Short CV of Liang He

CONTACT INFORMATION	*E-mail:* lhe20@unl.edu *Linkedin:* https://www.linkedin.com/in/liang-he-ab430333/

EDUCATION

Nankai University, Tianjin, P.R. China

Ph.D. in Computer Science and Engineering, 12/2011

ACADEMIC APPOINTMENTS

Associate Professor, 08/2024 to present

School of Computing
University of Nebraska Lincoln, NE, USA

Assistant Professor, 09/2017 to 08/2024

Department of Computer Science and Engineering
University of Colorado Denver, CO, USA

Research Fellow, 2015 to 2017

Department of Electrical Engineering and Computer Science (with Prof. Kang G. Shin)
University of Michigan at Ann Arbor, MI, USA

Research Scientist, 2012 to 2014

Pillar of Information System Technology and Design (with Dr. Yu Gu)
Singapore University of Technology and Design, Singapore

Research Assistant, 2009 to 2011

Department of Computer Science and Engineering (with Prof. Jianping Pan)
University of Victoria, BC, Canada

RESEARCH INTERESTS

Cyber-physical systems and internet-of-things with applications to batteries, vehicles, and manufacturing systems.

ENTREPRENEURSHIP

Co-founder of Batteries Beyond Batteries

HONORS AND AWARDS

- Citation: 2,785; H-index: 25; i-10 index: 42 (Google Scholar, 02/2024)
- Early Career Award for Excellence in Research, CEDC@CU-Denver, 2024.
- Best paper candidate of ACM e-Energy'23, 2023.
- University nominee for the Blavatnik National Awards for Young Scientists, 2021
- Winner of Lab Venture Challenge, Colorado State, 2021
- Lewis Family Innovation Award, CU-Denver, 2021
- Inclusive Pedagogy Academy, CU-Denver, 2021
- 1 paper highlighted in ACM GetMobile as top picks in the SIGMOBILE area, 2021
- Young Upwardly Mobile Professor Award, CU-Denver, 2020
- ACUE Certificate on Effective Teaching, 2020
- CRC Fellowship, CU-Denver, 2020
- CMTC Fellowship, CU-Denver, 2018

- Best Poster Award, ACM MobiSys'17, 2017

SELECTED
PUBLICATIONS

P-1. Hojun Choi and **Liang He**, RheelPower: Advancing Automotive IoT via Non-Invasive Power Generation from Rotating Vehicle Wheels, in *The 26th International Workshop on Mobile Computing Systems and Applications (**HotMobile'25**)*, 2025.

P-2. Zeyu Yang*, **Liang He**, Yucheng Ruan, Peng Cheng, and Jiming Chen, Unveiling Physical Semantics of PLC Variables Using Control Invariants, *IEEE Transactions on Dependable and Secure Computing (**IEEE TDSC**)*, 2024.

P-3. Zeyu Yang*, Hongyi Pu*, **Liang He**, Chengtao Yao, Jianying Zhou, Peng Cheng, and Jiming Chen, Deception-Resistant Stochastic Manufacturing for Automated Production Lines, in *The 27th International Symposium on Research in Attacks, Intrusions and Defenses (**RAID'24**)*, 2024.

P-4. Zeyu Yang*, **Liang He**, Peng Cheng, and Jiming Chen, Mismatched Control and Monitoring Frequencies: Vulnerability, Attack, and Mitigation, *IEEE Transactions on Dependable and Secure Computing (**IEEE TDSC**)*, 2024.

P-5. **Liang He** and Kang G. Shin, Rethink Physical Security: Protecting Vehicles via Battery-enabled Sensing and Control, *Proceedings of the IEEE (**P-IEEE**)*, 2023.

P-6. Zeyu Yang*, **Liang He**, Yu Hua, Chengcheng Zhao, Peng Cheng, and Jiming Chen, Reverse Engineering Physical Semantics of PLC Program Variables Using Control Invariants, in *The 20th ACM Conference on Embedded Networked Sensor Systems (**ACM SenSys'22**)*, 2022.

P-7. **Liang He** and Kang Shin, Battery-Enabled Anti-Theft Vehicle Immobilizer, in *The 20th ACM International Conference on Mobile Systems, Applications, and Services (**ACM MobiSys'22**)*, 2022.

P-8. John Pace, Jubilee Rao, Jesse Williams, and **Liang He**, Unsupervised Anomaly Detection using Batteries in eVTOL Vehicle Propulsion Test Bed, in *The 14th Annual Conference of the Prognostics and Health Management Society (**PHM'22**)*, 2022.

P-9. **Liang He**, Yuanchao Shu, Youngmoon Lee, Dongyao Chen, and Kang Shin, Authenticating Drivers Using Automotive Batteries, in *ACM International Joint Conference on Pervasive and Ubiquitous Computing (**ACM UbiComp'21**)*, 2021.

P-10. Yiqin Wang, Linghe Kong, Siyu Lin, and **Liang He**, Detecting Engine Anomalies Using Batteries, *IEEE Transactions on Mobile Computing (**IEEE TMC**)*, 2021.

