Mark Sullivan

Houston, TX
-Email me on Indeed: http://www.indeed.com/r/Mark-Sullivan/da5a59ed705b0b62

EMBEDDED SYSTEMS DEVELOPER
Systems Architect | Embedded Systems Programming | Digital and Analog Hardware Design
A high-productivity embedded systems engineer with diverse supporting skills. Working in C and C++ on Linux and Bare Metal embedded systems. An electronics hardware designer with broad experience. An excellent technical writer. An intelligent and creative out-of-the box thinker with varied business experience and diverse technical knowledge. A key asset to an engineering team or development project.
US Patents 5694376, 5351296, 9758581, 6032193. Proceedings of the 17th Symposium on Explosives and Pyrotechnics.

Work Experience

Contract Electronics, Firmware, and Mechanical Engineering
January 2019 to December 2021

• Servo-driven linear motion stage with 1,000 lb capacity and 15 ft travel. Proler Tubing Services.
• Arm M-7 based instrument controller with integrated motor drive and 24-bit data acquisition. Analytical Scientific Instruments
US, Inc Firmware in C, supporting PC software in C++
• Novel algorithm for arithmetic modulus as part of an FPGA-based cryptocurrency miner in Verilog and C
• Natural-gas powered bitcoin mine in a shipping container now running on site at a remote gas production facility Arkose Energy Corp.
Linux, C, Qt, and C++
• Custom torch-height control for three synchronized plasma cutters. Proler Tubing Services
• C++ Firmware for an ARM-based IOT thermostat. Linux and Qt
• USB digital security device which signs JSON objects using elliptic cryptography. Bare-metal in C
• Algorithm for phase measurement of a gyro in a very weak signal application. Factor of 10 improvement over the legacy method.
Erdos Miller. C code for proprietary hardware platform.
• Custom robot controller including real-time kinematics for a stacked polar coordinate system. 72 Concepts, Inc. Firmware in C.
Supporting PC software in Qt (C++)
• Modbus-Plus (a 1MB/s field bus) MAC/PHY including SoC with FPGA and ARM Core. Niobrara R&D Corporation Verilog and C
• Extreme low power level indicator for intrinsically safe environment. World Oilfield Machine C code for PIC16
• Qt-based (C++) Modbus register editor with multiple tear-tabs and chart recorder. Supports the new Modbus/TLS/TCP security standard.
• Qt-based (C++) Windows application for laboratory instrument. Background USB communications with the instrument.

Embedded Systems Engineer

Entrepreneur dba start-up Teapot 3D, Inc

January 2018 to December 2019

● Development of ARM M4-based embedded controller with USB, SD Card, TFT touch screen, stepper motor drives, etc Firmware in C
● Write firmware C for 3D printer controller. Real-time motion control including trajectory planner with novel cornering algorithm
● Manufacturing engineering to optimize product for production
● Write business plans and projections
● Meet with and pitch prospective investors, bankers, etc.
● Sold a couple of hundred printers but never could find an investor.

Embedded Systems Engineer

AWS
January 2015 to December 2017

● Distributed sensor/actuator system using RS-485 serial protocol with unique automatic addressing scheme. Electronic circuitry and
PCB, ARM firmware in C, PIC firmware in C, plastic enclosures.
● Cloud-connected window blinds including hardware and firmware in C for embedded motor control with TCP/IP communications, power over Ethernet, and battery management. Server-side software in C on AWS Linux. Designed RF remote control receiver to pair with existing transmitter. Had to crack encryption and generally reverse the over-the-air protocol. Architected and supervised development of web portal in Laravel on Linux/Apache/MySQL
● Electronics and C firmware for cloud-connected, parallel-kinematic motorized television mount. Complex trajectory planning and motion control. Sensorless collision detection for safety. Cloud-connection accessory with TCP/IP over Ethernet and serial interface to the motor controller.
● Military 2KW bi-directional DC/DC converter achieving 98% efficiency between 28VDC and 300VDC busses. CAN communications. Control system runs in on an ARM-based FPGA SoC. Designed hardware, wrote firmware in C, designed FPGA logic in Verilog. Designed auxiliary supplies including flyback and SEPIC converters.
● Invented a new paradigm for remote tracking of wildlife. Delivered proof-of-concept prototype but did not end up developing the final product.
● Battery with embedded BMS for Constellation space suit (ISS, Moon, and Mars). Firmware in Verilog. Convinced NASA to use a new battery chemistry for improved safety and cycle life.
● Embedded BLDC servo-motor control for a high-pressure precision pump for HPLC. Microchip 16-bit DSP with C firmware.
Implemented sinusoidal commutation with a hybrid of hardware and software. Maintain flow setpoint correcting for compressibility of fluid and deformation mechanical parts using pressure and temperature measurements. Multiple pumps can be linked to create programmable flow and composition gradients. Modbus RTU communications over RS-485 and USB.
● Hardware and C firmware for sub-miniature down-hole data logger recording vibration, rate of rotation, and temperature to flash chip.
Operates to 150 C. PC software to download and plot data.
● Surface communications interface for Measurement-While-Drilling instrument including reverse-engineering proprietary protocol, hardware design and C firmware development. Subsystems include 30 watt forward converter with programmable output voltage.
● USB to Modbus bridge with arbitration between dual Modbus master devices. Hardware and C firmware. Microchip PIC.

