R E S U M E   O F
V I N C E N T   J .   L I P S I O
F I R M W A R E   D E S I G N   E N G I N E E R

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PERSONAL

Birth Date:	May 7, 1958	Years Experience:	41
Birth Place:	Saint Petersburg, Florida	Marital Status:	Widowed

SUMMARY OF WORK EXPERIENCE

➢ Extensive experience with embedded systems that require hard real-time, deterministic, safety-critical behavior.
➢ Specialize in low-level hardware interfaces, hardware/software integration, device drivers, bootstraps, board support packages, and communications controllers.
➢ Implement structured, well-documented code, highly maintainable and readily validated and verified.
➢ Code in C and assembly and experienced in a wide variety of RTOSes.
➢ Proficient complying to Level A DO-178B, Class III FDA, and Class III EU/EFTA.
➢ Exceptional analytical, design, implementation, profiling, and performance optimization skills.
➢ Proficient at bringing up new hardware and readily able to debug at the assembly level.
➢ Review hardware designs, especially to recommend cost trade-offs between software development and manufacturing.
➢ Develop and implement algorithms and communications protocols.
➢ Forge solutions from experience employing, when appropriate, creative thinking and intuition.
➢ Craft scripts and other tools to automate repetitious tasks.
➢ Familiar with all aspects of the product lifecycle from requirements capture to qualification.
➢ Excellent verbal and written communication skills.

EDUCATION

University of South Florida, Tampa, FL: B.S.Cp.E., 1981
Saint Petersburg Junior College, Saint Petersburg, FL: A.A., 1977

PROFESSIONAL

Active member of the USACM and the IEEE Standards Association
Member of ACM, IEEE, IEEE-EMBS, and IEEE-CS

EMPLOYMENT HISTORY

April 2017 – Present:
Under contract to General Electric Healthcare, Laurel MD and Wauwatosa, WI

Working on several devices for monitoring fetal activity, both invasively and via ultrasound: Coding algorithms that process ADC output for, among other things, filtering signals and implementing control loops. Optimizing the code to minimize power consumption. Also implementing communications with an external monitor. Documenting for submission to the FDA and EU/EFTA as a class III device. Coding in C for an ARM Cortex-M7 processor, STM32F745VEHx. Using the Git version control manager and the GNU cross-compiler.

October 2016– February 2017:
Under contract to Stryker Medical, Orthopædics Division, Kalamazoo, MI

Improved existing code for an FDA and EU/EFTA class III device, both to make possible the implementation of all features specified by its requirements by greatly optimizing its performance, and also to render it acceptable for V&V by refactoring. Wrote drivers to interface the on-board FPGA with the processor. Coded in C with a trifle assembly for a target of a system-on-a-chip (SoC) with dual ARM Cortex-A9 processors. Used the Perforce version control manager, the GNU cross-compiler and cross-assembler, and the Xilinx Software Development KIT (SDK) for the ARM.

April 2015 – October 2016:

Personal leave due to being unexpectedly widowed.

August 2013 – April 2015:
Under contract to Tyco International, Ltd, Boca Raton, FL

Designed, implemented, tested, and documented a preemptive RTOS which was granted U.S. patent 9,280,389 and international patent WO2016109627 (A1) with another U.S. patent pending. Developed initially for very constrained hardware, a device with 10K of RAM (an MSP430F5342) to enable implementing a wireless mesh network on, this RTOS was designed and coded to be readily portable to other processor families, packaged for multiple platform releases, and with considerations for building in different environments. Implemented drivers to support the initial hardware with hooks for dropping into platforms with other peripheral devices. Produced demonstration code with accompanying written descriptions. Self-managed in a fluid environment and met all deadlines with early delivery in many instances. Worked as part of a team, interfacing with electronic engineers, assisting other developers and technical writers in creating documentation, and assisting quality assurance in writing and evaluating test plans. Coded primarily in C and some in assembly. Used the SVN version control manager, sundry hardware instruments, and the IAR integrated development toolkit for the MSP430 family.

February 2013 – July 2013:
Under contract to Elbit Systems, Fort Worth, TX

Identified, documented, and corrected software defects in a redesign of the V-22 Osprey's cockpit display. Organized and attended peer reviews. Unit and system tested the implementation and coordinated development with the test team. Quickly acquired proficiency in a number of project-specific tools. Utilized the Perforce, ClearCase, and Git version control managers. Coded in C for a power PC using the GreenHills Multi cross-development package and debugger with the Integrity RTOS.