P-11. Hongyi Pu*, **Liang He**, Chengcheng Zhao, David Yau, Peng Cheng, and Jiming Chen, Fingerprinting Movements of Industrial Robots for Replay Attack Detection, *IEEE Transactions on Mobile Computing (**IEEE TMC**)*, 2021.

P-12. Hongyi Pu*, **Liang He**, Chengcheng Zhao, David Yau, Peng Cheng, and Jiming Chen, Detecting Replay Attacks against Industrial Robots via Power Fingerprinting, in *The 18th ACM Conference on Embedded Networked Sensor Systems (**ACM SenSys'20**)*, 2020.

P-13. **Liang He**, Youngmoon Lee, and Kang Shin, Mobile Device Batteries as Thermometers, in *ACM International Joint Conference on Pervasive and Ubiquitous Computing (**ACM UbiComp'20**)*, 2020.

P-14. Youngmoon Lee, **Liang He**, and Kang Shin, Causes and Fixes of Unexpected Phone Shutoffs, in *The 18th ACM International Conference on Mobile Systems, Applications, and Services (**ACM MobiSys'20**)*, 2020.

P-15. Zeyu Yang*, **Liang He**, Peng Cheng, Jiming Chen, David Yau, and Linkang Du, PLC-Sleuth: Detecting and Localizing PLC Intrusions Using Control Invariants, in *The 23rd International Symposium on Research in Attacks, Intrusions and Defenses (**RAID'20**)*, 2020.

P-16. **Liang He**, Linghe Kong, Ziyang Liu, Yuanchao Shu, and Cong Liu, Diagnosing Vehicles with Automotive Batteries, In *The 25th ACM Annual International Conference on Mobile Computing and Networking* *(ACM MobiCom'19)*, 2019.

P-17. **Liang He**, Linghe Kong, Yu Gu, Cong Liu, Tian He, and Kang Shin, Extending Battery System Operation via Adaptive Reconfiguration, *ACM Transactions on Sensor Networks* *(ACM TOSN)*, Vol. 15, No. 11, 2019.

P-18. **Liang He**, Zhe Yang, Yu Gu, Cong Liu, Tian He, and Kang Shin, SoH-Aware Reconfiguration in Battery Packs, *IEEE Transactions on Smart Grids* *(IEEE TSG)*, Vol. 9, No. 4, pp. 3727-3735, 2018.

P-19. Junghyun Jun, **Liang He**, Yu Gu, et al., Low-Overhead WiFi Fingerprinting, *IEEE Transactions on Mobile Computing* *(IEEE TMC)*, Vol. 17, No. 3, pp. 590-603, 2018.

P-20. **Liang He**, Yu-Chih Tung, and Kang Shin, iCharge: User-Interactive Charging of Mobile Devices, In *The 15th ACM International Conference on Mobile Systems, Applications, and Services* *(ACM MobiSys'17)*, 2017.

P-21. **Liang He**, Guozhu Meng, Yu Gu, Jun Sun, Cong Liu, Yang Liu, and Kang Shin, Battery-Aware Mobile Data Service, *IEEE Transactions on Mobile Computing* *(IEEE TMC)*, Vol. 6, No. 16, pp. 1544-1558, 2017.

PATENTS

P-1. "Detecting anomalous behavior in aerial vehicle components"

- Co-inventors: Liang He, John Pace, Jubilee Rao, and Jesse Williams
- US Provisional Patent Application No. 63/403,578, filed, 09/2022

P-2. "System And Methods To Diagnose Vehicles Based On The Voltage Of Automotive Batteries"

- Inventor: Liang He
- US Patent Application No. 16/723,398, granted, 11/2022

P-3. "Anti-theft Vehicle Immobilizer Using Batteries"

- Co-inventors: Liang He and Kang G. Shin
- US Patent Application No. 63/165,790, granted, 07/2023

P-4. "Controlling Battery Output Power To Prevent Vehicle Theft"

- Co-inventors: Liang He and Kang G. Shin
- US Patent Application No. 16/823,647, granted, 06/2022

P-5. "User Aware Charging Algorithm That Reduces Battery Fading"

- Co-inventors: Liang He and Kang G. Shin
- US Patent Application No. 15/984843, granted, 02/2022

P-6. "Method To Estimate Battery Health For Mobile Devices Based On Relaxing Voltages"

- Co-inventors: Liang He and Kang G. Shin
- US Patent Application No. 16/605893, granted, 08/2021
- China Patent Application No. 2018800314255, granted, 11/2019
- Japanese Patent Application No. 2020-506131, granted, 09/2022
- Korea Patent Application No. 10-2019-7033092, granted, 04/2023

P-7. "Method to Charge Lithium-Ion Batteries with User, Cell, and Temperature Awareness"

- Co-inventors: Liang He and Kang G. Shin
- US patent Application No. 15/335556, granted, 05/2022

