Resume and Client List for James A. Littlefield

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James A Littlefield
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DIGITAL SYSTEMS CONSULTANT

MACHINE VISION	DATA COMMUNICATIONS
DATA ACQUISITION	REAL TIME SYSTEMS
HARDWARE DESIGN	SOFTWARE QUALITY
BIOMEDICAL SYSTEMS	ELECTROMECH. SYSTEMS

EDUCATION: Massachusetts Institute of Technology:
BS Electrical Engineering, (May 1980)
MS Aeronautics and Astronautics, Avionics (May 1982)

EXPERIENCE:
Prior work responsibilities have included systems analysis and architecture specification, project management, feasibility studies, software validation/verification, and the detailed design and implementation of hardware/software systems.

SOFTWARE DESIGN: WinNT, UNIX, VxWorks, Ladder Logic, C, Visual BASIC, FORTRAN, PL/M, and assembly languages for 808x, Z80,68xx, 80xx, MIPS R3000, ADSP21XX, MPC860, PIC, Rabbit, pSoc and 68000/68302 microprocessors.

HARDWARE DESIGN: TTL, CMOS, and other logic families. Microprocessor based instrumentation, CPLD and FPGAs. Familiar with in circuit emulation (ICE), logic analysis, communications, and other test equipment. Schematic capture (Orcad, Tango, Eagle) and PCB layout (Eagle).

PARTIAL CLIENT LIST:

Technical Products Inc, Sterling, MA (2008 - 2010)
- Software/Systems safety review for a remotely operated weapon system (ROWS)
- Software/Systems safety review for a ROWS with armored enclosure and enhanced on-screen targeting

nLight Corporation, (2008)
- Designed PCB for a multi-sensor battery powered device to log shock/impact, coolant flow, pressure and temperature for a solid state IR laser.

LTronics, Waltham MA (2008 – 2010):
- Embedded firmware development for Custom PCB test fixtures
- Created a Tcl/Tk based flexible test framework to support LTronics' production QC program.
- Consultant to LTronics in support of electronics development and analysis of

failed PCBs

Venture Technologies, Billerica MA (2006 – 2010):

- Electrical design (PIC) and firmware for a hand held gas leak detector
- Hardware design (PIC) and firmware development for a high intensity UV curing lamp application
- Hardware design for a Cypress pSoc based high brightness LED controller
- Hardware design (PIC, SiLabs), firmware development, and layout for a prototype RF object locator
- Hardware design (PIC) for a battery powered medical device prototype with Bluetooth interface
- Hardware design (MSP430) for a home health care device

Bioscale Inc, Cambridge MA (2008 – 2010):

- Designed C8051F360 based mechanical actuator control hardware/firmware
- Revised design of a handheld, linux based analysis instrument
- Developed serial bootloader firmware for C8051F350/F360 processors, saving over 50% code spave vs the legacy design.
- Developed Tcl/Tk utilities for application firmware management and log file analysis
- Design revisions and artwork for a dual channel DDS board
- Hw/Sw integration to add CNC control features to a lathe
- Li battery fuel gage and charging system calibration and tuning

Corporation for Laser Optics Research, Portsmouth NH (2002-2003):

- Design of control electronics for a 13000 lumen laser system. Delivered system provides for a ariable number of laser modules controlled from a central graphical user interface. Responsibilities include design of data communications protocols and their implementation. Mr. Littlefield designed two custom ZWorld SmartStar backplane boards which provided for PWM control of safety shutters and phase variable laser pulse triggering. Firmware for a touchscreen GUI based on the ZWorld OP7100 was also developed.

