

## Gary Cordelli

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## Embedded Computer Engineer

(321) 777-9094

<http://www.c-squared-group.com/mentor.htm>

Mr. Cordelli has three decades of experience on commercial and government contracts as a Computer Engineer, involving hardware and software design on levels from components to systems. He designs applications and real-time software/firmware on a variety of embedded, Sun and PC platforms for control, communications and computer systems. He has also designed hardware based on microprocessors, microcontrollers, and mixed-signal processors as well as FPGAs and CPLDs. He pursues embedded design and development opportunities that utilize and challenge his knowledge and abilities, addressing the problems and goals of each project through creative, robust and cost-effective solutions.

### Employment History:

- **Mentor Computer Consulting, LLC; Embedded Computer Engineer; 1986 - present**  
Designed software/firmware for wireless health monitor, multi-channel light show controller, in-flight entertainment (IPTV) system, environmental lab and handheld instruments, Tactical Air Navigation (TACAN) beacon simulator, Aircraft Weather Information Server/Terminal, T1/E1/POTS automated test equipment, GPS locator, misc. control systems, BIOS, OS, device drivers, and debuggers. Designed hardware/software for smart sensor networks, handicapped-user input devices, IR data transmitter, conveyor parts counter, test equipment, and other MCU-based products. Co-designed software for JTRS SCA radio set and waveforms (Software Defined Radio), INTELSAT TDMA network management, GSM-based Wireless Local Loop, Call Processing (ISDN Q.931, GSM 4.07/4.08), ATM and ISDN satellite gateways, INMARSAT dynamic network channel management (DAMA), DISA Bandwidth Management Center controllers, FAA LINCS/NIMS remote site monitoring/control, ion implanters, vacuum evaporators, consumer kiosks and POS devices.
- **Harris Corporation, Gov't Information Systems Division; Senior Engineer; 1985 - 86**  
Designed software for ATE, communications, battle management, and simulation.
- **The BDM Corporation, Tactical Systems Development; Computer Engineer; 1982 - 85**  
Co-designed software for EW/C3CM, UAV payloads, communications, surveillance and other systems.
- **Mentor Computer Consulting; Computer Engineer; 1978 - 82**  
Designed hardware & firmware for various MPU- and MCU-based systems for control, monitoring, security, etc.

Education: B.S., Magna Cum Laude, Computer Engineering, Florida Institute of Technology, Melbourne FL, 1982

### Partial Skills Summary:

- **Software Design - Assembly Languages:** PIC, MSP430, ARM, 8051, 80196, PowerPC, 68HC11, 68HC08, 68HC705, 68306, 80C320, 87C750, PSoC, DSP56F80x, 320C54x, 320C51, ADSP21xx, MAXQ, 680x0, x86, 8080, 8085, 6502, 6800, 6805, 6809, COP8, 80C166, Z8, Z80, Z180, 9900, 1802, 2650, Macro-11; **HLLs/Tools/Libs:** C/C++ (ANSI, Gnu, Visual Studio, Tornado, Borland, VisualAge, eMbedded, IAR, MPLAB, CodeWarrior, CodeComposer, Keil, Tasking), Java, Pascal, FORTRAN, BASIC, VB, APL, Ada, COBOL, MFC, Btrieve, SIMAN (simulation), ObjectGEODE (SDL), ACE-TAO (CORBA); **GUI Environments:** PEG, MS-Windows, OpenWindows, SunView; **OpSys:** Linux, uClinux, SMX, VxWorks, pSOS, Cosmos, QNX, uC/OS, DSP/BIOS, VRTX, Solaris, SunOS, UNIX, Windows CE/XP, AmigaDOS, RomDOS, RT-11, RSX-11M, RSTS/E, CP/M, misc proprietary RTOS; **Sys Programming:** Kernel, RTOS, BIOS, BSP, Device Drivers, Sockets, TCP/IP, UDP, SNMP, X.75, X.25, T1/E1, RS-232, RS-485, IEEE-488, ARINC429, I2C, SPI, PWM, CAN, USB, FFS, LCD, MMC/SD; **Apps:** Lab instruments, IPTV, MPEG, Satellite/Wireless, Call Management (ISDN Q.931, GSM 4.07/4.08), ATE, SDR/SCA, GPS, TDMA, ATM, Automation, Control, Simulation, Signal Processing, Telemetry, DACC, FEC, DAQ, POS; **Embedded Platforms:** Microcontroller, Microprocessor, Mixed-Signal Processor, DSP, embedded Sun & PC; **Misc:** ISO9000, POSIX, ICE, JTAG, SCCS, PVCS, CVS, VSS, DOORS, Rose (UML), ClearCase, ClearQuest
- **Hardware Design - Processor-based:** PIC, MSP430, ARM LH75410, PSoC, 8051, 87C750, 80C320, 68HC11, 68HC08, 68306, 68705, 80196, Z180, 8085, 6502, 6800, Z80, 1802, 2650; **Programmable Devices:** FPGA / CPLD using VHDL; **Digital:** xTTL, xCMOS, ECL, GaAs; **Analog:** ADC & DAC interfacing; **Tools:** OrCAD, Warp, PLDasm
- **Systems Design - System Engineer, Software Tech Lead, and full Hw/Sw Engineering for MCU-based Products**