July 2012 – December 2012:
Under contract to Technicolor, Indianapolis, IN

Responsible for implementing factory test code for a set-top box. Coded applications on a propriety system-on-a-chip (SoC) to direct MPEG traffic from assorted sources, to generate audio tones and video test patterns, and to test the device's other peripherals. Ported legacy tests from a non-RTOS system to Linux. Worked with those responsible for automating the tests to correctly adapt existing

protocols to be appropriate for the new product. Corrected and simplified test procedure documentation. Used GNU C, embedded Linux, and the ClearCase version control manager.

September 2011 – May 2012:

Under contract to DRS-ICAS, Merrimack, NH

Specified a communication protocol between a system-on-a-chip (SoC) consisting of an FPGA with a pair of MPC-5200 cores on-board and a device manufactured by a foreign entity: Authored and saw through review the Interface Control Document (ICD) for the protocol, coded and debugged the implementation of the in-house side, and wrote a simple driver under the GreenHills Integrity RTOS for the underlying raw Ethernet layer on the MPC603e core's Fast Ethernet Controller (FEC) residing on the FPGA. Developed numerical algorithms optimized for speed and optimized legacy code. Wrote UNIX shell scripts to expedite the building process. Used C and some assembly for the MPC-5200, the command-line GreenHills cross-development package, and the AccuRev version control manager.

January 2011 – September 2011:

Under contract to Keithley Instruments, Inc., Cleveland, OH

Designed, coded, and unit tested drivers for an MPC-5125. Reviewed FPGA design specifications. Ported high-level drivers written for the OSE RTOS running on ColdFire processors to GreenHills velOSity running on Power-PCs, preserving the same external interfaces so as to expedite the porting of application. Used C, C++, and some assembly for the MPC-5125 and MPC-1020, the GreenHills Multi cross-development package and debugger, and the Perforce version control manager.

June 2010 – December 2010:

Under contract to General Electric Transportation Systems, Melbourne, FL

Designed, implemented, unit tested, and documented modules for a railroad signaling and braking system. Created scripts for the GreenHills debugger to verify, among other things, the functionality of what should be unreachable code. Organized formal reviews of my own work and participated in reviews of others' requirements, designs, and code. Instructed fellow engineers in the writing of complex GreenHills debugger scripts and in the nuances of floating-point arithmetic and the C language. Used C and some assembly for the MCF-5235 ColdFire, the GreenHills Multi cross-development package and debugger, and the StarTeam version control manager.

February 2010 – June 2010:

Under contract to Occam Medical Design, Inc., Lutz, FL

Ported a Board Support Package to a 32-bit PIC platform from one customized in-house for 24-bit PIC processor based systems and wrote and tested RS485 and MODBUS drivers for the new BSP. Documented the new BSP's interface and commenced the writing of its application interface. Debugged the ported BSP and new drivers in conjunction with debugging the underlying hardware. Reviewed design and code from other teams. Used the GNU C compiler and debugger through MicroChip's IDE on the PIC24HJ256GP610 and PIC32MX460F512L, Doxygen, and the Tortoise SVN version control system.

September 2009 – February 2010:

Under contract to General Dynamics C4 Systems, Fort Wayne, IN

Designed, implemented, and debugged modules on a Software Defined Radio system to move data across address spaces for security purposes using the Integrity RTOS. Implemented and documented interfaces as well as wrote and executed unit test scripts for those modules. Used C and some C++, the GreenHills Integrity RTOS, Multi cross-development package, and debugger, and the ClearCase version control manager.

July 2008 – May 2009:

Under contract to L-3 Display Systems, Alpharetta, GA

Performed various tasks in accordance with DO-178B, level A: Designed and documented modules

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for inter-processor communications over MIL-STD-1553 and for interfacing with drivers for the Integrity RTOS. Taught fellow team members the rudiments of Power-PC assembly language and how to trace C code at the assembly level as well as in the use of the GreenHills Multi cross-development package and debugger. Created complex scripts for the GreenHills debugger and instructed fellow engineers how to write such scripts. Created test harnesses, test report templates, and check-lists for formal reviews. Wrote and executed unit test scripts. Authored and reviewed requirements, design documents, and safety specifications in accordance with ARP4754. Used DOORS, Doxygen, and the GreenHills Integrity RTOS, Multi cross-development package, simulator, and debugger.

