CV for David Schaafsma
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Selected Expertise

- Medical product design / development
- Optics – geometric, diffractive, waveguide, optical technology, optical materials, optical systems design
- Networks, data links, protocols
- Fiber optics, optical sensors
- Lasers & light systems, illumination
- Infrared materials & technology
- Imaging & microscopy (SEM & optical), spectroscopy
- Signal and image processing
- Spectroscopy, optical materials analysis

- Embedded computer systems, microcontrollers
- Software & programming, Embedded & high level languages
- Electronics, embedded design
- Sensors, data acquisition
- Semiconductor metrology, photovoltaics, renewables
- Project planning, management
- ISO 9000, SPC, GMP
- Tooling, process development
- Market, patent research
- Grant writing
- Expert witness

Employment History

From:	2004	**California Optical Engineering, Inc.**
To:	Present	Escondido, CA
Position:		*President & Principal*

Consulting in technology & product development (primarily medical and industrial), over 40 associates. Specialized in software and hardware (electronics, sensors, optics) development for medical devices, communications systems, and sensing. Recent projects have included:
   • Optical bilirubinemia measurements for neonates
   • image-based and sequential (point) genetic assays (fluorescent)
   • smartphone-compatible optical assay systems
   • pulse oximetry and optical blood pressure monitoring
   • optical blood glucose monitoring
   • confocal fluorescence microsopy
   • optical markers of glucose concentration in the eye (lens and aqueous humor)
   • optical pattern recognition for anti-counterfeit systems, development of optically-functional coatings
   • ophthalmic thermal therapy devices
   • design and validation of endoscopes/laryngoscopes
   • design and construction of microscope systems for fluorescent assays
   • laminar flow and lab-on-a-chip systems, colorimetric and fluorescent
   • embedded systems for dosimetry & flow measurement
   • in-vivo flow measurement for insulin dosimetry
   • ECG/MCT monitors
   • machine-vision flow control systems
   • monitoring of optical ablation of arterial plaque
   • design and experimentation for in-vivo optical probes
   • machine vision for computer aided surgery
   • colorimetric measurement of fluid concentration
   • design of ophthalmic instruments for early detection of eye disease
   • image processing for hyperthermia
   • robotic automated animal marking systems
   • polymer materials analysis & evaluation for angiography and angioplasty
   • high-speed hybrid optical-electronic data networks
   • research and experimentation on optical data storage media
   • optical semiconductor metrology
   • optical materials for packaging and tracking
   • infrared optical imaging for cancer detection

Core specialty areas include electronics (sensors, embedded systems, optical data transport, eCAD, programmable logic/VHDL, ARM, AVR, FPGA, DSP), software

(Linux/Windows, C/C++, Java, assembly, Python), and optics (systems level design to ray trace/non-sequential modeling using Zemax, Matlab).

From:	2006	**Computer Aided Surgery Associates**
To:	2009	La Mesa, CA
Position:		*Vice President of Engineering*

Developed and demonstrated non-contact alignment system for prosthesis placement (navigation) during total knee arthroplasty (TKA). Image-guided system used dual-band stereoscopic camera system with image processing to analyze alignment and provide feedback to surgeons. Early sponsorship from leading orthopedic companies.

From:	2006	**California State University**
To:	present	San Marcos, CA
Position:		*Adjunct Professor of Applied Physics*

Teach and develop curriculum in electronics, optics, and physics. Oversee student research projects, initiate industry collaboration with university. Lead academician in embedded systems/electronics focus of Applied Physics program, and nascent Electrical Engineering program.

From:	1999	**Ipitek/Tetra Tech Data Systems**
To:	2004	Carlsbad, CA
Position		*Director of Sensor Products*

Responsible for overall management and technical leadership of fiber optic sensor group (scientists, engineers, salespeople, and technicians):
- R&D, product management, engineering, business development, sales & marketing.
- Instrument electronic design: photoreceivers (e.g. low noise, high linearity and high speed), embedded processing (uC/PGA, DSP), interfacing (serial, Ethernet, some USB, displays, keypad, etc.), CPLD & FPGA (Xilinx) design.
- Redesigned temperature sensor product, improving performance & cost.
- Initiated supplier relationships with semiconductor, medical, automotive, aerospace customers.
- Designed, built, tested and sold instrumentation for semiconductor metrology, particularly wafer processing machinery, some deposition equipment.
- Designed, built, tested, and sold instrumentation for medical thermal therapy equipment, particularly hyper- and hypo-thermic methods.
- Software development: embedded processing (ARM, 8051, x86, eZ80), DSP (Analog/TI), scientific computing, numerical modeling.

