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### Electrical and Mechanical Engineer

Multidisciplinary engineer for scientific and industrial R&D, conceptual design, prototyping, integration, test, and manufacturing. Experienced with engineering team management. Strengths in industrial automation, rapid prototyping/additive manufacturing, sensing/data acquisition, and custom prototype development. In-depth experience with PCB design and production, solid state lighting and LEDs, laser processing, hybrid electric vehicles, fuel cells, engineering pedagogy, and courseware development.

Objective: A career position with a company realizing innovative solutions in cross-disciplinary engineering, automation, industrial or scientific R&D, IT, or new product design.

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### Work Experience

#### Hudson Price Designs, LLC Senior Controls Engineer

June 2015 – February 2017

Designed all custom PCBs and cabling for a robotic sample handling and positioning system operating in high vacuum (1e-6 mbar) for Transmission Electron Microscopy. Designed a modular architecture for system-wide integration of all electronic components to reduce assembly time, simplify maintenance, and present a polished product appearance.

Designed mixed-signal PCBs (developed, fabricated, and tested 8 new PCBs designs with multiple revisions in <18 months, including: several in-vacuum PCBs constructed from low-outgassing materials, a high-power, low-noise constant current LED driver for vacuum-chamber illumination, and a custom backplane-based multi-axis motor controller. Authored complete electrical system schematics, interconnect documentation & fabrication procedures for PCBs and custom cables. Trained employees as assembly technicians for in-house PCB and custom cable fabrication, supervised production and QC of serialized consumables (grids, cassettes, magazines).

Solved performance and electrical noise issues on first-generation production hardware. Tuned in-vacuum motion system for improved performance and reliability. Investigated and selected alternative vacuum-compatible actuators for next generation systems currently in development. Performed in-field service for deployed prototype hardware. Created custom tooling and techniques to improve manufacturability of consumable parts and capital equipment.

#### Rensselaer Polytechnic Institute, Troy NY

#### Research Engineer, Smart Lighting Engineering Research Center

August 2012 – June 2015

Designed and conducted experiments for NSF-funded Smart Lighting research. Designed and built custom lab equipment including: LED aging system; multi-channel environmental logger with direct-to-the-cloud data posting; 3D-printed housings for color sensors and color-tunable track lighting; fiber optic illumination for cryogenic phosphor testing; fixtures for optical/thermal LED characterization. Coordinated and implemented firmware/hardware modification of 5-channel color-tunable luminaires, achieving 100x framerate increase vs. stock.

Personal research focus on Laser Lift Off (LLO) and its effects on InGaN device efficiency, reliability, and degradation. Developed automated micropositioning optical test system for simulation of industrial LLO with custom hardware/firmware for laser pulse energy control and motion-synchronized in-situ measurement of LED photoluminescence. Determined novel hydrogen-repassivation approach for reduction of reverse-bias leakage current in LLO-processed InGaN LEDs.

Proposed and led adoption of embedded platform for distributed sensing and control of Smart Lighting. Managed the design and fabrication of custom color-sensors, designed HMI layout, managed software development to realize the same. Coordinated installations of optical time-of-flight sensors for occupancy sensing research. Benchmarked commercial bulbs (e.g. Sora, Cree), including characterization and reverse engineering of light engine, electronics, physical construction and thermal performance.

#### Rensselaer Polytechnic Institute, Troy NY

#### Project Engineer, The Design Lab

June 2008 – August 2012

Managed and mentored teams of multi-disciplinary engineering students in industry-sponsored engineering projects for engineering capstone course. Authored project descriptions, defined deliverables, mentored meetings twice weekly and mediated biweekly teleconferences between industry sponsors and student teams for enhanced communication and student productivity. Conducted weekly informal design reviews to assess task progress, coached student presentations/reports at major milestones.

Over 8 semesters, managed 39 teams with 13 industrial sponsors, 2 entrepreneurs, and 4 not-for-profit projects. Select topics included: GE Energy - robotic system for offshore wind turbine blade inspection; Boeing in-wing robotic system for assembly/inspection/repair; GE Medical - X-ray detector panel handling system for clean room; Schick - in-process machine vision inspection with novel structured light approach; Apieron - automation fixtures for mass assembly of medical testing consumables; US Olympic Skeleton team: wearable data acquisition system for in-situ characterization of athlete & skeleton sled performance.

Taught multi-disciplinary Introduction to Engineering Design course, instrumental in overhaul and subsequent courseware development. Authored and led interactive lectures on creativity, ideation and concept development, MC'd engineering competition finals. Served on School of Engineering Safety Committee, maintained official safety policy for student manufacturing labs and resources.

## Work Experience (continued)

### Rensselaer Polytechnic Institute, Troy NY

#### Graduate Student Researcher, Center for Automation Technology & Systems May – August 2006, 2007, 2008

Developed methods, hardware, and systems for automated fuel cell assembly. Specific project areas include: Ultrasonic bonding of high temperature polyphosphoric acid based polybenzamidazole PEM type membrane-electrode assemblies, robotic assembly of PEM fuel cell stacks, and laser cutting of membrane electrode assembly components.