October 2007 – July 2008:

Under contract to Crane Aerospace and Engineering, Lynnwood, WA

Developed, for the Airbus A-400m's anti-skid braking system, the modules to monitor and communicate with the IRDC (Interface Remote Data Concentrator) via the ARINC 429 protocol: Authored requirements and safety specifications in accordance with ARP4754. Designed, implemented, debugged, and documented code in accordance with DO-178B levels A and B. Mentored younger engineers in the C programming language, the design of code that is mission-critical as well as maintainable, implementation of algorithms, nuances of floating point arithmetic, the construction of unit tests, the use of in-circuit emulators, and general debugging skills. Was the in-house expert on the C programming language, Power-PC assembly language, and the Diab C development package. Performed reviews of others' requirements, designs, and code and reviewed validation plans. Worked with the V&V team to tweak the development team's coding practices to minimize validation efforts. Re-wrote build scripts, streamlined the build process, and served as system administrator for the machine dedicated to the team's build process, a Sun server using Solaris 2.8. Used DOORS, the Synergy version control and defect tracking system, the Diab C cross-compiler/linker and vision ICE for the MPC-750.

June 2007 – October 2007:

Under contract to Aircraft Braking Systems Corporation, Akron, OH

Performed object code analysis for validating for level A DO-178B certification the GreenHills C compiler's generation of object code for the MPC-565. Traced each op-code to the source code in the assembly output produced by compiling an FAA approved compiler verification kit and demonstrated that nothing in the object code performs any functionality not explicitly coded in the C source. Created numerous shell scripts, awk programs, et cetera, to automate tracing of repeated constructs. Wrote a report summarizing details of the object code trace explaining common constructs generated by the compiler as well as idiosyncrasies and inefficiencies and how the optimizer generates code that differs in sequence from the source code to in parallel perform DMA, arithmetic operations, and floating point operations. Explained to fellow engineers a great number of details of how the GreenHills compiler operates and advised the team on how to tweak the optimizer to best suit their needs. Used C and Power-PC assembly, utilizing the GreenHills Multi cross-development package, simulator, and debugger.

August 2006 – February 2007:

Under contract to GreenHills Software, Palm Harbor, FL

Wrote, documented, and executed white box tests for new device drivers in a board support package for the DO-178B version of the Integrity RTOS. These drivers are for several devices in an FPGA commissioned by Airbus as a peripheral to an MPC8240 CPU. The tests were written primarily in C and linked with a proprietary test bed framework; portions of the tests were written as complex scripts for the GreenHills debugger. Found several software bugs and a hardware bug. Taught fellow contractors about the side effects of the GreenHills optimizer on C code and assisted them in the use of the GreenHills Multi cross-development package and debugger. Used these GreenHills tools and the GreenHills JTAG probe with C and assembly, as well as Doors, and CVS.

September 2005 – August 2006:
Under contract to ABB Process Analytics, Lewisburg, WV

Customized GreenHills' MPC8260 FADS board support package to support an MPC8270 motherboard designed as the master controller for a gas chromatograph. Assisted the hardware designer in debugging the hardware and modifying the design for the final, production version. Wrote drivers for many devices, including a real time clock, SDRAM, and DPRAM controllers, as well as helped adapt canned drivers written for the MPC8260 FADS board for numerous other devices, including Ethernet, USB, VGA, and the PCI bus controller. Wrote drivers to interface with, and diagnosed bugs in, an FPGA. Assisted in bringing up the GreenHills Integrity RTOS and integrating the TCP/IP stack and various OSI applications. Used C, primarily, with some assembly and C++, for an MPC8270 (Power-PC) target running GreenHills Integrity, utilizing GreenHills Multi cross-development package, debugger, and JTAG probe, Doxygen, CVS, and a Tektronix logic analyzer.

