveries to the system test organization and the customer.
- Ported the modem to several hardware platforms.
- Designed a software instrumentation technique that allowed non-intrusive MIPS measurements down to the function level.

7/96 - 11/98: On assignment at Philips Consumer Communications, Piscataway, NJ

Worked on **CDMA** cellular wireless telephone development. Responsibilities & contributions included:

- Analysis of **IS95A** call processing code that was started by a former Japanese partner of Lucent
- Ported that code from the original platform to the newer Lucent platform, and from a Microtech Research Incorporated (**MRI**) compiler to a Borland compiler
- Developed configuration management and build processes spanning from the **UNIX Sablime** configuration management system to the Window 95/NT build and emulation systems
- Developed PC-based support tools to support logging and debugging of call processing
- Helped convert the call processing code from the **IS95A** standard to **J-008**
- Developed data mining tools to help analyze physical layer and call processing performance from data logged from the phones during drive tests.
- Worked on porting code from initial 80188 microprocessor-based phone to one using an ASIC containing an **ARM** processor core.
- Evaluated Qualcomm **MSM3000** mobile chip associated software for incorporation into a phone

9/94 - 7/96: On assignment at AT&T, Network Wireless System Business Unit.

Served as liaison between AT&T and Qualcomm on a joint effort to port CDMA cellular modem driver code. Responsibilities and contributions at Qualcomm's Colorado location included:

- Represented AT&T's view during architectural, design and code reviews.
- Transferred information between companies.
- Set up a Bell Labs-like development environment for the Qualcomm personnel.
- Trained Qualcomm personnel on developing under UNIX.
- Contributed to porting cell driver code. This entailed: porting from the MSDOS based Intel **80960** C compiler to the MRI Unix-based C compiler, and then to the MRI C++ compiler; from a locally produced kernel to **pSOS**+; from a complex chip set to a more integrated chip.
- Redesigned subsystems that were not part of the Qualcomm deliverables.
- Built a revision control system, and coordinated revisions
- Integrated modem systems, integrated and tested the modem with AT&T's cell code, and supported the modem implementation at AT&T after completion of Qualcomm's contract.

Responsibilities at AT&T's Whippany, NJ facility included: Integrating modem, operating system, and other support subsystems with the cell application code developed by AT&T; integrated the cell code with the switch; and participated in first 13KB CDMA call in the field.

4/93 to 9/94: *Consultant* - Computer Horizons Inc., Clark, NJ

Developed test plan and procedures for large multi-host **RAID** disk subsystem. Developed script-based, multi-tasking test system under AIX and X Windows on the RS6000 for RAID system verification. The system used normal file operations, raw device I/O, and direct **SCSI** I/O operations (via the **SCDISK** driver) to verify and characterize RAID algorithms, design validity, throughput, and response time. The system used parent/child relationships, communicating via semaphore-protected shared-memory segments and pipes. Administered several RS6000 computers being used for test positions.

Developed driver for analog to digital conversion interface on a **68332** based circuit pack. Designed build procedures for entire project and converted the Microtek XRAY monitor to run on the board. Developed conformance testing procedures to support the development of a VME **FDDI** network card for commercial aircraft use. Responsible for electrical, mechanical, environmental, and software conformance. Specified the software design of a VME host controller used to test the FDDI card. Ported FDDI code to a VME **MC68020** CPU card and provided sufficient stub software so that card could emulate FDDI card operation well enough to test the VME controller card. Produced a PC-based script-oriented test system that managed tests executing on the FDDI card, the host, and various peripheral cards.

12/92 to 4/93: *Member of Technical Staff* - Integrated Network Corp., Bridgewater, NJ

Designed automatic test execution program, used as the basis for developing a test fixture for testing circuit boards during manufacturing process. The system included a series of drivers, abstract circuit board component models, and canned algorithms to test circuit board models. Defined screen objects for simulating various types of input and output devices that the tester would be manipulating or reading.

Using the ASCII description language, the test designer described: test fixture hardware in terms of the device driver connections; the circuit under test in terms of the circuit models; the test procedure in terms of the objects manipulations provided by the canned tests; the screen layout in terms of the supported indicator types. The test execution program read and checked the test specification, built the display screen indicators and menus automatically, and prompted the tester for test execution.