Programmed Test Sources, Littleton MA (2001-2010)

- Designed PCB to implement a GPIB interface for PTS instruments. PCB included RCM2300 CPU core, interface logic, and programmable logic which provided high speed triggering and list modes.
- Developed firmware based on above PCB to provide IEEE 488.1/2 standard commands and an SCPI command set.
- Hardware design for an frequency dependent attenuator to implement gain leveling
- QuickLogic FPGA development to perform 12 digit BCD to 48 bit binary DDS frequency tuning word
- QuickLogic FPGA development to implement 1us phase stepping using Analog Devices DDS chip
- Wrote VisualBasic production test/calibration tools using Excel automation interfaces so that test configuration and result can be transferred via

spreadsheets

Assured Digital Inc., Littleton MA (1997-2000):

- Developed Tcl/Tk/C based software test environments on NT platforms to validate custom hardware and secure data comm. software.
- Enhanced and expanded a MS/SQL Server based database application for management of networks of VPN devices. Responsibilities included database table design, database administration, development of ODBC based client application
- Ported TCP stack and security routines to MPC860 based hardware platform under VxWorks. This task required customization of an existing Board Support Package (BSP) for the custom
  hardware platform and included implementation of a flash based dos file system emulation
- Preliminary investigation of Oracle/Linux based environment of hosting previously developed MS/SQL application.
- Maintained and enhanced LabView based production/burnin tools. Redesigned and implemented a burnin/traffic test suite to allow higher production throughput. This system was implemented using Tcl/Tk running on NT4.0 host machines.

EInk, Cambridge MA (2000-2003):

- ZWorld BL1700 based system w/ 24 bit ADC for very low flow rate coating machine and associated controls.
- ZWorld BL1700 based firmware for long bed linear coater production machine. This project required real time control of valves, pressure regulators, user interface, and a servomotor. In addition to firmware development, Mr. Littlefield assisted with sensor selection, hardware/software integration, and system test. Modbus RTU was used for communication with a precision flowmeter device.

Product Genesis Inc., Cambridge MA (2000-2001):

- Provided all low level I/O drivers for a prototype medical device based on the ZWorld BL1700 single board computer. Also implemented a full terminal interface to the device and Tcl/Tk based GUI which allowed "point and click" control over the prototype during software/hardware integration and test. The firmware provided realtime control for pressure regulators, roller pumps, solenoids, analog pressure/temperature sensors, and subsystem power control. Two custom serial protocols were implemented. Modbus RTU was also used.

MIT Center for Space Research/ Kavli Institute, Cambridge MA (1994-2010):

- Designed hardware daughter board for a MIPS R3000 processor and developed software to emulate a Remote Command Telemetry Unit (RCTU). System will be used as an aid in diagnostics for an Xray telescope satellite. Diagnostics package was interfaced to a Unix host.
- Developed Tcl/Tk based graphical front end and firmware diagnostics package in support of the Chandra, Xray telescope project. All software was developed for Unix/X windows environment.
- Developed hardware interface and Tcl/Tk display software for monitoring the spacecraft Power Supply and Mechanism Controller Subsystem.
- Wrote applications software for a Unix workstation and assembly code for DSP56001 based coprocessor card to generate various image test patterns for

simulation of CCD data streams.
- PCB layout for a sensitive resistance thermometer preamp for the MicroX programmable
- Layout, impedance analysis and fabrication supervision for the MicroX rigi-flex backpalne

TekAir Systems Inc., Danbury, CT (1994-2003):
- Provided Software development services for microcontroller based instruments to measure and control differential air pressure and flow within medical, industrial and laboratory settings.

QPeak Corporation, Bedford, MA (1991-2003):
- Developed firmware for ZWorld single board computers applications. This firmware and variations are used on a number of Qpeak's standard products as well as for various custom implementations.
- Developed VisualBasic 5.0 host application to provide GUI interface to laser power supply systems.
- Designed hardware for use with ZWorld CM71xx/72xx series core modules to provide digital I/O, frequency generation, and precision analog I/O. The resulting electronics package allowed QPeak to replace a suite of 6 PCBs with 2 providing reduced costs.
- Enhanced Register Control (ERC) PCB design including RCM2300 core module and Xilinx CPLC.
- Designed Rabbit 2000 based single board computer for military research application

Megapulse Corporation, Bedford, MA (1991-1995):
- Provided Software development services for a multimicrocontroller based system to monitor the stability of LoranC transmitter facilities and warn of out of tolerance conditions.
- Multiple Display X Window graphic system for Loran Chain control: Project responsibilities included displays, audio output, socket communications interfaces, X.25 WAN implementation and error handling.

