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John C. Zeigler

Career Summary

Mr. Zeigler has extensive experience in applying new technologies to real-world problems in diverse industry segments including remote sensing, electric utilities, medical instrumentation, and high-energy physics. He has managed multi-disciplinary R&D programs and directed multiple concurrent development projects in commercial, non-profit, and academic environments.

Experience

2006-Present Sensor Design Group, LLC., Houston, TX
Managing Director, Senior Design Engineer

2001-2006 Terrapoint USA, Inc., The Woodlands, TX
Manager of Sensor Development

1984–2001 Houston Advanced Research Center, The Woodlands, TX
Program Manager

1978–1984 Electric Power Institute, Texas A&M University, College Station, TX
Research Associate

Key Skills

Development of multi-disciplinary systems incorporating computer-based data acquisition, control, and monitoring functions. Project management, including scheduling, budgeting, and manpower allocation. Report, proposal, and technical paper writing. Experimental test planning, instrumentation, execution, and data analysis. Data acquisition and control system design, development, and operation. Circuit design, simulation, construction, and testing. Computer programming in Unix, Linux, and PC environments.

Education

1984 Master of Science in Electrical Engineering
Texas A&M University
College Station, Texas

1979 Bachelor of Science in Electrical Engineering
Texas A&M University
College Station, Texas

Memberships

Institute of Electrical and Electronics Engineers (IEEE)

American Society for Photogrammetry and Remote Sensing (ASPRS)

Major Projects

Electromagnetic Inspection
Project Manager, Design/Test Engineer

Ongoing development of advanced techniques and systems for electromagnetic inspection (EMI) of pipe. Hardware improvements include replacement of conventional coil pickup sensors with discrete Hall-element sensors providing superior detection of off-axis flaws. Software developments include a proprietary adaptive digital signal processing algorithm that increases signal to noise ratio and permits automated detection of smaller flaws in the presence of high background noise levels.

Virtual Zero Detection System
Software Engineer

Developing adaptive software-based Constant Fraction Discriminator (CFD) for "Virtual Zero" detection system to track and identify a 0° index point on a rotating pipe. Detection system uses Infrared (IR) and ultraviolet (UV) light sources and photodiodes to generate raw timing pulses. These hardware timing pulses are processed by a software CFD implemented on a National Instruments Compact-RIO Programmable Automation Controller (PAC) using LabVIEW 8.5 Real-Time software to produce a precision, low-jitter timing output.

High Temperature Superconducting Devices
Magnetic Designer

Ongoing collaboration with developer of advanced high-temperature superconducting (HTS) materials to demonstrate advantages of second generation (2G) wire in real-world devices. Performed magnetic design and testing of a hybrid warm-bore HTS magnet with a central YBCO coil flanked by Helmholtz coils made from BSCCO wire.

LiDAR Topographic Mapping Systems
Program Manager

Developed Light Detection and Ranging (LiDAR) systems to conduct 3-dimensional topographic mapping surveys from small twin-engine aircraft. Developed airborne sensors integrating high-power lasers, scanning and receiving optics, detectors with time-dependent gain control, GPS positioning, inertial navigation, and custom data acquisition and control electronics. Managed development of advanced post-processing and calibration techniques to correct first- and second-order errors in sensor alignment and produce highly accurate point clouds. Provided field installation, support, and maintenance for worldwide sensor deployments. The company's successful commercialization of this technology for both the public and private sectors earned the first-ever achievement award given by NASA Goddard Space Flight Center in the National Resources category.

Fiber Optic Sensors
Consultant

Developed detector, signal conditioning, and processing electronics for fiber optic sensors used in remote and distributed measurement of temperature, pressure, strain, and acceleration. The sensors were based on Fabry-Perot cavities and white light interferometry.

Electric Power Transmission System Studies
Program Manager

Analyzed the ability of a regional electric transmission system to support new generation capacity. Used traditional ac load flow and advanced probabilistic load flow (PLF) analysis techniques to determine what modifications, if any, would be required to support the desired capacity at a proposed site. Used PLF to evaluate the impact of new generation and/or transmission modifications on overall transmission system reliability.

Transmission Enhancement SMES
Program Manager

Performed site-specific analysis of the feasibility for large-scale Superconducting Magnetic Energy Storage (SMES) units to increase utility transmission system stability and capacity and to provide ancillary services such as voltage and frequency control, load following, short-term spinning reserve, and sub-synchronous resonance damping. Typical power ratings ranged from 50-500 MVA with stored energies of 0.5-5 MWh. The project was one component of a 3-year, $3.75 M SMES Technology Development Program funded by the State of Texas.

MicroSMES
Program Manager, Systems Integrator, Design/Test Engineer

Developed components for second-generation MicroSMES units (1-10 MW and 1-10 MJ) to provide high-quality power to critical commercial and industrial loads. Developed and patented a fast, high-power persistent switch capable of opening 1 kA in 100 μs. Demonstrated modular energy storage coils incorporating a scalable quench protection system. The project was a second component of a 3-year, $3.75 M SMES Technology Development Program funded by the State of Texas.