- Conceived, initiated, & directed R&D and product development in thermal, acoustic, pressure, biological, chemical, and e-field sensors, as well as communications devices & systems.
- Other R&D projects: millimeter-wave links, DWDM/UDWDM networks, wavelength cross-connects, fiber optic switches, avionics networks, free space optical communications, laser tracking systems, optical beam steering, and secure communications. Over 30 patent disclosures & 2 patent applications.

From:	1996	**U.S. Naval Research Laboratory**
To:	1998	Washington, DC
Position:		*Senior Scientist*

Developed devices & applications for chalcogenide (CG) fibers and integrated optics. Authored three patents, several publications resulting from research.   R&D accomplishments: first chalcogenide SM fused coupler, first IR singlemode near-field optical microscope probe, first model of 1.3 um CG fiber amplifiers, made CG fiber Bragg gratings. Built electro-mechanical system for fiber tapering. Wrote optical amplifier modeling code in C using open source compiler (Windows platform).   Other R&D areas: IR scene simulation, Raman amplifiers in CG, chemical sensors, microlensed fibers, photosensitive waveguides & photo-doping.

From:	1992	**National Institutes of Standards and Technology**
To:	1996	Boulder, CO
Position:		*Research Associate*

R&D in quantum optics of vertical-cavity surface-emitting semiconductor lasers. Set up, instrumented, wrote code for, and maintained optical characterization laboratory. Provided primary optical characterization support for all structures grown in NIST MBE machine.   Designed, modeled, characterized laser structures for MBE growth. Wrote code for multilayer dielectric modeling with complex index using Borland C++.   Designed instrumentation and wrote instrument control software (in Borland C) for photon counting spectroscopy system (noise floor 4 photons). Other measurements: reflectance, photoluminescence, DCXRD, SEM, and X-ray.   Other R&D accomplishments: quantum well interdiffusion, crosstalk in VCSEL arrays, angular and spectral dispersion of and spectral drift of the fundamental lasing mode in VCSELs.

From: 1989   **Bandgap Technology Corporation**
To: 1992   Broomfield, CO
Position: *Senior Characterization Engineer*

Primary quality control officer for a start-up compound semiconductor manufacturing company. Designed & supervised construction of characterization laboratory with budget over $2M. Developed and maintained characterization facilities (hardware, software, training, calibration, etc). Wrote numerous GUI instrument control & data acquisition applications for HP Unix workstations using XWidget & Athena toolkits. Primary technical interface to customers. Responsible for analysis and interpretation of all wafer test data. Set up and administered HP 9000 Unix cluster network for characterization and manufacturing. Trained and supervised technicians and engineers, implemented SPC. One of 4 lead engineers responsible for design and equipping of 2000 sq-ft Class 10 clean room. Techniques used: PL, photoreflectance, parametric testing, C-V profiling, Hall effect, resistivity/particulate screening, Nomarski microscopy, DCXRD, and RF device characterization.

Patents

Patent Number	Date Issued	Title
6,285,811	2001	Near-field optical microscope with infrared fiber probe
5,949,935	1999	Infrared optical fiber coupler

Application Number	Date	Title
US20060191566A1	2006	Solar concentrator system using photonic engineered materials
US20070246040A1	2006	Wide angle solar concentrator
US20060174867A1	2004	Nonimaging solar collector/concentrator
US20060233492A1	2006	Optical beam combiner/concentrator
US20080170826A1	2007	Misalignment-tolerant optical coupler/connector
WO2001027961A2	1998	Coated cathodoluminescent phosphors

Education

College/University	Degree
University of Colorado, Boulder, CO	Ph.D., Physics
Brown University, Providence, RI	M.S., Physics
Whitman College, Walla Walla, WA	B.A., Physics

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