February 2004 – March 2005; October 2001; May 1999 - May 2000; March 1996 – December 1997; August 1994 – February 1995:
Under contract to Critikon, General Electric Medical Systems, Tampa, FL

Designed and implemented as a C++ base class the device driver for a proprietary protocol riding on HDLC which drove the communications between the motherboard and daughter sensors of a state-of-the-art, multi-processor, modular vital-signs' monitor. Debugged this driver in conjunction with debugging the underlying hardware. Generated and executed a validation test suite for this driver as well as for parts of the derived classes implementing the two layers inheriting this driver. Helped bring up and debug the motherboard and crafted a board support package for it by modifying a canned BSP for a MC68360 evaluation board purchased with pSOS. Performed miscellaneous tasks for the release of that product: Identified requirements, designed, implemented, and validated a robust suite for customer use to update the flash images in the product's processors. Helped define manufacturing and software release procedures. Reviewed and documented software to facilitate approval by certifying agencies including the FDA and TÜV. Re-implemented some low-level drivers for faster and more deterministic performance. Instructed fellow engineers on the theory and implementation of the TCP/IP protocol stack and suggested ways to integrate existing proprietary protocols into it. Designed and implemented for subsequent generation of that product an add-on device for communications to peer devices that bridges a proprietary protocol riding on RS-232 to emerging industry-wide applications layers riding on UDP/IP; integrated a purchased OSI stack into an in-house RTOS. Optimized, simplified, and mostly re-wrote an in-house kernel acquired consequent to purchasing a product from a competitor, and reverse-engineered and structured much application code on that product. Designed and implemented device drivers for several OEM plug-in sensors to allow their use with main units designed in-house. Mentored junior engineers in the C language, structured programming, and design of life critical software. Used C++, C, and assembly for an MC68360 target running pSOS, for MC68302 and MC68EN302 targets using an in-house kernel, and for MC68000 using another in-house kernel. Utilized the Microtec cross-development package, NOHAU's back-ground mode debugger, GNU debugger, ClearCase, and an HP logic analyzer.

March 2003 – February 2004:
Under Contract to Lockheed Martin Tactical Systems, Eagan, MN

Responsible for 1394b subsystem's power-on self-test for the Integrated Core Processor on the Joint Strike Fighter (JSF). Designed test algorithms, coded the tests in C, wrote and executed the unit tests, and tested the code as much as possible on the target hardware which was still in development. Provided feedback to the hardware designers. Wrote the "C Style Guide" for the project Instructed fellow engineers in the C Programming Language, algorithms and optimization. Acted as the staff engineer whom several dozen other implementers depended on for answers to assorted technical questions. Moderated or attended a large number of peer reviews. Helped improve processes as part of the effort advance to level 3 of the CMMI (Capability Maturity Model Integration). Used the GreenHills C compiler and integrated package with the Multi debugger and Integrity RTOS for the PPC750. Also used DOORS, the Cantata Instrumenter package for the development and execution of the unit tests and analysis of code coverage as well as ClearCase for version control.

November 2001 – January 2003:
Under contract to Renal Solutions, Inc., Rochester, NY

Co-designed a kidney dialysis machine's controller. Organized and initiated the formal design process. Authored the software requirements specification. Co-authored the software architecture and specifications for inter-processor communications protocols. Identified and evaluated micro-controllers, A/D and D/A converters, communications controllers, and other components. Began coding the application and integrated it with RTOS-32 as well as with a GUI written out-of-house. Organized the various software components and initiated version control using PVCS. Developed algorithms for filtering noisy input converted from analog devices. Mentored entry-level engineers and instructed them in real-time design and implementation, state machines, communications protocols and interfaces, hardware control, subtleties of the C programming language, and many other subjects. Reviewed documentation and recommended changes to facilitate writing of test procedures and approval by the FDA and other certifying agencies.

September 2000 - July 2001:
Under contract to Lucent Technologies, Optical Networking Group, Naperville, IL

Contributed as part of a large team to the next generation of a high-speed optical network switch and bandwidth manager: Ported the hardware interface, low-level device drivers and bootstrap to a platform of multiple MPC860s communicating over 100-base-T Ethernet from a one of MC68360s with proprietary buses and protocols. Re-wrote the assembly language code and adapted the C++ code for use with the new platform and wrote validation suites to help ensure that the ported drivers would work in all contexts. Specified how to wrap the non-physical aspects of the existing proprietary protocols as the upper layers of the OSI stack and how to code this as a layer encapsulating the standard UDP/TCP/IP socket interface to ensure that the methods for accessing these data could be re-used by simply invoking the new base class including the socket interface in place of that of the obsoleted drivers. Instructed fellow engineers in writing shell scripts, various subtleties of UNIX, the structure and use of the OSI stack and the details of Ethernet, as well as in profiling and writing efficient code. Also, fixed miscellaneous bugs found by others prior to porting. Used C++ and assembly for the Motorola Power- PC family, the GreenHills cross-development package, the Chorus RTOS, the ClearCase version control manager, the xddts bug tracking tool, and the C-scope code browser, all on SPARC workstations running Solaris 2.7, as well as HP in-circuit emulators and logic-analyzers.