### In-House Design and Development Lab capabilities:

- TI MSP430, Silicon Labs C8051F3xx, and Maxim MAXQ2000 Mixed-Signal MCU Development Systems
- Sharp LH75410, NXP LPC2148, and Luminary Micro LM3S8962 ARM Processor Development Systems
- PIC, 8051, 87C750, Rabbit2000, 68HC11, HCS12, 68HC08Q, 68HC705K1, 68306, 80C196, 80C166, Z8, COP8, Embedded-Java JStamp, BASIC Stamp, and ST/Waferscale PSD Hardware/Software Development Systems
- dsPIC33 and DSP56F80x DSC; TMS320VC5416, TMS320C28x (piccolo), and TMS320C51 DSP Development Systems
- Cypress PSoC Designer / PSoC Express Development Systems
- Windows/DOS and Windows CE Software Development Tools (Visual Studio, eMbedded, Platform Builder)
- NetBurner ColdFire MCF5270 Eclipse-based uC/OS Development System
- Digital Design Lab with Misc. Bench Test Equipment (Oscilloscope, Logic Analyzer, Func Gen, Freq Ctr, DVM, etc.)

### Partial Client / Customer List:

LiveTV, Nyx, Yellow Springs Instruments, Mnemonics, Moog Aircraft Group, Neural-Robotics, COMSAT Labs, Lockheed Martin, SOTAS, Avenue Technologies, New Directions, Penn State-Hershey Medical Center, NCR, AT&T, DEC, Microsoft, Commodore-Amiga, ULVAC North America, Dupont, Diverse Data Products, Eaton Semiconductor, McCrory Stores, Social Security Administration, Spectrum Interactive, NIH, WHCA, NRL

**Multi-Channel XML-Programmable LightShow Controller *Nyx Illuminated Clothing, Inc***

Developed software in embedded C for the MSP430F2418-based LightShow Controller for NYX's LED-adorned cat-suit for Lady GaGa's "The Monster Ball Tour" in 2009-2010. Developed a two-tiered architecture comprising "patterns" and "programs" which use the patterns. Each pattern can define a sequence of discrete multi-channel on/off settings or a curve describing a single-channel variable level (either variable voltage or PWM output). Each program associates one of the patterns with parameters describing how it is used, including time-per-output, sequence period, inter-sequence dwell, and other parameters controlling the specific display of the pattern, allowing multiple programs to reuse the same pattern in different ways. Developed a small XML parser to allow patterns/programs to be programmed to on-chip Flash via an RS-232 interface.

