Stanford

Liang Min

Managing Director Bits & Watts Initiative, Precourt Institute for Energy

CONTACT INFORMATION

- **Alternate Contact**

  Sarah Weaver - Program Manager, Bits & Watts

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Bio

BIO

Dr. Liang Min is the Managing Director of the Bits & Watts Initiative at Stanford University, where he leads a multidisciplinary program advancing the digital transformation of the electric grid. Under his direction, Bits & Watts has launched several pioneering research efforts, including 100% Clean Electric Grid, EV50, AI for Climate and Energy, and the Digital Grid—an open platform designed to integrate distributed energy resources (DERs) at scale. Most recently, he launched the Powering AI Sustainably program, a cross-sector program addressing the surging energy demands of artificial intelligence while accelerating the transition to a clean and reliable power system.

Dr. Min also serves as the founding Managing Director of the Stanford Net-Zero Alliance, a global platform that brings together industry leaders, faculty, and students to collaborate on research and education aligned with a net-zero emissions future. He also established the Stanford Energy Executive Education Program, which equips senior energy leaders with the strategic insight and tools needed to navigate the rapidly evolving energy landscape. Beyond Stanford, he co-founded GridCARE, Inc., the first spinout from Stanford's Sustainability Accelerator, which unlocks latent grid capacity to accelerate time-to-power for data centers and support the AI-driven clean-energy transition.

His career spans leadership roles across academia, national laboratories, and industry. At the Electric Power Research Institute (EPRI), Dr. Min led the grid operations and planning team and directed phasor measurement unit (PMU) research, resulting in multiple U.S. patents deployed at utilities through the support of the American Recovery and Reinvestment Act. At Lawrence Livermore National Laboratory, he founded the Energy Delivery Group and served as associate program leader for the lab's national cyber and infrastructure resilience program. He also directed the Electric Operations Program for California's Energy Systems for the 21st Century (CES-21)—a $150 million public-private initiative leveraging high-performance computing to enhance grid reliability, security, and value to ratepayers.

Outside of work, he is an avid runner with the personal best marathon time of 2 hours and 50 minutes.

CURRENT ROLE AT STANFORD

Managing Director for the Bits and Watts Initiative, Precourt Institute for Energy

Managing Director for the Net-Zero Alliance, Stanford Doerr School of Sustainability

EDUCATION AND CERTIFICATIONS

- Ph.D, Texas A&M University (2007)
- M.S., Tianjin University (2004)
- B.S., Tianjin University (2001)

PROJECTS

- Hierarchical Engine for Large-scale Infrastructure Co-Simulation (HELICS) - Department of Energy (4/1/2016 - 3/31/2019)
- Multi-Scale Integration of Control Systems (EMS/DMS/BMS) - Department of Energy (4/1/2016 - 4/1/2019)
- Unified Remedial Action Scheme (RAS) Modeling and Simulation Tool for Grid Resiliency - Bonneville Power Administration (10/1/2016 - 3/31/2018)
- DER Siting and Optimization Tool for California - Department of Energy (4/1/2016 - 3/31/2018)
- Large-Scale Integrated Electric-Transmission and Distribution-Grid Dynamic Simulation - Lawrence Livermore National Lab (10/1/2012 - 9/30/2015)
- Probabilistic Transmission Congestion Forecasting - California Institute for Energy and Environment (3/1/2006 - 3/1/2008)
- Fast Fault Screening for Real-Time Transient Stability Assessment - NYSERDA (10/1/2006 - 9/30/2010)

PATENTS

- Liang Min, Nan Duan. "United States Patent Appl. No.: 16/997872 Voltage Stability Smart Meter", Lawrence Livermore National Security, LLC, Aug 19, 2020
- Liang Min, Can Huang. "United States Patent Appl. No.: 16/988,171 SYNCHRONIZED ELECTRIC METER HAVING AN ATOMIC CLOCK", Lawrence Livermore National Security, LLC, Aug 7, 2020
- Xiao Chen, Can Huang, Liang Min, Charanraj Thimmisetty, Charles Tong. "United States Patent United States Patent Appl. No.: 16/721588 Computational framework for modeling of physical process", Lawrence Livermore National Security, LLC, Jun 25, 2020
- Pei Zhang, Liang Min, Jian Chen. "United States Patent US8126667B2 Measurement based voltage stability monitoring and control", Electric Power Research Institute, Feb 28, 2012
- Pei Zhang, Liang Min, Nan Zhang. "United States Patent US7603203B2 Method for voltage instability load shedding using local measurements", Electric Power Research Institute, Oct 13, 2009

PERSONAL INTERESTS

In his spare time, he is an avid marathoner.