May 2000 - August 2000; August 1999 - December 1999; May 1998 - April 1999:
Under contract to Baxter Healthcare Corporation, Renal Division, Largo, FL

Specified a new system architecture for the controller of a kidney dialysis machine for which previous software implementation efforts had failed. Designed, implemented, and validated its bootstrap, board support package, device drivers, timer and self-test functions, as well as customized library and arithmetic functions as required for efficiency and resource constraints. Worked out and tweaked interrupt latency, task contexts/priorities, and hard real time constraints in an environment with limited memory resources. Developed, implemented, and refined numerous algorithms. Specified manufacturing and software release procedures; wrote a flash driver for customer use in installing software updates. Documented the software and verification procedures to win approval by certifying agencies including the FDA and TÜV. Instructed fellow engineers in use of in-circuit emulators, profiling and writing efficient code, non-integral binary arithmetic, use of locks and semaphores for resources shared by several threads, and subtleties of the C programming language. Used C and assembly for a pair of MC68EC000s running the CMX RTOS. Utilized the GreenHills cross-development package, the Source Safe version control system, and HP in-circuit emulators and logic-analyzers.

April 1995 - December 1995:
Under contract to Motorola, Messaging Services Product Group, Fort Worth, TX

Specified the system architecture of the receiver for a two-way messaging system's infrastructure. Implemented the binding to the UDP/IP protocol stack of ReFLEX encapsulated in proprietary upper layers of the OSI model; reviewed the protocols utilized with other teams implementing the same and

specified validation procedures.   Developed protocols to use RS-485 for inter-processor communications. Taught fellow engineers a number of subjects, especially internal device access in MC683xx processors, the implementation of semaphores and circular queues, and the handling of arbitrarily sized values without using floating-point representation. Evaluated CASE tools. Ported existing code from an MC68302 target to an MC68360; used C and assembly with pSOS. Utilized the Microtec cross-development package and ClearCASE under Unix on Sun and HP workstations with several debuggers and logic analyzers.

August 1993 - July 1994:
Under contract to Network Systems Corp., Minneapolis, MN

Involved in the analysis and design phases of a very high-performance, multi-processor networking bridge. Specified the generalized design for link-layer driver interfaces and physical-layer controllers generically as well as designed the drivers and controllers for Ethernet, X.25, T1, and T3. Helped design programmable logic to increase the performance of the network controllers' hardware and specified hardware modifications for increasing the MPU's performance in accessing peripheral controllers. Investigated the feasibility of re-using C++ code written for a previous product for the less time-critical parts of the software. Helped improve and document processes to achieve ISO 9001 certification. Instructed fellow engineers in object-oriented design and C++ as well as in linking C modules with C++ modules. Used GNU C and assembly for an AMD 29000 target running VX Works.

January 1993 - June 1993:
Under contract to Fibercom, Inc., Roanoke, VA

Complying to level A RTCA/DO-178B, designed, implemented, and debugged the Ethernet driver and hub manager for the Ethernet/FDDI bridge/router for the Boeing 777 aircraft and integrated these drivers into the rest of the firmware. Mentored fellow engineers learning to use an in-circuit emulator. Assisted the hardware designers in debugging the Ethernet and mother boards. Helped debug a custom RTOS written for the project. Used C for a target of two I80960 RISCs, one running that custom RTOS and the other VX Works, and utilized the GNU cross-compiler under SunOS, AMC's Code Tap, and an HP logic analyzer.

November 1992 - December 1992:
Under contract to Genesys, Inc., Orlando, FL

Converted a graphical user interface for a medical radiological display system to work in Kanji. Wrote diagnostics and described software changes needed to support new hardware for a WORM drive interface. Suggested ways to make this software more maintainable. Used C on an IBM RISC 6000 workstation under AIX.

