RESUME

CLIFFORD B. GERHARD, P.E.

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Cliff Gerhard is a licensed Professional Engineer (California) and is currently Director and Lead Consulting Engineer at E-M Designs' Electrical Engineering Group.

Cliff is a third generation Electrical Engineer with more than 25 years of technical experience. He has produced designs used in medical instruments, spacecraft, aircraft, automobiles, motorcycles, emergency vehicles, industrial control, computer products, test equipment, telephony, communications, consumer products, and toys.

His broad experience gives him the tools to tackle the most challenging designs. Cliff is analytical, organized, and has a firm grasp of Engineering fundamentals.

SPECIALITIES

Analog Circuit Design	Data Acquisition - ADC and DAC, Multiplexer Circuits Power Supply Circuits DC to DC Converters / Battery Chargers / Motor Control Bio-potential Monitoring Circuits Amplifier Circuits / Filters Audio / Video
Digital Circuit Design	Data Communications Discrete Logic Programmable Logic
Microprocessor	Microchip PIC Types Atmel AVR TI MSP430 Motorola 68HC Types Philips / Intel 8031/8051 Types
Software Experience	Schematic Capture – Altium, Protel, OrCAD, Schema, HiWIRE PCB Layout – Altium, Protel, Mentor (Veribest), PADs, Tango, HiWIRE Mechanical – Solidworks Analog and Digital Circuit Simulations – MicroCap (SPICE), MathCAD, OrCAD (PSPICE)

EDUCATION

WEST COAST UNIVERSITY, Los Angeles, CA.

Cliff completed his requirements at night, while working full time, and graduated with honors obtaining the following ABET accredited degree in 1990:

Bachelor of Science in Engineering
Option in Electrical Engineering
(magna cum laude)

Cliff passed the California Engineer in Training (E.I.T.) exam on his first attempt in 1991. He successfully petitioned the board to allow him to take the Professional Engineers License Exams (P.E.) early (normally 4 years of experience is required after obtaining the E.I.T. exam) and then took the P.E. exam in 1993 and passed on his first attempt. In the 1993 exam, 28% of those who took the test received a passing score.

PROFESSIONAL EXPERIENCE

May 2001 to Present

E-M Designs, Inc. Dana Point, CA

Director – Electrical Engineering Group

In May of 2001, Gerhard Engineering, Inc. was purchased by E-M Designs, Inc. and became E-M Designs, Inc. - EE Group. At that time Cliff left his position at CMD Technology to take the position of Director / Lead Consultant. He left on good terms and in fact, CMD was one of the new group's first customers.

Cliff's responsibilities include Electrical Engineering and management of the EE Group. Cliff has been the lead Engineer on several very interesting and challenging projects. The following are some examples:

Smart DC Power Supply – Li-FePo4 (A123) battery based DC power supply for use in medical computer carts. Cliff was the leader of the design team and was personally responsible for all of the hardware design including analog and digital circuitry, Microcontroller hardware, thermal design, PCB layouts. He was also responsible for Mechanical design (solid modeling in SolidWorks) and management of the firmware and software application development.

Medical Electronics – Cliff has participated in multiple research programs for a local medical electronics company. He has been personally responsible for the design of EEG monitoring circuits that push the state of the art in tolerance to high electrode impedances. These devices also include high channel count, high speed analog multiplexers and Analog to Digital Converters. The latest project is the first production version of this EEG technology. http://www.neurocomp.com/Systems/Pulsar.aspx

In addition to hardware design of REG, EEG, and EKG circuits, he was also involved with system evaluations during clinical tests in the operating room and neo-natal ICU facilities of several local hospitals.

Amusement Park Attractions – Cliff designed the electronics for several multi vehicle remote control systems. The systems consisted of up to 21 Helm stations, a central RF transmitter (900MHz), and 21 Decoder / Receiver boards mounted in the vehicles. Cliff personally designed the entire system including the system architecture, RF design, communication protocols, analog and digital circuit designs, Microcontroller hardware and firmware, and Printed Circuit board layouts. http://www.thola.com/ecs/

Emergency Vehicle Siren – 200 Watt, Dual Sound with High Frequency Switching Audio Power Amplifier. This prototype system consisted of a high power switching DC/DC converter (125kHz) with custom magnetics and a two channel (100 Watt each) switching audio power amplifier. Thermal management was one of the greatest challenges for this design. Cliff was a member of the design team and was responsible for the microcontroller hardware and initial firmware design, analog circuitry, thermal design, and PCB layouts.

Automated Test System – Test Station for component used in the National Missile Defense Program. This system consisted of a rackmount industrial computer with a National Instruments Data Acquisition System and a custom electronics rack that was capable of controlling 15 servo actuators for burn in tests. The systems were also used to automate acceptance testing and documentation of the test results. Cliff was responsible for all of the custom electronic circuit design, power sub-system, electronics card-cage design, and printed circuit board layout.

AC-DC Power Supply - Battery Replacement for the Single Channel Ground and Airborne Radio System (SINGARS). These devices were small AC/DC power supplies that were packaged to emulate the Lithium Batteries used on the SINGARS radios. The device is to be used when AC power is available to save the expense of batteries and disposal. This was a very compact package that also included a small Sealed Lead Acid Battery to supply the radio in the event of short duration power failures. This has evolved into a family of products that fit several different radios. http://www.iristechnology.org/products/?cat=5

March 1999 to May 2001
CMD Technology, Inc. Irvine, CA
Technical Manager – Power and Packaging Group

Business slowed at Gerhard Engineering and in 1999, and Cliff took a full time position as Technical Manager of the Power and Packaging Group at CMD Technologies, Inc. (a prior customer of Gerhard Engineering). In this position, he was personally responsible for all Analog / Power Circuit designs for the company's line of storage products.