**In-Flight Entertainment (IPTV) System *LiveTV, Inc***

Developed software in C/C++ for several subsystems in the 3<sup>rd</sup>-generation LiveTV in-flight entertainment system, providing live television and movies to individual seats on several airlines, including JetBlue and Continental Airlines. Developed the mrmmpush application to duplicate playlist and control file content from terminal-based servers onto on-board content servers via wireless links whenever an airplane was docked at a gate. Developed a number of device drivers under uClinux 2.6.x and completed port of open source U-Boot facility for the ColdFire-based Ethernet Switch and Antenna Controller (ESAC) subsystem; also developed drivers in C under Linux 2.6.x for the x86-based Content Server and System Controller (CSSC). Developed LipSync application to synchronize an MPEG audio channel delivered over the airplane Public Address system to MPEG video streams transmitted to each seat via an on-board IP network for use in the safety video and other all-seat presentations. Developed maintenance application in C/C++ under Windows to re-program Flash devices in the multi-processor-based Antenna subsystem. Developed automated test facility in C under Linux for the 3<sup>rd</sup>-party video pump and developed fixes and feature enhancements in C under Linux for this IPTV (MPEG-2 Program Stream over RTP) data pump.

**Wireless Health Monitor System (WHMS) *NICCO, Inc***

Developed software in embedded C for the MSP430F2418-based Main Control Processor (MCP), Storage Interface Processor (SIP), and Wireless Interface Processor (WIP), as well as the MSP430FG4618-based EKG Channel Processor (ECP). Together with TMP275-based Temperature Modules and EKG Electrode Modules, these comprised a wireless modular health monitoring system (WHMS) incorporated into the fabric of a vest designed to be worn under an astronaut's space suit, under a sub-contract to NASA. Also developed software in C++ under Windows Mobile for a GUI to discover Bluetooth-based WHMS vests in the vicinity and allow the receipt and display of the health data, including body temperature, heart rate, and filtered EKG graph. The ECP module takes EKG samples via three electrode modules and uses digital filtering to extract clean EKG signals and derive heart rate data; the MCP module captures this data in one-second packets and combines it with TMP275 temperature readings and transmits it to a Bluetooth-based GUI unit via the WIP and optionally stores it for later retrieval in a micro SD card in the SIP module.

**Multi-Channel/Multi-Parameter Handheld Water Quality Instrument *Yellow Springs Instruments Inc***

Developed software in embedded C/C++ for the LH75410 ARM-based Instrument Main Processor and MSP430F169-based Analog Co-Processor for YSI's Professional Plus Handheld Water Quality Instrument, providing Dissolved Oxygen, Conductivity/Resistivity/Salinity/TDS, pH/ISE (CL, NO<sub>3</sub>, NH<sub>4</sub>), Temperature and Barometer measurement and logging. Developed Universal Menu Service to provide a generic, re-usable user menu engine for this and future YSI instruments, as well as a number of other re-usable driver-layer modules for this and future instruments sharing the same processor platforms, and several re-usable service-layer modules for this and future instruments using any processor. Added ARM power management to MicroDigital's SMX RTOS and wrote LCD driver for Swell Software's PEG library on LH75410. Analyzed/debugged several hardware issues and proposed design mods that corrected and/or enhanced operation.

**Software Communications Architecture (SCA) Airbourne Quad Zebra and Broadcast Intelligence JTR Sets *Mnemonics Inc***

Developed Red- and Black-side waveform Resources, Device proxies, and test bed tasks in C++ under VxWorks (Tornado, Rose, ClearCase) for Mnemonics' PowerPC-based JTRS SCA AQZ and BI radio sets, including separate development contracts providing SIDS, TIBS, and TDDS/TADIXS-B Waveform Applications. Integrated code with Harris dmTK™ CoreFramework and created CF-independent CORBA interface layer. System Engineer on TIBS waveform contract.

**Conductivity Lab Instrument LCD Conversion *Yellow Springs Instruments Inc***

Re-architected software design of YSI's 3100 Conductivity/Salinity Instrument to replace in-line LCD control/display code on a 68HC11 with a generic LCD Driver API and a separate LCD Driver module, to satisfy an immediate need to port the software to a new LCD/controller hardware component and to provide a simpler method for possible future ports if required.

**Distributed Smart Sensor Network *So Cal client not releasable per NDA***

Developed distributed smart sensor based on the MSP430, each of which monitors several displacement variables by scanning multiple quadrature encoders and reports composite data to a central computer via an RS-485 network. Code optimized for low power operation. Purpose of the sensor network remains covered by NDA.

**KBIO Slave I/O Processor *Yellow Springs Instruments Inc***

Developed Slave Processor for YSI's 3200 Conductivity and 5100 Dissolved O<sub>2</sub> Instruments using Microchip PIC 16F72 microcontroller and MPASM code. Found and fixed bugs in client 80C196 Master Processor BSO/Tasking C code.