3/90 to 6/92: *Senior Consultant* - Tropaion, Inc., Matawan, NJ

Modified an SCO UNIX tty device driver, which provides an interface allowing Arabic character sets to be displayed on a variety of terminals. Modified driver to accept color commands from the user application, to get color control command strings for destination terminal from terminfo database, and to control colors of the destination terminal.

Consultant to AT&T on assignments that included:

- Developed LADS 1.0 PC-XT based alarm monitoring system for telephone central offices. Duties included analyzing the proprietary AT&T E-Telemetry alarm protocol and devising a method to eavesdrop on the alarm traffic using a PC. The binary alarm data was to be mapped to alarm naming information extracted from the AT&T TMAS operations support system. Analyzed the TMAS Informix database structure and wrote appropriate K-shell, Informix SQL, ACE, and C programs.
- Developed PMAS 386/PC-based system to monitor alarm and performance monitoring data for a trans-Atlantic fiber-optic transmission system. Implemented AT&T TABS-AS&C and TABS-Path-PM protocols on an eight-port expansion card. The system used DESQview 386 API to provide multitasking window-management and menu execution needs. Used MKS Toolkit to provide K-shell user interface windows and dial-in capability. The system logs alarm events, thresholds and performance data, provides history and present-state summary reports. Currently in use in 5 countries.
- Developed LADS 2.0, which required modifying system to support 4 ETelemetry facilities, 8 remote display terminals, and external aisle pilot indicators. E-Telemetry facility was re-engineered to allow LADS 2.0 to monitor the protocol to extract information like LADS 1.0, but to take over the polling functions in the event that the E-Telemetry central stops polling. Tasks included selecting modems, bridges, PC-controllable facility switches, remote terminals, and electrical and mechanical design of the interconnects between these components. The LADS 1.0 was ported to the PMAS DESQview/MKS platform and expanded to support the multiple facilities and external pilot panels. The Informix code was expanded as needed and data compression was used to speed the database transfer process. The database and log reporting techniques of the PMAS & LADS 1.0 systems were merged and expanded to support needs of different customers.

11/87 to 3/90: *Design Engineer* - Telecom Analysis Systems, Eatontown, NJ

Designed high speed synchronous/asynchronous serial communications test set. Duties included functional specification, designing multiple-80C188 processor boards, porting XINU operating system to the boards, and designing system architecture and application software. Managed work of 2 other programmers. Brought product design from concept to manufacture. Designed software tools, startup code, and libraries necessary to allow use of an MSDOS native compiler for embedded code development for the system. Code modularity and portability allowed 60% to 70% of the 80K lines of code representing the operating system, ASYNC and GPIB control interfaces, and front panel menu system to be ported to a new ISDN test set on a similar hardware platform in 2 afternoons.

6/79 to 6/87: *Technical Associate to Member of Technical Staff* - Bell Laboratories, NJ

- Participated in software specification and operational firmware design for 80188 based "wrapper" processor board used in modems. Responsible for system analysis, analyzing implementation of communications protocols, designing unit front panel menu control system, and designing program building tools to support 80188 code cross-development on UNIX.
- Designed an 8085-based surveillance terminal for AT&T Operations

Systems. Defined software and hardware architecture and participated in software design for a 80186 based protocol converter that concentrates four E2A protocol links to a single point-to-point link with a UNIX host processor.

- Designed an IBM PC based E2A protocol communications analyzer.
- Participated in architecture design of new AT&T UNIX based Operations Support Systems. Had primary responsibility for defining the hardware/firmware/software architecture and components necessary for the distributed communications fabric used by the systems for event gathering. Analyzed, performed needs evaluation and specified network configurations of private multipoint data facilities, dial-up networks, data multiplexers, and Datakit.
- Developed system test tools on UNIX, PC and embedded platforms. Did extensive development on Hewlett-Packard 64000 and 64700 processor development systems. Wrote an MS-DOS API to run on an Intel 80188 based co-processor board to allow simple embedded-DOS applications to run on the board without modifications. Ported XINU operating system from LSI-11 to run under MS-DOS.