Engineering Manager, Archimedes

Malvern Instruments, Inc - Houston, TX
January 2014 to December 2015

● Lead a team of 3 developing a new, unique scientific instrument
● Supervise and act as a technical resource for manufacturing
● Help marketing team understand the technology
● Work with supply chain for key MEMS component
● Design experiments to verify performance of the technology
● Develop C code for embedded Microchip processor
● VHDL code for signal processing in Xilinx FPGA
● Position ended when company relocated to the UK

Sr Embedded Systems Engineer, NPI

Malvern Instruments, Inc - Houston, TX
January 2013 to December 2014

● Collaborate in a team of 3 mechanical engineers, 2 electrical engineers, and 6 programmers developing a new, best-in-class scientific instrument
● Design main electronics board for new flagship product, Omnisec Discover
● Take ownership of problems in electronics, software, and legacy product support
● Develop C and VHDL code for bare-metal embedded system on Xilinx FPGA with Microblaze soft processor core
● Develop C++ and C# code for Windows platform
● Select and specify electronic components for my designs working with online data sheets, manufacturers, and distributors
● Assist Engineering Manager with development of domain-specific signal processing algorithms

Sr Embedded Systems Engineer

Cyclotronics Power Concepts, Inc - Houston, TX
January 2011 to December 2013

● Managed and led a team of 2 engineers and 2 technicians designing embedded control and power systems in a high-reliability, quick-turnaround environment
● Project management with responsibility to the bottom line and for problem resolution
● Translated customer requirements into system architectures by understanding customer business models and processes
● Wrote proposals, statements of work, instruction manuals, and production procedures
● Designed digital and analogue electronics systems for OEM subassemblies
● Captured schematics and laid out PCBAs using Altium
● Programmed Microchip, ARM, and Microsemi/Actel SOC platforms in C and C++ Logic in Verilog.
● Designed automatic test setups
● Mechanical engineering, designed and refined customer components and approx. 20 in-house fixtures
● Embedded programming and algorithm development in C and Assembly
● Linux server and Windows workstation programming in C, C++, and C#
● Wrote three small iPhone apps in Objective C

Senior Electrical Engineer

Red Eye Technology, Inc - Houston, TX
January 2009 to December 2010

● Led a team of 2 engineers and 1 programmer developing new clean energy technologies

● Communicated technical achievements to upper management and investors by translating technical to lay terminology
● Invented and patented new solar power inverter topology and novel electromagnetic transformer
● Designed digital and power electronics systems to 250 KW
● Developed real-time control firmware in C

Sr Electronics Engineer

DeWalch Technologies, Inc - Houston, TX
January 2007 to December 2009

● Architecture, electrical, and mechanical design of novel electronic lock to disrupt company's niche market
● Designed of cryptographic protocols to unlock lock and authorize key. Code in C
● Implemented XTEA cipher on smallest Microchip microcontroller to minimize size and cost Code in Microchop assembler

Chief Scientist (CTO) / Senior Electrical Engineer

Remote Knowledge, Inc - Houston, TX
January 2005 to December 2007

● Managed and led a team of 2 engineers and 2 programmers delivering sophisticated satellite communications and tracking technology for the marine industry
● Developed architecture for high speed in-motion satellite Internet access terminal and GPS tracking transponder
● Designed digital and analogue electronics and wrote embedded systems code in C and Assembler
● Ported Linux to Coldfire platform and implemented satellite data pipeline in FPGA with Verilog

Founder and President

Niobrara R&D Corporation - Joplin, MO
January 1987 to December 2004

● Managed a manufacturing company with 18 employees delivering high-reliability products and yielding 15% net profits
● Built a world-class engineering team still well respected in the industry
● Sold products to half of the Fortune 500 including big-three US automakers, Intel, Microsoft, Motorola, and NASA
● Wrote lots and lots of C code.
● Developed a proprietary Linux distro with a real-time scheduler.
● Authored patents, user instructions, internal technical manuals, and company procedures and policies

Education

BS in Computer Science

Mathematics Pittsburg State University
1979

Power Design

Stanford

Introduction to Battery Management Sytstems

(University of Colorado), Coursera Converter Circuits (University of Colorado)

Skills

- C++
- Intelligence experience
- C
- Technical writing
- FPGA
- Adobe Dreamweaver
- Eclipse
- Visual Studio
- Math
- Microsoft Word
- Mechanical engineering
- PCB
- Adobe Photoshop
- Adobe Illustrator
- Git
- Linux
- SolidWorks
- Microsoft Excel