Hien Vu

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Research Interests

- Low-power wireless sensing
- Thermal management for Li-ion batteries
- Hybrid electrical energy storage systems

Education

Purdue University, West Lafayette, Indiana, USA (expected) 2026
Ph.D. in Electrical and Computer Engineering
- Major area: Computer Engineering; Minor area: Computer Science
- Advisor: Dr. Younghyun Kim

University of Wisconsin–Madison, Madison, Wisconsin, USA 2023
M.Sc. in Electrical and Computer Engineering
- GPA: 3.82/4.00

Soongsil University, Seoul, South Korea 2020
M.S. in Computer Science
- GPA: 3.86/4.00

Hanoi University of Science and Technology, Hanoi, Vietnam 2018
B.Eng. in Electronics and Computer Engineering
B.Sc. in Electronics and Telecommunications Engineering

Publications

Wireless Sensing in Precision Agriculture

- Hien Vu, Omkar Prabhune, Unmesh Raskar, Dimuth Panditharatne, Hanwook Chung, Christopher Y. Choi, and Younghyun Kim. **MmCows: A Multimodal Dataset for Dairy Cattle Monitoring**. NeurIPS (the Conference on Neural Information Processing Systems), 2024. Spotlight paper, top 5% ratings, acceptance rate 25.3%.
- Hanwook Chung, Hien Vu, Younghyun Kim, and Christopher Y. Choi. **Subcutaneous temperature monitoring through ear tag for heat stress detection in dairy cows**. Biosystems Engineering, 2023.
- Hien Vu, Hanwook Chung, Christopher Y. Choi, and Younghyun Kim. **eTag: An Energy-Neutral Ear Tag for Real-Time Body Temperature Monitoring of Dairy Cattle**. ACM MobiCom (International Conference on Mobile Computing and Networking), 2023. Acceptance rate 24%.

Electrical Energy Storage Management

- Hien Vu and Donghwa Shin. **Simultaneous Internal Heating for Balanced Temperature and State-Of-Charge Distribution in Lithium-ion Battery Packs**. Journal of Energy Storage, 2023.
- Nhat-An Nguyen, Hien Vu, Massoud Pedram, and Donghwa Shin. **An Attachable Battery– Supercapacitor Hybrid for Large Pulsed Load**. IEEE Design & Test, 2022.
- Hien Vu and Donghwa Shin. **Scheduled Pre-heating of Li-ion Battery Packs for Balanced Temperature and State-of-charge Distribution**. MDPI Energies, 2020.

Control Systems Design

- Hien Vu, Nhan Tran, Loan Pham-Nguyen, and Huy-Dung Han. **LQG Regulator for Control Moment Gyroscope based Balancing System**. IEEE ICCE (International Conference on Communications and Electronics), 2018.

Fellowships and Awards

2023 **Young Fellowship** and **Travel Award**, ACM/IEEE Design Automation Conference
2023 **NSF Travel Award**, International Conference on Mobile Computing and Networking
2021 **Young Fellowship**, ACM/IEEE Design Automation Conference

Professional Experience

2024–Present **Research Assistant**, Purdue University, West Lafayette, IN, USA
- Working on low-power wireless sensing mechanisms in precision agriculture
- Developing multimodal sensing techniques for health monitoring of dairy cattle

2021–2024 **Research Assistant**, University of Wisconsin–Madison, Madison, WI, USA
- Developed an energy-neutral ear tag for real-time heat stress detection in dairy cattle
- Optimized RFID backscattering for low-power wireless temperature measurement
- Integrated inductive resonant coupling for effective wireless power transfer

2019–2021 **Research Assistant**, Soongsil University, Seoul, South Korea
- Developed control strategies for internal heating of Li-ion batteries in cold conditions
- Designed a high-speed high-performance FPGA-based NAND flash storage system
- Engineered a flexible portable non-interrupt conformal wearable battery for military

2018 **Research Visitor**, Seoul National University of Science and Technology, South Korea
- Integrated CAN bus control for Li-ion batteries in electric vehicles

2017 **System Engineer**, Interland Inc., Hanoi, Vietnam
- Investigated sensing solutions for measuring dissolved oxygen in water

2016 **Design Intern**, Viettin, Hanoi, Vietnam
- Developed IBM-based cloud solutions for automated indoor agriculture

2015–2018 **Research Assistant**, Hanoi University of Science and Technology, Hanoi, Vietnam
- Developed a gyroscope-based balancing system for two-wheel personal vehicles
- Designed air pollution monitoring devices and deployed on a large scale

Teaching & Mentoring Experience

Fall 2023 **ECE 399 Independent Study**, Research Mentor, UW-Madison, WI
- Project: Analyzing gas compounds for health monitoring of dairy heifers
- Helped an undergrad student develop a wireless sensor suite for measuring gases

Spring 2023 **ECE 399 Independent Study**, Research Mentor, UW-Madison, WI
- Project: Characterizing high-precision pressure sensor for monitoring dairy cattle
- Mentored an undergrad student in analyzing air pressure to detect standing behaviors

Fall 2022 **Undergraduate Research Scholars Program**, Research Mentor, UW-Madison, WI
- Project: Monitoring dairy cattle's comfort using integrated ear tags
- Helped an undergrad student to develop a low-power ear tag to measure ear flicks

Spring 2022 **ECE 315 Introduction to Microprocessor Lab**, Teaching Assistant, UW-Madison, WI
Fall 2021 **ECE 315 Introduction to Microprocessor Lab**, Teaching Assistant, UW-Madison, WI
Fall 2021 **ECE 210 Introduction in Electrical Engineering**, Teaching Assistant, UW-Madison, WI
Spring 2020 **Circuits Laboratory II**, Teaching Assistant, Soongsil University, Seoul, South Korea
Fall 2019 **Circuits Laboratory I**, Teaching Assistant, Soongsil University, Seoul, South Korea
Fall 2018 **Power Electronics**, Teaching Assistant, HUST, Hanoi, Vietnam

Presentations

August 2024 **ACM/IEEE ISLPED** (International Symposium on Low Power Electronics and Design)
• Title: eTag: An Energy-Neutral Ear Tag for Real-Time Body Temperature Monitoring of Dairy Cattle

March 2024 **NSF CPS PI Meeting** (Cyber-Physical Systems Principal Investigators' Meeting)
• Title: Mitigating Heat Stress in Dairy Cattle using a Physiological Sensing-Behavior Analysis-Microclimate Control Loop

October 2023 **UW–Madison Sustainability Symposium**
• Title: Sustainable Dairy Farming using Wearable Technology for Heat Stress Detection

October 2023 **ACM MobiCom** (International Conference on Mobile Computing and Networking)
• Title: eTag: An Energy-Neutral Ear Tag for Real-Time Body Temperature Monitoring of Dairy Cattle

July 2023 **ACM/IEEE DAC** (Design Automation Conference), Young Fellow Program
• Title: WisTag: An Energy-Neutral Wearable Sensor for Real-Time Animal Monitoring

December 2021 **ACM/IEEE DAC** (Design Automation Conference), Young Fellow Program
• Title: An Optimal Control Scheme for Hybrid Power System with Synchronous Buck Converter

Media Coverage

Nov 9, 2023 Smart system keeps cows cool. Covered by Agri-View (link).

Oct 18, 2023 Mooooo's in distress? In the barn of the future, smart system will keep hot cows cool. Covered by UW-Madison News (link).

Skills

- **Programming**: Assembly, Verilog, C, C++, Python, and MATLAB
- **System modeling**: characterization and simulations of complex cyber-physical systems
- **Hardware design**: low-power, high-speed, and high-power system design