Benjamin A. Rolfe
Strategic Technology Consultant

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Experience Summary

- Extensive experience with wireless technologies, protocols and standards
  - Analysis, specification and design of a wide variety of wireless technologies
  - Leading-edge innovator in wireless technologies including Ultra-wide band (UWB), millimeter wave.
  - Baseband specification, design and implementation
  - Deployment planning and field support
  - Network analysis and design validation
  - 20+ years in communications systems
- Development of communication standards:
  - Contributor to IEEE 802 standards in multiple working groups (802.1,802.3, 802.11, 802.15, 802.16, 802.19, 802.24)
  - Member of IEEE 802.15 Working Group Technical Experts Group (TEG)
  - Member of IEEE 802 Wireless Executive Committee
  - Contributor to other IEEE standards development groups
  - Contributor to standards in TIA, ANSI, ISO, IETF, Bluetooth SIG, USB-IF
- Development of smart energy standards and systems technology:
  - Initiator of P802.15.4g PHY standard for smart utility networks;
  - Original member, NIST industrial to grid (I2G) Domain Expert Working Group
  - Contributor to NIST vehicle to grid Domain Expert Working Group
  - Contributor to IEEE standards in information and power engineering societies
  - Contributor to Wi-SUN Alliance PHY layer specification, Field Area Network specifications
  - Lead developer of reference implementation of the Wi-SUN FAN protocol stack
- Capable technology and strategic leader, with tactical experience in engineering, project and general management with a proven record of technology innovation and successful product development in consumer electronics, communications, energy and aerospace;
- Success leading multi-disciplinary teams to successful project completion:
  - Multiple IC design completions
  - IC through large scale networked systems experience
  - Enterprise scale software product development and deployment
  - Successful deployments in multiple application spaces and markets
  - Product lifecycle experience from concept through customer support
- Experience with regulatory processes and procedures
  - Developing new regulations, interpretations and conformance procedures
  - Product conformance test and certification (regulatory and standards)
- Experience with IPR evaluation and execution
- Entrepreneurial experience in various roles including founder, CEO, CTO, board member and advisor. Coach and mentor to entrepreneurs at stages from pre-founding to maturity.

Prior positions include senior level technical leadership and management positions in smart energy systems, wireless systems development, informatics, telecommunications infrastructure and test equipment, software development, professional services, and aerospace.

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Currently managing director and principle technologist of strategic technology consultancy with active engagements in wireless.

Currently hold Working Group executive position in IEEE 802.15 and IEEE 802.24. Active voting member of IEEE-SA. Former member and voting representative to TIA.

Currently serving as co-founder and Chief Technical Officer of the UWB Alliance, and industry alliance formed to promote and protect the technology.

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Experience (Highlights)

May 2001 to Present ***Founder,*** ***Strategic Technology Consultant*** **Blind Creek Associates, Los Gatos, California**

Provide strategic technology consulting: technology assessment, strategic analysis, standards development, project/product planning and execution. Focused on advanced Energy, Smart Grid, RF and wireless technologies and protocols, GPS, media, telecommunications and supporting technologies. On behalf of BCA clients, have served as interim VP and CEO for wireless startup companies. Current projects include developing strategy for regulatory compliance, development of standards, specifications in industry alliances, design, implementation and testing of a reference implementation of the Wi-SUN protocol stack, business development, launch of an industry alliance, and other technical consulting roles.

Past projects include smart energy systems and standard development, wireless communication system analysis, network design and deployment planning for utility wireless networks, development of numerous standards, and development of new regulatory conformance methods, conformance test and approval of products in multiple regulatory domains, and technology assessment and strategic planning.