- British Patent Application No. 18145482, granted, 09/2018
- Korea Patent Application No. 10-2018-7028062, granted, 09/2018
- German Patent Application No. 1120170011671, filed, 09/2018

INVITED TALKS

- "Battery-Enabled Vehicle Immobilizer"
  - Boulder New Tech, USA, 2024
  - Destination Startup Showcase, USA, 2024
- "Batteries beyond Batteries"
  - University of Nebraska Lincoln, USA, 2024
  - Cambridge University, UK, 2023
  - University of Michigan, USA, 2023
  - North Carolina State University, USA, 2023
- "Diagnosing Vehicles Using Automotive Batteries"
  - Shanghai Jiaotong University, China, 2019
  - Fudan University, China, 2019
  - Zhejiang University, China, 2019
- "Batteries as Power Supplies and Sensors"
  - Nankai University, China, 2019
  - Southeast University, China, 2019
- "Cognitive Battery Management with Cyber-Physical Approaches"
  - University of Colorado Boulder, USA, 2017
- "Reconfiguration-Assisted Battery Management"
  - University of Waterloo, Canada, 2016

EXTRAMURAL GRANTS

My research has received over \$3.6M funding support from NSF, NASA, and Colorado State, among which I have a share of \$1.6M as PI (or PI of subcontract to CU-Denver).

G-1. Sole PI, NSF I-Corps, NSF-2336145, I-Corps: Battery-enabled Vehicle Immobilizer, \$50,000, 10/2023 – 02/2025.

G-2. Sole PI, NSF SaTC, NSF-2245224, Collaborative Research: SaTC: CORE: Medium: Securing Interactions between Driver and Vehicle Using Batteries, \$573,596, 06/2023 – 05/2026 (Part of a \$1.2M collaborative project with The University of Michigan, UM grant: NSF-2245223).

G-3. PI, NSF DCSD, NSF-2231759, Diagnosing Vehicles Using Automotive Batteries as Physical Root-of-Trust, \$620,780, 04/2023 – 03/2026.

G-4. Sole PI of Subcontract, NSF SBIR (Phase 1), NSF-2151374, Airborne Contagion Mapping through Visual Exhale Monitoring, Industry PI: Shane Transuex, \$256,000 (share: \$16,421), 09/2022 – 08/2023.

G-5. Sole PI, Colorado OEDIT, OEDIT-2022-2453, BAuth: Battery-based Anti-Theft Vehicle Immobilizer, \$96,096, 05/2022 – 05/2024.

G-6. Sole PI of Subcontract, NASA SBIR (Phase 2), NASA-80NSSC22CA144, ARADISS Adaptive Real-time Anomaly Detection & Identification for Space Systems, Industry PI: Jesse Williams, \$799,987 (share: \$185,000), 05/2022 – 04/2024.

G-7. Sole PI of Subcontract, NASA SBIR (Phase 1), NASA-80NSSC21C0356, ARADISS Adaptive Real-time Anomaly Detection & Identification for Space Systems, Industry PI: Jesse Williams, $131,355 (share: $25,000), 05/2021 – 10/2021.

G-8. Co-PI, NSF CPS, CNS-1739577, CPS: Small: Imposing Recovery Period for Battery Health Monitoring, Prognosis, and Optimization, PI: Kang G. Shin, $450,000 (share: $117,619), 08/2017 – 07/2022.

SELECTED
STUDENT SUCCESS

S-1. Adarsh Thoke, Graduate Education Distinguished Master's Capstone Award, 2024

S-2. Ngoc Que Anh Tran, Outstanding Graduate of Engineering College (Undergraduate Category), 2024

S-3. Ngoc Que Anh Tran, Outstanding Graduate of CSE Department (BA Category), 2024

S-4. Daniel Rodriguez, Outstanding Graduate of CSE Department (BS Category), 2024

S-5. Nathan Maas, Outstanding Graduate of CSE Department (BS Category), 2023

S-6. Hojun Choi, Chancellor Scholarship, 2023

S-7. John Marinelli, Outstanding Graduate of CSE Department (Graduate Category), 2023

S-8. John Pace, Outstanding Graduate of Engineering College (Graduate Category), 2022

S-9. John Pace, Outstanding Graduate of CSE Department (Graduate Category), 2022

S-10. Dennis Mills, Outstanding Graduate of CSE Department (Undergraduate Category), 2022

S-11. Rhys Butler, Chancellor Scholarship, 2020

SELECTED
PROFESSIONAL
SERVICES

Editorship: Associate Editor, IEEE Transactions on Vehicular Technology, since 2022

Chair Positions: co-chair of ACM EnergySP'24; publication co-chair of ACM e-Energy'24

TPC Membership: SenSys'25, e-Energy'24, '23; IoTDI'22; RTCSA'21, '20; MASS'20, '19; IC-CPS'18

Advisory Reviewer Board/Pannel: NSF, DoE, Samsung, NSC Poland, RGC Hong Kong