Developed rapid prototyping technique and equipment for edible fused deposition modeling utilizing chocolate in partnership with Stratasys, Inc. Research and development efforts from 2005 to 2008 began with basic material handling research, progressed through multiple proof-of-concept prototypes, allowing process proving and tuning, followed by the development of a proof-of-process production prototype chocolate-based fused deposition modeling system. Key responsibilities included documentation, equipment design, construction and testing.

#### Undergraduate Student Researcher, Flexible Manufacturing Center May 2005 – August 2005

Completed electrical integration on custom 2-Laser, 5-axis CNC cutting machine. Notable features include Spectra Physics HIPPO series frequency tripled DPSS UV (355nm) laser system, custom Synrad Firestar CO2 Laser (9300nm), 3 Kollmorgen matched servo/controller axes, Trilogy linear motor X-Y stage with flying optics, Aerotech servo drives for X-Y axis control, and nitrogen blanketed focusing optics.

### Intel Corporation, Hillsboro OR

#### Electrical Engineering Internship

May – Dec. 2003, May – Aug. 2004

Performed post-silicon debug and validation testing on server chipsets. Collected, post-processed and summarized eye diagrams for XMB chip's Memory Interface (MI), presented results to MI Task Force. Converted and executed test vectors on Agilent 93k high-speed SOC tester and Agilent 81250 parallel bit error rate tester, calibrated 81250 for PCIExpress testing and validated PCI-Express function of TNB chip's B-0 stepping. Developed and maintained a method to post-process and summarize collected chipset characterization data.

### General Dynamics: Electric Boat Corporation, Groton CT

#### Electrical Engineering Co-op

January – August 2000

Under Confidential Clearance, developed ship control hardware for the NSSN (Virginia Class) Nuclear Submarine. Designed self-contained computer controlled hardware/software test system for prototype and production proving of proprietary mixed signal servo valve amplifier card. Coordinated system construction and wrote LabVIEW control software. Conducted interdepartmental ground loop analysis for multi-system shipwide control hardware. Performed prototype hardware testing and in-circuit design debugging.

## Education

### Rensselaer Polytechnic Institute (RPI), Troy, New York

Master of Science, Mechanical Engineering,

December 2006

Thesis: *Ultrasonic Bonding of Thin, Flexible, Mixed Composition Materials*

Bachelor of Science, Electrical Engineering

May 2005

Minor in Science and Technology Studies

## Patents

Y. Li, L. S. Schadler-Feist, C. Ullal, C. S. Goodwin, R. F. Karlicek, Jr., US Provisional Patent App. 61/983,591: “**Cross-linkable matrix-free nanocomposites with tunable optoelectronic functionalities and the methods for their macro-, micro- or nano-structures construction**”, Pub. Date: Apr 24, 2014

R. F. Karlicek, J. J.-Q. Lu, C. S. Goodwin, A. Tkachenko, Patent number: WO 2013158949 A1, “**Light emitting diodes and a method of packaging the same**”, Pub. Date: Oct 24, 2013

## Leadership

Founding Member, Tech Valley Center of Gravity makerspace, Troy NY

May 2013 – Present

Team Advisor, Rensselaer Formula Hybrid Racing Team

2009 – 2015

Founder and President, Rensselaer Formula Hybrid Racing Team

2007 – 2009

President, Rensselaer Science Fiction Association, RPI, Troy, NY

1998 – 2001

## Skills

### Automation and Systems Integration

Robotics, Motion and Actuation, I/O, Networking and Embedded control, Personnel Safety

### Electronics

Design (EDA), Testing & Debugging, Soldering, Prototyping, Short-run Production, ESD safety

### Mechanical

Design (CAD & CAM), Rapid Prototyping, Machining, Welding & Joining, Automotive

### Computer

**Programming:** LabVIEW, C, G-Code, some Python, some C++, HTML, Assembly (68k)

**Operating Systems:** Microsoft Windows, Linux, Unix, Android, OS X

**Software:** Mentor Graphics PADS, SolidWorks, Unigraphics NX, MasterCAM, NI LabVIEW, LaTeX

**Hardware & Networking:** 10/100/1000 Ethernet Cabling Standards, WiFi, BSD & Linux-based Routing

## Teaching

### Rensselaer Polytechnic Institute, Troy NY

September 2007 – 2012

**Multi-Disciplinary Senior Capstone** – Project Engineer (manager, mentor) for student engineering teams

**Introduction to Engineering Design** – Lecturer and section instructor

**Laboratory Introduction to Embedded Control** - Graduate Teaching Assistant, with Prof. Paul Schoch

**Introduction to Engineering Electronics** - Graduate Teaching Assistant, with Bill Mielke

**Advanced Manufacturing Laboratory** - Graduate Teaching Assistant, with Prof. Stephen Derby and Larry Ruff

## Hobbies

SCUBA diving, skiing, dancing, home brewing, weaving chain maille