**Tactical Air Navigation (TACAN MIL-STD-291B) Beacon Simulator *Moog Aircraft Group***

Designed real-time firmware for the Moog OE-273 Tactical Air Navigation (TACAN) Beacon Simulator. Used multiple Microchip PICs as an ACU Timebase Source and Monitor (16F873), ID and Equalization Pulse Generator (16F873) and random-period Squitter Pulse Generator (12C671), all driving a Video Generator (16F873) with pulse-width, reference delay, power and frequency band controls and error-inducement test modes. Replaced a less precise 70+ IC design.

## **Gary Cordelli, Computer Engineer (321) 777-9094 Some Selected Contract Projects (cont)**

### Astrolink™ Worldwide Multimedia and VPN Satellite Network Lockheed Martin Global Telecom

Designed software in C under the Cosmos RTOS to provide distributed database capability for Astrolink control system.

### INTELSAT New TDMA Infrastructure - RTE/TSM Local Management System Lockheed Martin Global Telecom / INTELSAT

Technical lead for Core Management software team. Designed six individual real-time processes; including, protocol-independent Message Router and GPS, Host Station Equipment, Sw Version, FTP, and TCP Managers. Designed software architecture using the Verilog/Telelogic ObjectGEODE™ SDL development CASE tool. Developed C code under Solaris and Cosnix on Sun Ultra-5 platforms. Wrote Java code for GUI on PC-based remote terminals.

### NCMS™ - INMARSAT Aeronautical Network Channel Management System COMSAT Labs / INMARSAT

Developed real-time processes for Resource Management (carrier allocation), Service Management (AES logons and carrier mobility management) and Resource Monitoring (local/global carrier pools and satellites) in SDL. Developed processes in C under Solaris on Sun Ultra workstations to implement primary/secondary NCMS nodes and system Arbiter within INMARSAT's Network Channel Management System. Implemented optimization algorithms for adaptive operation in priority-block or on-demand assignment (DAMA) modes based on traffic to use spectrum efficiently while maintaining or improving QoS. Interconnected Regional Location Register databases and the INMARSAT MMS.

### DPELS™ GPS-based Downed-Pilot Emergency Locator Avenue Technologies

Designed PIC 16C63-based GPS controller to receive, process and re-transmit position information with error-correction coding at very low-power. Designed PIC-based receiver interface to a PC serial port to recreate original GPS NMEA data to provide low-power, high-integrity FEC transmission capability from multiple DPELS transmitters to a GPS mapping application to pinpoint DPELS locations for the Hellenic Air Force (Greece). Wrote GPS simulator in Java for testing.

### ALE-2000™ ATM Link Enhancer (DS3/E3 Satellite-to-ATM Switch Interface) COMSAT Laboratories

Designed software in C under the Cosmos RTOS on Motorola 68030 platform to control custom FPGA-based and standard PMC-Sierra DS3/E3 framers. Designed Object Oriented (OO) architecture to detect Line Interface Unit (LIU) cards for DS3-to-DS3 or DS3-to-E3 links and provide upgrade path for future LIUs. Passed overhead data to allow transparent insertion between ATM switch & wireless modem in a WAN. Used interleaving & Reed-Solomon FEC via idle/unassigned cells to allow ATM over satellite at DS3/E3 rates with no bandwidth increase. Mitigated burst errors typical of satellite links to reduce cell losses/errors and burst error patterns that can produce undetected header errors and delivery of erroneous cells, achieving a  $1 \times 10^{-10}$  BER to support the most stringent classes of ATM service.

### Digicall™ GSM Wireless Local Loop COMSAT Labs / Aydin Telecom Division [L-3 Communications GNS]

Designed real-time processes for Time-Slot Interchange TDM load sharing Bus Manager for "A" to "Abis" Cross-Connect, T1/E1 Span Manager, Clock Manager, Mobility Management, Call Management and the Central Office (PSTN) Terminal Interface using SDL to encode the GSM 4.07/4.08 protocol and other real-time processes. Developed C code under Solaris and Cosmos RTOS on 68360-based CPUs within the Aydin Corp GSM-lite™ Base Station Controller and Network Access Subsystem (MSC and other Network Switching Subsystem components) and Multiple Subscriber Unit.