TechnoView Inc., Newport Beach, CA (1992-1997):
- As chief engineer, Mr. Littlefield was responsible for design of a microvolt signal acquisition and processing system including both hardware and software. Software was developed in C++ and incorporated real time graphic displays and acquisition hardware interfaces. Serial communications interface and data display software was developed for both DOS and UNIX/X Windows environments.
- Developed hardware/firmware for a DSP based coprocessor board to process medical ultrasound images and print them on an HP LaserJet printer. Responsibilities included top level hardware design, component selection, specification development, and all aspects of the DSP software development.

ScanService Corp., Irvine, CA (1993):
- Software development for a ZWorld Little PLC, SBC used to control electron microsope equipment.

Reel/EFX, Hollywood CA (1993):

- Software development for a ZWorld Tiny Giant SBC based product. Specific task areas were LCD display driver support for PCX format images, high speed pulse counters for light level measurements, user interface menu system, a nd time/date interface for scheduled start/stop operations.

BioRad Laboratories, CA (1992-1993):

- As lead team member for a software quality assurance program, Mr. Littlefield is responsible for test plan development, test case design, implementation, results reporting, and overall V&V program management for a specific product. In addition to verification/validation activities, Mr. Littlefield worked with client's software development and regulatory affairs departments to integrate software quality procedures into the development process.

WeldLogic, Chatsworth, CA (1992):

- Review of signal processing algorithms for automated welding machine. Developed signal filtering approach and provided custom commands for Microstar Laboratories signal processor card.

DPI, Los Angeles, CA (1991-1992):

- Software design and SW/HW integration of a 386/AT based biomedical processing and acquisition system with VGA graphic waveform display.

Cambridge Engineering Inc., Burlington Vt. (1991-1992):

- Ported user interface, data management, and communications code from 68HC11 to 68302 based hardware platform. Tasks included requirements review, selection of processor for enhanced hardware, code modifications, device driver development for the 68302 high performance serial comm. controllers, and implementation of a bridge device for linking upgraded hardware with older generation equipment. The enhanced hardware/software combination, provided substantial performance improvements and increased reliability for USCG Omega Transmitter Station control electronics.

System Resources Corporation, Burlington, MA (1989-1996):

- Principle software engineer for PLC to NAS760 synchronous protocol link for new control tower at LAX (Los Angeles, CA).
- Principle software engineer for Nantucket Enhanced RMS: Software developed for multiple GEFanuc 9070 and 9030 PLCs networked over RFmodems. A central 9070 forwarded equipment status over a sync. phone link using NAS790 protocol. Project responsibilities included software architecture, hardware/software integration, requirements analysis, Ladder software coding, and development of firmware for protocol implementation.
- Developed software architecture for screen management and proprietary low speed ring network for management of Omega Navigation System transmitter sites. Responsibilities included development of system performance specifications, implementation documents, implementation, and management of a team of two programmers. Software was prototyped using TurboC and then moved to the target 68HC11 processors.
- Principle Hardware Engineer for Transportation Systems Center Wake Vortex measurement system. Tasks included analysis of early version of the system, design of low noise preamplifier, system architecture specification and

implementation. Using a mixture of 'off the shelf' subsystems combined with project specific electronics, a very high performance signal acquisition and processing system was designed.
- Systems Integration for Runway Visibility Systems Evaluation project. Assisted personnel at the Volpe National Transportation Systems Center in the design, implementation, and deployment of an industrial computer based system to compare performance of two generations of runway visibility monitoring systems. Primary activities for this project included system requirements analysis, design and installation of an optically isolated interface PCB, and software development.

ICC Technologies Inc., Philadelphia, PA (1989):

- Developed micro-controller software for electric generator engine control equipment. The system incorporated automatic generator start/stop and performance monitoring in both standalone and multiple generator networks. A remote monitoring system was also developed.