Teaching

COURSES

2025-26

- Electric System Planning with Emerging Generation Technologies and Large Load: ENERGY 176, ENERGY 276 (Aut)

2024-25

- Electric System Planning with Emerging Generation Technologies: ENERGY 176, ENERGY 276 (Aut)

2023-24

- Electric System Planning with Emerging Generation Technologies: ENERGY 176, ENERGY 276 (Aut)

Professional

WORK EXPERIENCE

- Group Leader, Energy Delivery and Utilization - Lawrence Livermore National Laboratory (1/1/2017 - 6/7/2019)
- Associate Program Leader, Cyber and Infrastructure Resilience - Lawrence Livermore National Laboratory (1/1/2016 - 6/7/2019)
- Research Director, Electric Operations program, CES-21 - Lawrence Livermore National Laboratory (11/7/2011 - 1/1/2016)

- Senior Project Manager - Electric Power Research Institute (3/6/2006 - 11/4/2011)

Publications

PUBLICATIONS

- **Powering AI at Speed in California**
  Min, L., Chueh, W., Ehrenpreis, I.
  Stanford Precourt Institute for Energy.
  2025

- **Adoption of Artificial Intelligence by Electric Utilities** *Energy Law Journal*
  Slate, D. D., Parisot, A., Min, L., Panciatici, P., Hentenryck, P. V.
  2024; 45 (1): 1-23

- **The Pandemic an unprecedented impact to grid operation** *IEEE POWER & ENERGY MAGAZINE*
  Min, L., Li, F.
  2022; 20 (6): 14-15

- **Charging infrastructure access and operation to reduce the grid impacts of deep electric vehicle adoption** *NATURE ENERGY*
  Powell, S., Cezar, G., Min, L., Azevedo, I. M. L., Rajagopal, R.
  2022

- **Decentralized and Coordinated V-f Control for Islanded Microgrids Considering DER Inadequacy and Demand Control** *IEEE TRANSACTIONS ON ENERGY CONVERSION*
  She, B., Li, F., Cui, H., Wang, J., Min, L., Oboreh-Snapps, O., Bo, R.
  2023; 38 (3): 1868-1880

- **The COVID-19 Boost for Clean Electricity** *IEEE POWER & ENERGY MAGAZINE*
  Li, F., Li, X., Sun, H., Di Ninno, F., Quaglia, F., Cunha, G., Moreno, R., Flores, W. C., Chamorro, H. R., Min, L.
  2022; 20 (6): 56-65

- **Power Distribution System Synchrophasor Measurements With Non-Gaussian Noises: Real-World Data Testing and Analysis** *IEEE Open Access Journal of Power and Energy*
  Huang, C., Thimmisetty, C., Chen, X., Stewart, E., Top, P., Korkali, M., Donde, V., Tong, C., Min, L.
  2021; 8: 223-228

- **Smart Meters Enabling Voltage Monitoring and Control Functionalities: The Last-Mile Voltage Stability Issue** *IEEE Transactions on Industrial Informatics*
  Duan, N., Huang, C., Sun, C., Min, L.
  2021

- **Risk Assessment of Rare Events in Probabilistic Power Flow via Hybrid Multi-Surrogate Method** *IEEE TRANSACTIONS ON SMART GRID*
  Xu, Y., Korkali, M., Mili, L., Chen, X., Min, L.
  2020; 11 (2): 1593–1603

- **A Bayesian Approach to Real-Time Dynamic Parameter Estimation Using Phasor Measurement Unit Measurement** *IEEE TRANSACTIONS ON POWER SYSTEMS*
  Xu, Y., Mili, L., Chen, X., Korkali, M., Min, L.
  2020; 35 (2): 1109–19