Currently active in IEEE standards association LMSC (802) in developing standards, regulatory policy contributions and smart grid advisory contributions. Currently positions in 802.15 working group include wireless treasury co-treasurer, vice chair for the 802.15 maintenance standing committee, working group chairs Technical Expert Group, and member of wireless leadership executive committee, active in 802.18 Regulatory TAG, vice chair of 802.24 Smart Grid TAG, acting vice-chair task group 4z, co-treasurer of the 802 wireless treasury. Past instigator of multiple amendments to 802.15.4, including the 802.15.4g task group for Smart Utility Network wireless physical layer standard and 802.15.4k task group for Critical Infrastructure Monitoring; lead contributor for combined proposal; significant contributor and assistant technical editor 802.15.4e MAC enhancements task group, and many other amendments to 802.15.4; major contributor to revisions to 802.15.3 and 802.15.4; leadership roles in numerous task groups.

Past representative to Telecommunications Industry Association (TIA) TR-51 technical committee developing layer 1 through layer 4 standards for Smart Utility Networks and member of the regulatory and policy working group; Representative to Wi-SUN alliance (past and current); Founding member NIST Industry to Grid Domain Expert Working Group, and contributor to NIST PAP2 and PAP10.

Current clients include companies involved in Consumer electronics, Smart Grid systems, internet of things, large scale network systems, and communications systems development/deployment.

Past client projects include regulatory conformance program setup, field area network planning and design validation, large scale media production and distribution networks, wireless ICs and supporting products including 802.11, 802.15.4, Bluetooth, Wireless-USB, wireless positioning

systems, and others, advanced informatics software products and professional services, and large scale wide area process monitoring and control products and applications. Blind Creek has completed many projects for clients that require innovation and creativity; we have helped clients to begin projects so as to avoid pitfalls and problems, and also to salvage ongoing projects that are in trouble.

January 2008 to December 2012	***Founder, System Architect***	**Element Energy Systems**

Developed overall system architecture for innovative energy management technology. Developed concept for autonomous cell-level monitoring, control and coordination in multi-cell packs using a distributed control and communication model. Validated technology concepts, performed cost/benefit and feasibility analysis, developed technology roadmap and lead design and implementation of initial prototype. Applied innovative systems approach to create a new category of energy storage management products. Developed company's foundation IP and patent filings. As founder, developed business plans, strategy, fund-raising and evangelizing the technology and company. Managed engineering efforts in early stages. Element was acquired by Volterra Semiconductor in December 2012.

Mar 2006 to Oct 2006	***V.P. of Engineering***	**Aether Wire and Location**

Directed engineering efforts for development of ultra-wide band (UWB) low rate communication and precision location integrated circuit. Directed software, systems and hardware development, integrating the Aether Wire technology with ARM processor core, interfaces and support logic into a single chip solution. Taped out multiple versions. Managed proof of concept collaboration with a major telecommunications R&D company. Contributed to business development, strategic planning, and pursuit of funding. Supported acquisition of company IP by another company.

Nov 2003 to Jan 2006	***Principle, co-founder, V.P. of Engineering***	**InSilico Discovery, Inc.**

Guided the application of academic research in informatics, combined with commercial enterprise scale and internet software technologies, to create the pioneering commercial product (discoveryHub™) in use by GE Healthcare, Glaxo Smith Cline, Merck, Amgen and others. Leveraged internet and web technologies to create new query management technology. Established an engineering process for product generation and delivery; developed OEM strategy and relationships; created product demonstrations and completed proof of concept projects; assessed and addressed customer requirements and created solution architectures; created support and professional services organizations (w/GE). Technology acquired by Amersham Biosciences, which was acquired by GE Healthcare.

June. 2000 to April 2001	**Director of Engineering Software and MAC Development**	**Fantasma Networks, Inc. Mountain View, California**

Responsible for digital baseband IC development (through MAC layer) for high rate, low cost UWB chip set. Created and lead software and MAC development team; coordinated and directed

digital hardware development, integration and test efforts; Technical contributor for design and implementation; contributed to product roadmap, standards strategy and FCC regulatory efforts. Fantasma acquired by Pulse-Link.