Payload Systems Inc., Cambridge MA (1986-2003):

- Flight hardware design for CCU project including pump controls, RTD and pressure sensor interfaces, redundant CAN bus, and power control logic.
- Designed backplane and modular control boards for a flexible bioreactor system (MARS). The system incorporated a 4 channel pump controller with tachometer feedback, 24 bit A/D converter, CAN intermodule communications, and 1 wire temperature sensors.
- Designed PIC based PCB for CCCU project and wrote firmware drivers for peripherals including CAN bus interface, Dallas 1 wire bus drivers, and 24 bit A/D converters
- Hardware design of iSBX circuit board interface between a life sciences experiment platform and the space shuttle satellite downlink subsystem.
- Systems architecture and software development for shared memory communications between life sciences experiment platform multiprocessors.
- Software Quality Review: participated with in house staff in desk checks, code walkthroughs, and design reviews.
- Lead Analog hardware engineer for Spacecraft Charge Monitor (SCM) systems development. The SCM included 16 bit ADC housekeeping, 300V and 5kV digitally tunable power supplies, and signal conditioning. In addition to charge monitoring the SCM could function as an electron spectrometer. Mr Littlefield developed Tcl/Tk based application software which allowed setup, tuning, and collection of electron spectra from a PC.

ISTAT Corp, Dayton, NJ (1988) :

- Developed LCD screen graphic primitive library, time/date user interface procedures for 64180 micro-controller. Coded in C and assembler.

Datascope Corp., Paramus, NJ (1985-1989):

- Graphic primitives for LCD bit mapped display, data communications, trend data subsystem, keyboard command processor, and thermal printer control system for medical product. Software Quality Review of third party message based multi-tasking system and communications interfaces.
- User Interface, data communications, trend data management subsystem for

CO2/Anesthetic Agent monitoring product.
- Validation of Production Quality Assurance (PQA) Software
- I/O system for noninvasive oxygen saturation product
- Enhancements to digital strip chart recorder firmware
- Diagnostic software to aid in PQA
- Local network protocol converter

Teknekron Software Systems, Berkeley, CA., (Jan/Feb 1988)
- Assisted with on site product support and communications hardware fault diagnosis for a distributed processing UNIX installation.

B&M Technology Services, Hamilton St., Cambridge MA (1988):
- Interim project team leader for a LORAN-C receiver evaluation project. Worked with in house staff to develop proposal, cost projections, project plan, and initiate initial vendor contacts.

CardioData, Northboro, MA (1987):
- Identification of appropriate PC network architecture for medical information management system. Responsibilities included network loading analysis, vendor selection, and subsystem acceptance testing.

STAT Systems Inc, Philadelphia, PA. (1985-1988):
- Served on the corporate Scientific Advisory Board
- Desigend PC based high speed data acquisition and waveform display generation using compiled BASIC
- Development of a data communications software protocol linking HPIL and RS232 devices
- IBM PC/XT/AT to mainframe data communications link design
- Designed computer interface system for blood gas analysis equipment

CC1 Inc., Blairstown, NJ,(1985):
- Implemented mage processing software for a high resolution, color, machine vision system. Project responsibilities included system architecture, specification development, algorithm development, and implementation. Target machine was a VME bus 68000 based multiprocessor.

Publications

The PPOD Project: Programmable Pilot Oriented Display, An Analysis of the Adaptability of LORANC to Air Navigation, Joint University Program for Air Transportation Research1980, NASA Conference Publication 2176

Validation of Tracking Algorithm for Hybrid AVM Navigation System, September 1981, U.S. Department of Transportation, Transportation Systems Center, Kendall Sq., Cambridge MA

Flight Evaluation of LORANC for General Aviation Area Navigation, Journal of the Institute of Navigation, Winter 19811982, Vol. 28, Number 4

A Semiautomated Anesthesia Record Keeper A Clinical Evaluation, D.A. Paulus et al, Presented at the 6th Computers in Anesthesia Conference, Asilomar Conference

Center, Pacific Grove CA, Oct. 1985

Intelligent dataacq card drops system bandwidth requirements by 40x, Paul Schreier, Personnel Engineering and Instrumentation News, April 1992. This article was proposed by Mr. Littlefield and is based on consulting work which he provided to VNTSC under FAA contract.

Patents

Patent Number 5,359,327 *A/D Converter System with Interface and Passive Voltage Reference Source*. Held jointly with Eric W. Brown of TechnoView Inc.

Patent Number 5,488,368 *A/D Converter System and Method with Temperature Compensation*. Held jointly with Eric W. Brown of TechnoView Inc.