- **A Bayesian Approach to Real-Time Dynamic Parameter Estimation Using PMU Measurement** *2020 IEEE Power & Energy Society General Meeting (PESGM)*
  Xu, Y., Chen, X., Mili, L., Korkali, M., Min, L.
  2020

- **A Bayesian Approach to Real-Time Dynamic Parameter Estimation Using PMU Measurement**
  Xu, Y., Chen, X., Mili, L., Korkali, M., Min, L., IEEE
  IEEE.2020

- **UPS: Unified PMU-Data Storage System to Enhance TD PMU Data Usability** *IEEE TRANSACTIONS ON SMART GRID*
  Kosen, I., Huang, C., Chen, Z., Zhang, X., Min, L., Zhou, D., Zhu, L., Liu, Y.
  2020; 11 (1): 739-748
- **Robust Medium-Voltage Distribution System State Estimation using Multi-Source Data** *2020 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)*
  Zhao, J., Huang, C., Mili, L., Zhang, Y., Min, L.
  2020
- **Response-Surface-Based Bayesian Inference for Power System Dynamic Parameter Estimation** *IEEE TRANSACTIONS ON SMART GRID*
  Xu, Y., Huang, C., Chen, X., Mili, L., Tong, C. H., Korkali, M., Min, L.
  2019; 10 (6): 5899-5909
- **Potential Benefits of Vehicle-to-Grid Technology in California** *IEEE ELECTRIFICATION MAGAZINE*
  Donadee, J., Shaw, R., Garnett, O., Cutter, E., Min, L.
  2019; 7 (2): 40-45
- **A JModelica.org Library for Power Grid Dynamic Simulation with Wind Turbine Control** *2019 IEEE Power & Energy Society General Meeting (PESGM)*
  Qin, Y., Koakali, M., Top, P., Min, L.
  2019
- **Demand Side Energy Management Under Emergency Conditions**
  Chen, Z., Minb, L., Huang, C., Zhang, W.
  2018: 1-5
- **Demand Side Energy Management Under Emergency Conditions**
  Chen, Z., Min, L., Huang, C., Zhang, W., IEEE
  IEEE.2018
- **Guest Editorial High Performance Computing (HPC) Applications for a More Resilient and Efficient Power Grid** *IEEE TRANSACTIONS ON SMART GRID*
  Huang, Z., Tate, Z., Abhyankar, S., Dong, Z., Khaitan, S., Min, L., Taylor, G.
  2017; 8 (3): 1363-1365
- **Integration of functional mock-up units into a dynamic power systems simulation tool** *2016 IEEE Power and Energy Society General Meeting (PESGM)*
  Top, P., Qin, Y., Min, L.
  2016
- **A Hybrid Framework for Online Dynamic Security Assessment Combining High Performance Computing and Synchrophasor Measurements** *2015 IEEE Power & Energy Society General Meeting*
  Farantatos, E., Del Rosso, A., Bhatt, N., Sun, K., Liu, Y., Min, L., Jing, C., Ning, J., Parashar, M.
  2015
- **A Federated Simulation Toolkit for Electric Power Grid and Communication Network Co-simulation**
  Kelley, B. M., Top, P., Smith, S. G., Woodward, C. S., Min, L., IEEE
  IEEE.2015
- **A federated simulation toolkit for electric power grid and communication network co-simulation** *2015 Workshop on Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES)*
  Kelley, B. M., Top, P., Smith, S. G., Woodward, C. S., Min, L.
  2015
- **High performance computation tools for real-time security assessment** *2014 IEEE PES General Meeting | Conference & Exposition*
  Del Rosso, A., Min, L., Jing, C.
  2014
- **On-line transient stability analysis using high performance computing** *IEEE ISGT 2014*
  Smith, S. G., Woodward, C., Min, L., Jing, C., Del Rosso, A.

