Hien Vu

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RESEARCH INTERESTS

- ML-driven system design and signal processing for remote sensing
- Low-power wireless sensing
- Thermal management for Li-ion batteries

EDUCATION

Purdue University, West Lafayette, Indiana — (expected) Aug 2026
Ph.D. in Electrical and Computer Engineering — GPA: 3.65/4.00
- Major area: Computer Engineering; Minor area: Computer Science
- Advisor: Dr. Younghyun Kim

University of Wisconsin–Madison (UW-Madison), Madison, Wisconsin — May 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 (HUST), Hanoi, Vietnam — May 2018
B.Sc. in Electronics and Telecommunications Engineering — GPA: 3.51/4.00

PUBLICATIONS

Wireless Sensing in Precision Agriculture

- Unmesh Raskar, Omkar Prabhune, **Hien Vu**, and Younghyun Kim. MooBot: RAG-based Video Querying System for Dairy Cattle Behavior and Health Insights. **CVPR Workshop**, 2025.

- **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 **Doctoral Researcher**, Purdue University, West Lafayette, IN
- Architected a machine learning system using mmWave radar to track respiration of moving subjects, achieving pose tracking error < 5 cm and respiration error < 3 bpm.
- Developed a high-precision Ultra-Wideband tracking network and an optimization-based multi-view visual localization system achieving centimeter accuracy in real-time tracking.
- Engineered an end-to-end multimodal ML fusion pipeline (UWB+IMU+RGB) for subject tracking and behavior monitoring in precision agriculture.
- Recruited and trained a team of 20+ members to curate the MmCows dataset, automating temporal synchronization with drift < 10ms and validation for 213k bounding boxes.

2021–2024 **Graduate Research Assistant**, UW–Madison, Madison, WI.
- Led a cross-discipline team to design and deploy eTag, an energy-neutral sensing system using backscatter communication, as a multi-node IoT network on production cattle.
- Designed a shared-coil architecture for simultaneous RFID communication and wireless charging in wearable devices, reducing footprint by 30% compared to dual-coil designs.
- Developed energy-efficient firmware for RFID scanning using STM32-based LoRa SoC that reduced energy cost by 15x and engineered a robust wireless power transfer protocol.
- Analyzed 2,000 hours of field data to validate system reliability and real-time heat stress detection in complex operational settings.

2019–2021 **Research Assistant**, Soongsil University, Seoul.
- Led the full-lifecycle development of a flexible conformal wearable battery using a cascade multiphase buck converter delivering 840W in 5-second pulses for military applications.
- Delivered a production-grade system that passed US DoD testing and achieved technology transfer to a contractor.
- Developed a bidirectional buck-boost control policy enabling uninterrupted power delivery and continuous operation under dynamic load conditions.
- Developed control strategies for internal heating of Li-ion batteries in cold conditions that balance both cell temperature and SOC without requiring precise cell characterization.
- Designed high-speed FPGA-based flash storage system with 512GB SLC-NAND using Altium Designer, minimizing propagation delay.
- Implemented Extended Kalman Filter on a RISC-V MCU to process 9-DOF IMU data for precise pose tracking in AR/VR applications.

2018–2019 **System Engineer**, Interland Inc., Hanoi.
- Investigated sensing solutions for measuring dissolved oxygen in water to automate monitoring for large-scale shrimp farming.
- Integrated sensing hardware with IBM cloud services to enable automated data collection and system management.

2015–2018   **Undergraduate Research Assistant**, HUST, Hanoi.
- Developed a gyroscope‑based balancing system and control algorithms for two‑wheeled personal vehicles to maintain stability.
- Designed air pollution monitoring devices and managed the deployment of sensor networks on a large scale to track environmental metrics.

TEACHING and 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

Fall 2019   **Circuits Laboratory I**, Teaching Assistant, Soongsil University, Seoul

Fall 2018   **Power Electronics**, Teaching Assistant, HUST, Hanoi

PROFESSIONAL SERVICES

Jan 2026   Web co‑chair for ISLPED 2026 (IEEE/ACM International Symposium on Low Power Electronics and Design)

Jun 2025   Reviewer for NeurIPS 2025 (The Conference on Neural Information Processing System)

PRESENTATIONS

Oct 2025   **Purdue Institute of Chips and AI: Workshop on Chips & AI**
- Title: Edge AI for Wearable and Wireless Sensing

May 2025   **Purdue OIGP Spring Reception**, Interdisciplinary Graduate Programs
- Title: Multimodal Sensing and Learning for Precision Livestock Farming

Jan 2025   **Purdue AI Fusion**
- Title: Multimodal Sensing and Learning for Precision Livestock Farming

Dec 2024   **NeurIPS** (The Conference on Neural Information Processing System)
- Title: MmCows: A Multimodal Dataset for Dairy Cattle Monitoring

Oct 2024   **Purdue ECE Grad Student Symposium**
- Title: MmCows: Multimodal Sensing and Deep Learning Framework for Dairy Cattle Monitoring

Aug 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

Mar 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

Oct 2023	**UW–Madison Sustainability Symposium**
	• Title: Sustainable Dairy Farming using Wearable Technology for Heat Stress Detection
Oct 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
Jul 2023	**ACM/IEEE DAC** (Design Automation Conference), Young Fellow Program
	• Title: WisTag: An Energy-Neutral Wearable Sensor for Real-Time Animal Monitoring
Dec 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, 2023	Smart system keeps cows cool. Covered by Agri-View ([link](#)).
Oct, 2023	Mooooo's in distress? In the barn of the future, smart system will keep hot cows cool. Covered by UW-Madison News ([link](#)).

KEY SKILLS

- **Machine Learning & AI:** ML-based computer vision, sensor data fusion, and real-time ML deployment.
- **Programming:** Python, C/C++, MATLAB, Assembly, and Verilog.
- **Embedded Systems:** microprocessor design, real-time systems, and sensor integration (RISC-V MCU).
- **Hardware Design:** High-speed/high-power/low-power systems design, wireless sensing systems.
- **Data Analysis & Simulation:** Physical system modeling, multimodal signal processing, MATLAB simulations.
- **Cross-Disciplinary Collaboration:** Worked with diverse teams to develop and deploy complex systems.