High Temperature Superconductor Flux Pump
Consultant

Developed conceptual design for a high temperature superconductor (HTS) flux pump suitable for powering a high-energy physics detector magnet at 8.33 kA. Designed a scale model prototype which was tested at 200 A. Funding for the project was obtained through a Small Business Innovative Research (SBIR) grant.

High-Current Superconductor and Cryogenic Test Facility
Program Manager

Developed the High-Current Superconductor and Cryogenic Test Facility for internal development activities and marketed its use to external organizations needing its unique capabilities. The facility could simulate large machine environments with currents up to 300 kA, background fields up to 5 T, and temperatures down to 1.8 K. The facility set the world record of 303 kA for the highest current in a superconducting cable.

Superconducting Magnetic Energy Storage (SMES)
Project Leader, Systems Integrator, Design/Test Engineer

Developed components for a dual-use defense and civilian technology program designing a 400 MW, 20 MWh pulse power SMES system. Developed a 300 kA superconducting transformer, a 300 kA superconducting current sensor, and a distributed data acquisition and control system. Integrated these subsystems with a 1.8 K superfluid helium liquefier and a 5 T background field magnet to produce a complete test facility. Tested 200 kA cable-in-conduit (CIC) superconducting cables and splices under simulated operating conditions.

MRI/MRS Magnets
Design/Test Engineer

Developed components and subsystems for Magnetic Resonance Imaging

(MRI) and Magnetic Resonance Spectroscopy (MRS) magnets for medical imaging and research applications. Developed magnet charging systems incorporating multiple power supplies, persistent current switches, quench detection and discharge circuits, and flux pumps for charging, fine-tuning, and compensating field drift. Selected subsystems were used in the development of the world's first passive, iron-shielded MRI magnets (up to 4.5 T) and the first actively shielded high-resolution MRS magnet (9.4 T).

Proton Linac

Project Leader for RF and Controls

Developed a 100 kW, 470 MHz pulsed rf power source for a 750 keV linear accelerator (linac) consisting of an H^- ion source and a 4-rod radio-frequency quadrupole (RFQ). Developed a distributed control and data acquisition system with ion source controls and pulse power supplies floating at –35 kV. This was the world's first application of a klystrode amplifier coupled to an accelerating cavity.

Radiation Damage Studies

Project Leader, Design/Test Engineer

Performed experimental measurements on the effects of radiation damage to semiconductor devices operating in cryogenic environments as a part of a feasibility study of a passive quench protection system for the Superconducting Super Collider (SSC). Developed a novel test stand for *in situ* measurement of power diode performance during high-energy neutron irradiation at temperatures down to 5 K. Designed a 7 kA, 300 µsec pulse power supply, a data acquisition and control system, and a portable cryostat for irradiation tests conducted at a nuclear reactor.

SSC Magnets

Design/Test Engineer

Developed a test facility and participated in the design, fabrication, and testing of a series of superferric (iron-dominated superconducting) magnets for the Superconducting Super Collider (SSC). Developed a real-time control system, programmable power supplies with current ratings from 750 A to 15 kA, a flexible quench detection and monitoring system, and a magnetic field harmonic measurement system. Performed extensive performance testing of magnets ranging in length up to 28 m, which was the world's longest superconducting magnet.

Utility Distribution Feeder Protection

Design/Test Engineer

Designed, implemented, and field-tested an integrated microprocessor-based Distribution Feeder Protection System for electric utility substations. The units incorporated a three-phase and ground overcurrent relay, arcing fault detection, data logging, and remote monitoring.

Load Flow/Utility Systems Analysis

Consultant

Developed a basic Stott load flow program used by two divisions of DOW Chemical Company to calculate steady-state currents, voltages, and power flows in electric utility transmission and distribution systems.

Electromagnetic Field Characterization
Test Engineer

Participated in a series of field tests to characterize the transient electromagnetic environment of 138-500 kV class utility substations during normal switching operations and staged faults.

Patents

United States Patent 6,317,303, "High-speed superconducting persistent switch", John C. Zeigler and Scott D. Peck, November 13, 2001.

Partial Publication List

Damir Latypov et al. including John Zeigler, "Performance Comparison of Laser Scanners with Rotating and Oscillating Mirrors", Proceedings of APSRS 2004 Annual Conference, Denver, CO (2004).

R. A. Haugerud et al. including J. Zeigler, "Lidar measurement of topographic change during the 2004 eruption of Mount St. Helens, WA", American Geophysical Union, Fall Meeting, San Francisco, CA (2004).

David J. Harding et al. including John C. Zeigler, "Western Rainier Seismic Zone Airborne Laser Swath Mapping", Geological Society of America Annual Meeting, Seattle, WA (2003).

R. A. Haugerud et al. including J. Zeigler, "Acquiring Research-grade ALSM Data in the Commercial Marketplace", American Geophysical Union, Fall Meeting, San Francisco, CA (2003).

