

Greg Linder

Founder and Owner, SolarSCADA LLC (www.solarscada.com)

Founder and Owner, Linder Engineering Works, LLC (www.linderlabs.com/glinder)

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Objective

SolarSCADA provides turn-key solutions for Solar SCADA systems. Linder Engineering Works provides embedded systems design, PCB layout, and schematic design services. My current goal is to run SolarSCADA and Linder Engineering for continued growth, and provide consulting services to those in the PV and Renewables industry grappling with modern data integration and grid interoperability challenges. I have directly participated in several GW of PV throughout my career, including SCADA design, commissioning, and repair.

Qualifications

- 12 years of experience with SCADA for distributed generating assets, including solar, wind, biogas, and reciprocating engine systems.
- 10 years of experience with substation communications and relay programming
- 11 years of data remote data radio design and implementation, including wireless mesh, 900MHz line of site, and various WiFi systems
- 15 years embedded system design using multiple types of microcontrollers
- 15 years PLC system programming, design, and panel layout
- 15 years PCB design and layout experience
- Extensive international travel and multicultural collaboration experience
- Highly collaborative and friendly personality

Education

- MSEE, Clarkson University, May 2009
- BSEE, University of Illinois Urbana-Champaign, May 2005
- Completed coursework required for a BS in Computer Engineering also at University of Illinois
- Extensive study in Photovoltaic Engineering in 2003-2004 from University of New South Wales, Sydney, Australia

Professional Memberships and Certifications

- Colorado Professional Engineer (Dec, 2014)
- IEEE member since 2003, PES (Power & Energy Society) member
- American Solar Energy Society (ASES) member since 2007
- ARRL Member and Amateur Extra radio licensee, call: KC9OPU

Experience

- **SolarSCADA, LLC** (Denver, Colorado) (July 2018-Present)
 - Participating in the American Made Solar Challenge Round 5 Hardware Track for SolarSCADA's continual development in 2022.
 - Designed and deployed the Pyranometer SPD (Surge Protection Device) for protection of RS-485 based pyranometers with long cable homeruns.

- Developed and deployed a large-scale PV asset monitoring solution, currently with 50MW of installed assets in six states based on RadixIOT's Mango™ Platform.
- Deployed entire software cloud and server platform to implement support for current alphabet-soup of solar generation related protocols.
- **Kleinfelder Group, Project Professional** (Denver, Colorado) (October 2014 – Jun 2018)
 - Provided SCADA knowledge base to Kleinfelder team for 100's of MW of solar systems
 - Designed and implemented large-scale reservoir monitoring ADAS Systems involving 100's of Vibrating Wire sensors and other instruments.
 - Support substation protective relay setting and SCADA design efforts
 - Provided field support for last-minute commissioning efforts to bring solar assets online
- **Linder Engineering Works, LLC: Founder** (Denver, Colorado) (2008 – Present)
 - Drafted patents for several new technologies
 - Field commissioning and debugging services for several clients in the solar space, related to inverter underperformance and troubling power quality issues on-site
 - Provided data integration for legacy equipment, including upgrades for Series 90-70, and other proprietary controllers and data services.
 - Integrated emerging data protocols in renewable generation space, including various solar protocols, such as the SunSpec Alliance, SMA Sunny Data, and the OpenADR demand management protocol
 - Designed and constructed hardware and firmware for ARM-based embedded systems, including embedded end of arm (EOA) actuators.
 - Led teams installing and commissioning heavy-duty shipyard overhead crane lifters, large-scale PV plants, and industrial automation technologies
 - Designed and constructed hardware and developed firmware for Microchip PIC-based embedded systems, including a multi-axis motor drive device with wireless mesh data aggregation and precision distance measuring system for pneumatic tools
 - Performed mechanical design of assemblies and systems for pneumatic placing tools
 - Prototyped and tested encoderless universal dual-axis solar tracker controller
 - Developed embedded indoor-agricultural controller system for low cost control of indoor aeroponic and hydroponic growing systems.
- **Juwi Solar Inc: SCADA Engineer** (Boulder, Colorado) (July 2010 – August, 2014)
 - Deployed full plant-wide configurations in Subnet Solutions Substation Server platform for data integration of solar plant assets, including various brands of inverters, weather stations, protective relays, utility meters, and programmable logic controllers
 - Designed and configured SCADA Master, including operator screens, redundant database configuration, web interface, and user management using the Control Microsystems ClearSCADA host platform
 - Designed and implemented VPN solution for secure plant to control center communication using DNP3 over IP and OPC
 - Designed and managed construction of electrical panels for utility-scale solar plant control, including integration of PLCs, temperature rated computers, uninterruptible power systems, radio communications systems, and DC and AC sensing
 - Designed custom shunts and sensing equipment to allow revenue grade measurements on both DC and AC sides of an inverter
 - Responsible for the design, implementation, and commissioning of the Juwi SCADA system, which currently monitors nearly 200 MW of PV generating capacity across six states
 - Spearheaded effort for research into NERC/CIP requirements for the Juwi Solar distributed SCADA system.