Feb. 1992 to	***Director, Remote Test Systems***	**Sage Instruments**
June 2000	***Principal Software Engineer***	**Freedom, California**

Telecommunications test equipment developer and manufacturer. Participated in transitioning company to mature vendor. Applied commodity technology to create new product platforms, new product lines and business areas. Managed all engineering related to the Remote Test Systems (RTS) product line, including software, hardware, testing and support; co-creator of the RTS group and products; Software architect for the common software platform used in the majority of Sage products; performed overall system architecture, design, software/hardware tradeoffs, planning, cost/schedule analysis and risk assessment/mitigation strategy; established design goals, specific guidelines, standards and procedures for software development lifecycle; investigated new technologies for potential application to Sage products, including emerging high bandwidth delivery methods and related services, such as integrated data/voice services, wireless local loop services, voice over IP, and mobile wireless services. Created pioneering products for telecommunications service test and analysis including signaling analysis (in-band, CAS and ITU signaling systems), broad-band service commissioning, and large scale network test systems (wire-line and wireless). Authored embedded code, signal processing algorithms, and contributed to FPGA designs and implementations; conducted hardware and mechanical design for product prototypes; worked with sales and marketing to establish product roadmap, required capabilities and features; served as the primary technical contact with key customers and prospects, including pre-sales requirements determination and post deployment support.

Information on positions prior to 1992 available upon request

Prior positions include technical and leadership positions in aerospace with emphasis on navigation and guidance systems, avionics system architectures, digital imaging and signal processing (8 years); start-up experience in image processing algorithms and product implementation; consulting on application of advanced digital signal processing to medical imaging.

Highlights of IEEE 802 Standards Development

- Major contributor technical editor, IEEE Std. 802.15.4a-2007 (UWB precision ranging)
- Contributor to IEEE Std. 802.15.4c-2009 (Extensions for operation in China)
- Contributor to IEEE Std. 802.15.4d-2009 (Extensions for operation in Japan)
- Major contributor to IEEE Std. 802.15.4-2011 (2nd revision)
- Major contributor to IEEE Std. 802.15.4e-2012 (MAC enhancements)
- Contributor to IEEE Std. 802.15.4f-2012 task group (Low Rate UWB, RFID)

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- Instigator, major contributor to IEEE Std. 802.15.4g-2012 (Smart Utility Networking)
- Significant Contributor to IEEE Std. 802.15.4j-2013 (Medical Band operation)
- Major contributor and vice-chair, to IEEE Std. 802.15.4k-2013 (LECIM)
- Major contributor, contributing editor, IEEE Std. 802.15.4m-2013 (Whitespace)
- Task group vice-chair, Major Contributor, 802.15.4-2015 (3rd revision)
- Contributing editor to IEEE Std. 802.15.4u-2016 (operation in India)
- Major contributor to 802.15.3-2016 (1st revision)
- Contributor to IEEE Std. 802.15.4v-2017 (multi-region operation)
- Major contributor, IEEE Std. 802.15.3e-2017 (High Data Rate Proximity Communications)
- Task group Chair and Technical Editor, IEEE Std. 802.15.3f (Millimeter Wave band extension)
- Currently acting vice-chair, 802.15.4z task group (Enhancements to UWB ranging)
- Currently member of 802.15 Technical Expert Group (TEG), which assists task groups in developing amendments and new standards. TEG advises task groups on process, technical consistency with base standards, and technical issues as required.
- Currently chair 802.19 Sub-1GHz Coexistence Interest Group
- Currently co-Treasurer, 802 wireless treasury, and voting member Wireless Executive Committee

Education

University of California, Irvine, BS, Information and Computer Science.

University of California, Los Angles, Post-graduate study in Systems Engineering and Aeronautical Engineering.

University of Southern California, Post-graduate study in Systems Engineering with emphasis on digital imaging and digital signal processing.