2014

- **Micro Behavior Information Decision Research in An ABM Traffic and Energy Model**
  Qin, Y., Jim, G., Min, L., Yao, Y., IEEE
  IEEE.2013: 22-27
- **Advancing the adoption of advanced computing methods and technologies for real-time control center operations** *2012 IEEE Power and Energy Society General Meeting*
  Wigington, A., Min, L., L, C., Murray, W., Narayan, A.
  2012
- **Advancing the Adoption of Advanced Computing Methods and Technologies for Real-Time Control Center Operations** *General Meeting of the IEEE-Power-and-Energy-Society*
  Wigington, A., Min, L., Li, C., Murray, W., Narayan, A.
  IEEE.2012
- **Utility application experience of Probabilistic Risk Assessment method** *IEEE/PES Power Systems Conference and Exposition*
  Zhang, P., Min, L., Hopkins, L., Fardanesh, B., Patro, P., Useldinger, J., Graham, M., Ramsay, D.
  2009
- **Utility Application Experience of Probabilistic Risk Assessment Method**
  Zhang, P., Min, L., Hopkins, L., Fardanesh, B., Patro, P., Useldinger, J., Graham, M., Ramsay, D., IEEE Power & Energy Soc
  IEEE.2009: 770-+
- **Voltage Stability Margin Computation and Visualization for Tri-State South Colorado Area using EPRI Power System Voltage Stability Region (PSVSR) Program**
  Wei, W., Zhang, P., Min, L., Graham, M., Ramsay, D., IEEE
  IEEE.2009: 1248-+
- **Voltage Stability Margin Computation and Visualization for Tri-State South Colorado Area using EPRI Power System Voltage Stability Region (PSVSR) Program** *2009 Asia-Pacific Power and Energy Engineering Conference*
  Wei, W., Zhang, P., Min, L., Graham, M., Ramsay, D.
  2009
- **Utility application experience of Probabilistic Risk Assessment method** *2009 IEEE/PES Power Systems Conference and Exposition*
  Zhang, P., Min, L., Hopkins, L., Fardanesh, B., Patro, P., Useldinger, J., Graham, M., Ramsay, D.
  2009
- **Short-term probabilistic transmission congestion forecasting** *Third International Conference on Electric Utility Deregulation and Restructuring and Power Technologies*
  Min, L., Lee, S., Zhang, P., Rose, V., Cole, J.
  2008
- **Short-term probabilistic transmission congestion forecasting**
  Min, L., Lee, S. T., Zhang, P., Rose, V., Cole, J., IEEE
  IEEE.2008: 764-770
- **Utility Experience Performing Probabilistic Risk Assessment for Operational Planning** *2007 International Conference on Intelligent Systems Applications to Power Systems*
  Zhang, P., Min, L., Hopkins, L., Fardanesh, B.
  IEEE.2007
- **Utility experience performing probabilistic risk assessment for operational planning**
  Zhang, P., Min, L., Hopkins, L., Fardanesh, B., IEEE
  IEEE.2007: 12-+
- **A Probabilistic load flow with consideration of network topology uncertainties**
  Min, L., Zhang, P., IEEE
  IEEE.2007: 7-11
- **A Probabilistic Load Flow with Consideration of Network Topology Uncertainties** *2007 International Conference on Intelligent Systems Applications to Power Systems*

Min, L., Zhang, P.
2007

- **Total transfer capability computation for multi-area power systems** *IEEE TRANSACTIONS ON POWER SYSTEMS*
  Min, L., Abur, A.
  2006; 21 (3): 1141-1147
- **REI-equivalent based decomposition method for multi-area TTC computation**
  Min, L., Abur, A., IEEE
  IEEE.2006: 506-+
- **A decomposition method for multi-area OPF problem**
  Min, L., Abur, A., IEEE
  IEEE.2006: 1689-+
- **Two-level multi-area TTC calculation by updating power transfer distribution factors** *IEEE Power Engineering Society General Meeting, 2005*
  Min, L., Zhao, L., Abur, A.
  IEEE.2005
- **Multi-area transfer capability evaluation using voltage stability constraints**
  Min, L., Abur, A., IEEE
  IEEE.2005: 332-337
- **Two-level multi-area TTC calculation by updating power transfer distribution factors**
  Min, L., Zhao, L., Abur, A., IEEE
  IEEE.2005: 491-496