### TheJudge™ Raceway Monitors New Directions

Designed firmware for PIC 16C63-based Racetrack Controller to provide stand-alone control/monitoring of start-gate, race timer, and 8 lanes of IR car sensors, plus an RS-232 interface for reporting results to PC-based Race Manager software. Also designed PIC 16C54-based Raceway Controller interface for Japanese four-wheel drive continuous-loop multi-pass racetracks. Additionally designed PIC 12C508A-based E.T.™ Electronic Timer Module and SunlightMAX™ 40kHz IR Data Transmitter option chips for enhanced race management.

### Aviation/Cockpit Weather Service & FlightNews™ Airline/Cruise Ship Live News Service COMSAT Labs / Boeing

Designed software in C under Windows on embedded PCs to implement Receive Terminals (ARINC429) for COMSAT's Aeronautical Multi-cast Transport Protocol (CAMP) Broadcast File Transfer service over INMARSAT's aeronautical satellite network to support the NASA/UAL/Boeing Aviation Weather Information (AWIN) and Cockpit Weather Information (CWIN) as well as COMSAT's FlightNews™ services via the Flight Information Service (FIS). Receive Terminals are in use by NASA, United Airlines, FedEx and Air Force One as well as maritime customers of INMARSAT's news and weather services. Also developed real-time C code under Cosmos RTOS on Sun SPARCstations for COMSAT Aeronautical Services' Broadcast Communications Servers, fielded in Santa Paula and Southbury.

### X.75 Satellite Efficient Protocol Converter COMSAT Labs / INTELSAT

Developed GUI code in C++ under Windows (PC) and SNMP and control code in C under Cosmos RTOS (Sun) for X.75 SEP Converter with multi-destination multiplexing and independent packet switched data network capabilities, connecting X.75 packet switches via satellite with improved QoS while reducing bandwidth requirements.

### SmartCircuits™ Remote Site Alarm Monitoring & Control (SNMP) SOTAS [Mantas]

Designed OO architecture and developed code in C and x86 Assembly to implement a Remote Site Monitoring and Control product under RomDOS™ (with CardTrick™ flash file system) on embedded PC platforms with TMS320C31 DSP-based A/D Slave I/O processor ISA cards. Developed BIOS mods for console-less boot and motherboard chipset DOS memory remapping. Developed redirection module for RS-232/modem console access and SNMP interface module using ISI's Envoy for SNMP access. Over 5000 units run 24/7 within the FAA's Leased Interfacility National Airspace System (NAS) Communications System (LINCS) and NAS Infrastructure Management System (NIMS).

### HealthCheck™ Remote Site Host Monitor SOTAS [Mantas]

Designed PC-based system health check monitor in C under Windows to control multiple modems to dial-up remote sites, request a health check callback, receive a status dump and post-process to provide real-time status in a virtual list box. Provided capability for immediate and scheduled checks on user-selectable sites (by area code, region and/or site type).

## **Gary Cordelli, Computer Engineer (321) 777-9094 Some Selected Contract Projects (cont)**

### High-Speed Data Gateway (ISDN terrestrial-to-satellite) COMSAT Mobile Communications [Telenor Satellite]

Designed real-time Digital Access Cross-Connect switch control software in C on Sun SPARCstations for High-data-rate Gateway Switch (HGS) to interconnect INMARSAT Std A/B Land Earth Stations with terrestrial ISDN networks using Q.931 Call Management, providing global 56/64Kbps high-speed data services (A-HSD and B-HSD) to mobile users. Designed hardware-independent Cross-Connect Manager, hardware-dependent switch driver, and X.25 protocol driver processes.