J. Zeigler et al., "Digital terrain and elevation mapping with the Terrapoint LiDAR system", 8th SAGA Biennial Technical Meeting and Exhibition, South Africa (2003).

John Zeigler, "All About LiDAR Data Acquisition", 9th Annual Illinois Geographic Information Systems Association Workshop, Illinois (2003).

S. Peck and J. Zeigler, "Power Quality", Wiley Encyclopedia of Electrical and Electronics Engineering, Edited by John G. Webster, Ph.D., John Wiley & Sons, Inc. (1999).

G. Liang et al. including J. Zeigler, "Development of Superconducting Joints for NMR Superconducting Magnet Applications", Proceedings of Fifteenth International Conference on Magnet Technology (1998).

G. Liang et al. including J. Zeigler, "Development of Superconducting Joints for TWC High-Jc Nb3Sn Wires for NMR Superconducting Magnet Applications", Advances in Cryogenic Engineering, Vol. 44 (1998).

J. Colvin et al. including J. Zeigler, "Second Generation Micro Superconducting Magnetic Energy Storage (MicroSMES) Sub-Systems", Superconductor Industry, Vol. 10, No. 4 (1997).

T. Mann, J. Zeigler, and T. Young, "Opportunities for Superconductivity in the Electric Power Industry", IEEE Transactions on Applied Superconductivity, Vol. 7, No. 2 (1997).

G. Liang et al., including J. Zeigler, "Study of Impregnating Epoxy Resins for High Field NMR Superconducting Magnets", Advances in Cryogenic Engineering, Vol. 41 (1996).

R. Teodorescu et al., including J. Zeigler, "400 MHz / 89 mm Actively Shielded High Resolution NMR Magnet", IEEE Transactions on Magnetics, Vol. 32, No. 4 (1996).

S. Peck, J. Zeigler, and C. Luongo, “Tests on a 200 kA Cable-in-Conduit Conductor for SMES Application”, IEEE Transactions on Applied Superconductivity, Vol. 4, No. 4 (1994).

S. Peck and J. Zeigler, “Test Results for a Subscale (100 kA) SMES Splice”, Thirteenth International Conference on Magnet Technology, Victoria, B.C., Canada (1993).

J. Colvin et al., including J. Zeigler, “Superferric Correction Magnets for the SSC”, IEEE Transactions on Magnetics, Vol. 27, No. 2 (1991).

J. Zeigler et al., “A Test Facility for 200 kA SMES/ETM Conductors”, IEEE Transactions on Magnetics, Vol. 27, No. 2 (1991).

W. MacKay et al., including J. Zeigler, “Operation of a 473 MHz Pulsed Klystrode Power Source”, Proceedings of the 1990 Linear Accelerator Conf., LA-12004-C (1991).

R. Carcagno and J. Zeigler, “Studies of Cold Protection Diodes”, Supercollider 2: Proceedings of the Second International Industrial Symposium on The Supercollider (1990).

C. R. Meitzler et al., including J. Zeigler, “Test of a Compact 750 keV H- Preinjector”, AIP Conference Proceeding Series, 210 (1990).

F. Huson et al., including J. Zeigler, “The High Field Superferric Magnet II”, Particle Accelerators, 28 (1990).

J. Colvin et al., including J. Zeigler, “SMES Conductor Test Program”, IEEE Transactions on Magnetics, Vol. 25, No. 2 (1989).

J. Zeigler and R. Carcagno, “Lifetime of Passive Quench Protection Diodes in the SSC”, Proceedings of the IEEE Particle Accelerator Conference (1989).

J. Colvin et al., including J. Zeigler, “The high-field superferric magnet, Design and test of a new dipole magnet for future hadron colliders”, Nuclear Instrumentation and Methods in Physics Research, A270 (1988).

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M. Fan et al., including J. Zeigler, “Correction Magnets for the Superconducting Supercollider”, Proceedings of the IEEE Particle Accelerator Conference (1987).

J. Zeigler, R. Carcagno, and M. Weichold, “Experimental Measurements of Radiation Damage to Power Diodes at Cryogenic Temperatures”, Proceedings of the IEEE Particle Accelerator Conference (1987).

F. Huson, et al., including J. Zeigler, “Superferric Magnet Option for the SSC”, IEEE Transactions on Nuclear Science, NS-32, No. 5 (1985).

M. Aucoin, J. Zeigler, and B. Russell, “Feeder Protection and Monitoring System, Part I: Design, Implementation and Testing”, IEEE Transactions on Power Apparatus and Systems, PAS-104, No. 4 (1985).

M. Aucoin, J. Zeigler, and B. Russell, “Feeder Protection and Monitoring System, Part II: Staged Fault Test Demonstration”, IEEE Transactions on Power Apparatus and Systems, PAS-104, No. 6 (1985).

J. Zeigler, “The Design and Implementation of a Distributed Hierarchy for Overcurrent Protection and Monitoring of a Power Distribution System”, Master of Science Thesis, Texas A&M University (1984).