- **Clarkson University: Research Assistant** (Potsdam, New York) (2007-2009)
 - Designed and constructed SCADA system for Clarkson Anaerobic Manure Digester
 - Designed and built 500 gallon trailer-mounted portable anaerobic digester
 - MS Thesis, “Failure Analysis and Smart Grid Control Protocols for Anaerobic Digesters”
- **SolFocus Inc: Intern** (Mountain View, California) (Summer 2008)
 - Assisted with installation and commissioning of SolFocus solar tracking systems
 - Installed and configured equipment for solar telemetry and control systems
 - Advocated the use of utility-standard control protocols and hardware to solar field control
- **Chicago Spotlight: Field Service Technician** (Chicago, Illinois) (2006-2007)
 - Installed and commissioned building-integrated lighting control networks
 - Trained others in the use and installation of dimming and control equipment
 - Worked with electricians in the installation of lighting control systems
 - Repaired numerous theatrical electrical systems, including automated fixtures, follow spots, lighting control consoles, and dimming equipment
- **SmartSpark Energy Systems: Embedded Systems Engineer** (Champaign, Illinois) (2005-2006)
 - Designed and built a large scale PLC based water-immersion battery cycling test system
 - Wrote firmware for family of proprietary PIC-based non-dissipative battery charge balancing systems
 - Designed and built family of MSP430 based low-power floating channel data acquisition systems for battery characterization
- **U of I Future Energy Challenge 2004: Controls Team Leader** (Urbana-Champaign, Illinois) (2004-2005)
 - Controls team leader for the design of experimental high-efficiency 500 watt three phase variable frequency drive with active power factor correction
 - Designed and wrote PIC18 firmware in assembly language
 - Designed and built hand-wired prototype hardware to test code prior to PCB completion
 - Laid out multiple mixed-signal circuit boards containing power inverter, control and isolated communications sections
 - Performed significant characterization, debugging, and testing work using dynamometers and power measuring equipment
- **UNSW Solar Racing Team: Mechanical Team Leader** (Sydney, Australia) (2003-2004)
 - Race Team member competing with the UNSW Sunswift II solar car in the 2003 World Solar Challenge
 - Mechanical Team Leader for the initial design phase of the UNSW Sunswift III
 - Negotiated sponsorship contracts for fiberglass materials supply, mold release agents, and large-scale CNC machining for the initial tooling
 - Directed mechanical design efforts for Sunswift III, including steering systems, suspension, trailer, monocoque chassis, and composite materials
 - Assisted with design and debugging of soft-switched maximum power point tracker
 - Actively sought opportunities to present on high efficiency transportation technologies via radio interviews, NRMA shows and CeBIT Australia
- **George L. Clark X-ray Facility: Student Employee** (Urbana, Illinois) (2000-2005)
 - Designed custom cable support bracket to address design oversights in Kappa-geometry diffractometer
 - Performed maintenance and repair work on x-ray diffraction equipment
- **Fermi National Accelerator Lab: Intern** (Batavia, Illinois) (2001-2003)
 - Designed and constructed semi-automatic RF test stands for wave-guides and particle accelerating structures

- Performed preliminary design work for a fully automated high-volume RF disk testing and sorting system
- Assisted with the installation, leak checking, and acceptance procedures of a large vacuum brazing furnace
- Recovered presumed-lost magnet data and Fortran code from legacy VAX/VMS systems
- **University of Illinois School of Chemical Sciences: Undergraduate Research Assistant** (2001-2002)
 - Designed and built in-situ platinum polishing attachment for a kappa-geometry x-ray diffraction instrument
- **Aberle GmbH & Company: Apprentice** (Gutach, Germany) (2000)
 - Performed shop floor tasks, including manufacturing parts, programming machines, and quality control
 - Assisted ISO 9001 compliance documentation
- **Norris Cultural Arts Center: Crew** (St. Charles, Illinois) (1997-2000)
 - Responsible for maintenance of theatrical systems, including lighting instruments and controls, sound equipment, rigging systems and hydraulics
 - Performed several crew roles, including set construction, lighting and sound design, fly rail operation, and special effects

Patents

9,802,116 *Machine learning controller for prize dispensing entertainment machines*, issued 2017

Presentations and Publications

1. Linder, Greg, Marques Montes. *Demonstration of Inverter Based Grid Voltage Support Functions on 19 MW (DC) PV Generating Facility*. Presented at the 2014 ASES / Intersolar conference. San Francisco, California.
2. Linder, Greg, John Tembrock, Tony Motisi, Electra Lamb, Dave Kubat, Mike Pauly. *AC and DC Restoration for Utility Scale Photovoltaic Generating Assets*. Presented at the 2012 IEEE Power and Energy Society Transmission and Distribution Conference and Exposition. Orlando, Florida.
3. Linder, Greg. *Communications Reliability for Utility Scale Photovoltaic Plants*. Presented at 2011 Subnet Solutions User Group, October, 2011. Austin, Texas.
4. Linder, Greg. *Subnet Solutions' Substation Server Simplifying Solar SCADA*. Presented at 2010 Subnet Solutions User Group, October, 2010. Phoenix, Arizona.
5. Linder, Greg, Stefan Grimberg, Ph. D. *Comparison of Monitoring Systems for Anaerobic Digesters*. Presented at 2010 IEEE Power & Energy Society Conf., New Orleans, Louisiana
6. Linder, Greg, Stefan Grimberg, Ph.D., Eric Thacher, Ph.D. Shaun Jones. *Implementation of a Distributed Standard Anaerobic Digester Control System Based on Observations from Real World Failure Analysis*. Presented at 2009 ASABE Annual International Meeting
7. Linder, Greg. *The Importance of Standard SCADA Protocols to the Reliable Operation of Distributed Farm-Scale Anaerobic Digesters*. Presented at 2009 IEEE PES Power Systems Conference and Exposition, Seattle, Washington
8. Linder, Greg. *Failure Analysis and Smart Grid Control Protocols for Anaerobic Digesters*. [Thesis] Clarkson University, May 2009
9. Romanov, Gennady, Tug Arkan, Harry Carter, Timergali Khabiboulline, Gregory Linder. *Measurements of high order modes in high phase advance damped detuned accelerating structure for the NLC*. Proceedings of LINAC 2004, Lubeck, Germany.