### CircuitSentry™ Telephony Transmission Quality Monitoring SOTAS [Mantas]

Designed modular architecture and developed code in C and x86 Assembly for an automated Telephone Network Quality Monitor under RomDOS™ (with CardTrick™ flash file system) on embedded PC platforms with POTS monitor ISA cards using Dallas programmable filters and TI codecs. Designed BIOS mods for console-less boot and motherboard chipset DOS memory remapping. Developed console redirection module to provide "console" via RS-232/modem. Designed hardware mods to avoid PC architecture I/O bottleneck. Developed software for second-generation Object Oriented (OO) version of this product to control TMS320C31 DSP-based Slave I/O processor ISA cards (T1, E1, and 12-line POTS) and VHDL mods for FPGA bus interface. Used by AT&T, BT, KT, MCI, Sprint and other int'l carriers as well as the FAA's Leased Interfacility National Airspace System (NAS) Communications System (LINCS). Over 5000 units run 24/7 for LINCS alone, servicing over 14,000 connections to provide a high-reliability network to safely manage the national Air Traffic Control system.

### DISA Bandwidth Management Center SNMP controllers COMSAT Laboratories

Developed SNMP sub-agents and other software in C under OS/2, HP-UX and HP OpenView for Bandwidth Management Center computers and terminals to support the operation of military communications networks over commercial satellites as part of the Defense Information System Agency (DISA) Commercial Satellite Communications Initiative (CSCI) program. The software monitors carrier performance, antenna coverage, and transmission requirements, as well as monitoring and controlling remote earth terminals, including the handling of all system faults, alarms, and other events.

### PFX™ High-Speed Conveyor Parts Counter Sigma Systems

Designed Intel 80C196-based small parts counter with programmable capability to count items of varying sizes moving down a high-speed conveyor. Provided a local LCD-based user interface as well as a remote PC user interface.

### Ion Implanters and Electron Beam Vacuum Evaporators Eaton Semiconductor [Axcelis] and ULVAC North America

Designed real-time I/O Controller code in C and Z180 Assembly under VRTX on HD64180-based CPU cards. Designed real-time Linear Accelerator, Resonator and Rotary Drive control processes and developed C code under VxWorks on 68020-based VME cards for Eaton Semiconductor multi-MeV ion implanter products. Also developed Recipe controller and front-end processes in C for ULVAC North America ion implanter and ISOVAP e-beam vacuum evaporator products.

### Mouser™ Universal (Serial/PS2/Bus) Mouse Interface Chips Ecco

Designed Philips 87C751-based interface chip to provide universal PC mouse output from quadrature sensor inputs, with multi-protocol (Microsoft, Logitech, Mouse Systems, Sun, et al) compatibility. Also designed 87C751-based interface chip to connect any off-the-shelf mouse to a generic microcontroller, providing standardized X-Y position data.

### Re-configurable Macro PC Keyboard Spectrum Interactive

Designed Zilog Z8-based programmable PC keyboard providing an LCD display of a set of text/graphic function keys and pressure-sensitive overlay interface to generate corresponding macro key sequences and/or navigate hierarchical key menus. Wrote Windows/DOS programs in C to upload menus and macros from user-editable configuration files.

### Foot-Mouse (Handicapped PC Access Product) StarGlide

Designed an Intel 8051-based controller to interface quadrature sensors and switches in a foot-operated X-Y position input device and provide a standard PC mouse output data stream with auto-sensing BUS, Serial and PS/2 interface and multi-protocol compatibility with Microsoft, Logitech, Mouse Systems and other mouse protocols.

### Touch-Sensitive Panel Kiosk Display Dupont

Designed National Semi COP8-based controller for touch-sensitive display. Developed PC driver in C and x86 ASM to convert screen displays to touch "key" areas on-the-fly for an interactive consumer information kiosk application.

### Puffer Keyboard (Handicapped PC Access Product) National Institutes of Health

Designed Motorola 68HC11-based PC keyboard controller to provide standard PC XT/AT keyboard protocol output from a handicapped "sip-and-puff" interface.

### Point-of-Sale and Back Office Systems McCrory Stores

Developed software for PC-based POS systems for real-time database access, POS access security, end-of-day processing, report generation, and back office database management using C, x86 assembly and the Btrieve library.

### VAXmate BIOS and Device Drivers Digital Equipment Corporation

Designed BIOS features and various device drivers PC AT compatible desktop computer.

### Mainframe 9-track Tape Driver for PCs Social Security Administration

Designed device driver in x86 assembly language for TDX-45/50 GCR 9-track quad density tape drive, and a background tape spooler to transfer mainframe data on tape to DOS disk files for Social Security recipient data processing.