August 1991 - November 1992:
Under contract to Comtec Systems, Inc., Pompano Beach, FL

Created a complex and fast LCD driver in C with some assembly to drive a control panel for medical equipment. This user-friendly device conforms to strict specifications and includes line drawings as well as text in multiple languages with varied character sets, capable of being changed on the fly. Wrote MS-DOS commands for capturing character fonts and line drawings from a VGA screen and producing source files containing the resulting bit-maps with their indexing tables. Also specified the real-time characteristics of the whole system and communications between the control panel and the main unit. Used the Intermetrics cross-compiler for a MC68331 target and NOHAU's back-ground mode debugger.

March 1991 - June 1991; October 1988 - February 1990:
Under contract to Nova Research & Engineering, Inc., Clearwater, FL

Ported into C and commented totally undocumented Z-80 assembly code driving an optical scanner and stepper motors for a quality-assurance machine for printing bank checks. Also, responsible for an interactive teaching aid for dental students. Implemented stepper-motor controllers in assembly on a Z-8000 system embedded in an IBM PC, a user-interface in Pascal to drive the controller, and communications between the two. Additionally, debugged and perfected an MC6805-based stepper

motor controller for sealing and time-stamping pouches for transporting valuables. Used Borland's Turbo Pascal compiler the AD2500 cross-assembler.

May 1990 - March 1991:

Under contract to Nokia Data Communications, Inc., Largo, FL

Involved on a team of 18 engineers developing a methodology for structured analysis, design and coding for a series of networking products with an anticipated long life-cycle. Designed on Cadre's Teamwork CASE tool and implemented the bootstraps for a multiple-processor spanning-tree bridge in MC68020 assembly and C++; designed as objects and implemented in C++ the device-drivers for X.25 and Ethernet link chips, cooperating with the hardware designers to bring up the system using ICEs and logic analyzers; also interacted with the designers of the ILACC Ethernet controller chip in debugging the silicon and correcting the data sheets. Made the template for the group's validation testing procedures as well as wrote and executed the first test suites. Authored a 50-page C++ style guide. Installed a cross-compiler package on a network of Apollo workstations and wrote numerous Korn shell scripts to interface to this package, produce makefiles, check for stylistic errors and inconsistencies between design and code, and to automate in other ways the more repetitious tasks of the development process. Used C, C++, and assembly for a target of MC68020s running pSOS. Utilized the GreenHills cross-compiler and cross-assembler on an Apollo workstation under UNIX, AMC's ICE and sundry logic analyzers.

September 1983 - October 1988:

Senior Software Engineer, Digital Services Corporation, Gainesville, FL

Involved in embedded systems in assembly and C to control digital video broadcasting hardware for real-time, state-of-the-art special effects including 3-D transformations, pixel interpolation, anti-aliasing, propagation of test patterns, and transformations between RGB and YUV as well as between NTSC and PAL. Interacted with E.E.s to optimize trade-offs between hardware development/manufacturing and software development costs. Brought up new hardware using logic analyzers, oscilloscopes and vector-scopes. Developed numerous algorithms, often working with a mathematician. Wrote several specialized floating-point libraries to drive idiosyncratic hardware. Modeled proposed video analog and digital hardware. Responsible for maintaining quality of and customer satisfaction with machines being manufactured. Wrote communications modules and designed/debugged device drivers to interface diverse machines for broadcasting studios. Optimized existing ROM code to conform to previously abandoned design specifications. Specified and implemented user interfaces and modified them in response to users' feedback, wrote operators' manuals, trained customers, performed field service. Designed test fixtures. Created diagnostic software for quality assurance. Programmed manufacturing equipment and trained assembly-line workers in its use. Used assembly, C and Pascal or MC68020, MC68008 and MC6809 targets. Utilized several cross-compilers and cross-assemblers under UNIX and other OSs on Heurikons, Sun workstations and other hardware platforms as well as many types of hardware test equipment.

June 1976 - September 1983:

Software Engineer, Nova Research & Engineering, Inc., Clearwater, FL

Designed, implemented, and documented single-chip micro-controllers with self-testing ROM bootstraps, monitors, and debuggers for a wide variety of applications. Implemented device drivers for peripherals. Modified operating systems, especially Apple DOS, for specialized needs, including disk-encryption.

1973 - 1975 (Summers):

Programmer, Saint Petersburg Junior College, Saint Petersburg, FL

Customized compilers, interpreters, and operating systems. Created mathematical libraries. Helped install and wrote/debugged device drivers for peripherals. Used assembly and FORTRAN on Nova mini-computers and the BIT-480.