CMD was a leading manufacturer of RAID Controllers and Semiconductors. Cliff was responsible for all of the analog circuit design for the Storage Products Group. These designs included the Power System Architecture for a number of Raid Controllers. The circuit designs included hot swap circuitry, power sequencing, multiple high frequency switching DC to DC Converters, and battery backup systems.

The following are some design examples:

Hot swappable power subsystem for OEM RAID products – Cliff was responsible for the design of Power distribution and redundancy on the company's Titan and Dakota RAID Products.
http://web.archive.org/web/20000619154912/www.cmd.com/ProductInfo.cfm?ProdID=160
http://web.archive.org/web/20010406002759/www.cmd.com/ProductInfo.cfm?ProdID=170

RAID controller board - 5 power zones (+5V, +3.3v, +2.5V, +1.85V, +1.5V), high frequency switching DC/DC Regulator circuits, soft start and current limit circuitry, power sequencing circuitry, power zone monitoring circuitry, on board power supply margin testing circuitry.

NiMH Battery Subsystem – This battery back up scheme was intended to supply power to DIMM memories. The high-speed memories require a large supply current (1.5A) when operating and a small current when in standby mode. The system required that a large amount of memory be transferred prior to a system shutdown or power failure. The memories required a "glitch free" transition to battery power at the time of power fail or brown out. This was accomplished using parallel switching regulators. A microcontroller based charging circuit was also part of this design.

He was responsible for the selection of the company's PCB Layout tools (Veribest/Mentor). CMD's PCB designs featured large dense boards, with fine pitch surface mount and BGA packages, high frequency interfaces including LVD SCSI, 1GHz Fibre Channel, ATA, IDE, and 100-Base T Ethernet. Cliff was responsible for the design of PCB stack-ups to handle the complex impedance control and signal integrity issues.

March 1984 to May 2001
Gerhard Engineering, Inc. Mission Viejo, CA
President / Consulting Engineer

In 1984 Cliff left Data Chron because the demands of the job were making it difficult for him to make adequate progress towards his degree. He joined Gerhard Engineering (his fathers consulting business) and continued taking classes at night. The experience gained by 16 years of working with his father, who is a pioneer in the electronics field, has proved invaluable throughout his career.

The following list is a sample of some of the more important projects Cliff was responsible for during his time at Gerhard Engineering:

Medical Electronics

32 Channel Rheoencephalograph (REG) System (Bio-Impedance)
32 Channel Portable EEG
Bio-potential Measurement Circuits (EKG, EMG, etc.)
Galvanic Skin Response (GSR)
Impedance Pneumograph
Photo Plethysmograph

Designs for Spacecraft FPA (focal plane array) front ends and data acquisition circuits for the following Programs:

Delta Star – Engineering Support / Printed Circuit Design
http://www.aero.org/publications/crosslink/summer2001/03.html
Mars Observer Camera – Engineering Support / Documentation
http://www.jpl.nasa.gov/missions/missiondetails.cfm?mission=MarsObserver
AIT – Team Leader – Analog Front End
http://www.globalsecurity.org/space/systems/ait.htm
SBIRS-LOW – Team Leader – Power Supplies / Digital Controls
http://www.globalsecurity.org/space/library/report/1998/sbirs-brochure/part08.htm
TES – Engineering Support / Printed Circuit Design
http://tes.jpl.nasa.gov/
CrIS – Engineering Support / Printed Circuit Design
http://npoess.noaa.gov/index.php

Requirements for these projects included Mil-883B compliance, radiation hardness (for low earth orbit), and redundant circuits.

Automotive Products

Microprocessor based Sirens / PAs
http://www.fedsig.com/products/index.php?id=117
http://www.fedsig.com/products/index.php?id=114
Shotgun lock controller
Light Bar controller
RF collision avoidance system
Ultrasonic collision avoidance system
Microprocessor based fuel injection cleaning system
MBZ diagnostic tools

P.C. Peripherals

10/100 base T Network cards
Video Cards
Riser Cards (100+ designs including Intel's NLX Reference Design)
PCMCIA / Cardbus Host Adapter

Telephony

DTMF Remote Control with Digital Voice
http://www.jandy.com/html/products/controls/controlsacc/telelink.php
Telephone Line Interface (FCC Part 68 compliance)
Digital Music Box
http://www.musicboxclassics.com/product.htm

October 1979 to March 1984
Data Chron, Inc. Tustin, CA
Chief Engineer

Data Chron Inc. manufactured time code products for use in the aerospace industry. Cliff started as an entry-level technician and eventually became Chief Engineer. As Chief Engineer, Cliff was responsible for all new designs and their development through production. His responsibilities also included project scheduling and management of the production test department. A list of some of the products designed by Cliff:

Count Down System / Time Code Generator for Kwajalein Missile Test Range
Count Down System / Time Code Generator w/ 1 PPS Digital Phase Lock Loop
DR11-C Computer I/O
RS-232 Computer I/O
IEEE 488 Computer I/O