

# Hien Vu

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A researcher with expertise in developing effective solutions for machine learning systems, low-power sensing, and electronics optimization. Seeking a challenging role to leverage problem-solving and cross-disciplinary skills to drive impactful research.

## EDUCATION

- Ph.D. in Electrical and Computer Engineering** (expected) 2026  
*Purdue University, West Lafayette, Indiana, USA*
- M.Sc. in Electrical and Computer Engineering** 2023  
*University of Wisconsin–Madison (UW–Madison), Wisconsin, USA*
- B.Sc. in Electronics and Telecommunications Engineering** 2018  
*Hanoi University of Science and Technology (HUST), Hanoi, Vietnam*

## PROFESSIONAL EXPERIENCE

- Research Assistant, NEIS Lab, Purdue University, WL, IN, USA** 2023–Present
- Engineered a large-scale, multimodal sensor network for real-world data acquisition, integrating custom-designed wearable UWB tags with stationary cameras, and implementing a robust time-synchronization protocol across all nine distinct modalities.
  - Developed an end-to-end multimodal sensor fusion pipeline for complex behavior classification that demonstrably improved model accuracy and robustness over any single sensor modality.
  - Architected a multi-stage computer vision system for object identification and behavior classification from challenging isometric, multi-view video streams, and developed a novel optimization-based method to generate high-fidelity 3D ground-truth locations from 2D image annotations.
- Research Assistant, WISEST Lab, UW–Madison, Madison, WI, USA** 2021–2023
- Designed a novel, energy-neutral wearable sensor from the ground up, featuring a shared-coil architecture for RFID and wireless charging, which solved critical issues of mutual coupling and device footprint in compact wearable designs.
  - Developed the embedded firmware and low-power architecture for the sensor tag, achieving a 15x reduction in the energy cost of RFID scanning through custom on-chip decoding and aggressive power gating.
  - Engineered a smart, long-range Wireless Power Transfer (WPT) system with a closed-loop safety protocol, enabling real-time power adjustment based on LoRa feedback of the tag's coil temperature and battery state.
  - Fabricated, deployed, and managed a multi-node IoT network in an operational dairy barn, collecting and analyzing over 1,900 hours of real-world data to successfully validate the system's energy-neutral performance and its ability to run for 5 days on a single 13-minute charge.
- Research Assistant, EC Lab, Soongsil University, Seoul, South Korea** 2019–2021
- Designed a flexible, high-energy supercapacitor-based power device for military applications, capable of delivering 840 W in multiple 5-second discharge cycles. Developed an advanced control algorithm that allows the main buck converter to work as a bi-directional buck-boost converter, allowing the system to run continuously without interruption during the operation (📺).
  - Developed a pre-heating technique for lithium battery packs working in cold environments using a novel energy exchange process that allows balancing both cell temperature and SOC without requiring precise characterization of the cells.
  - Implemented a high-speed design for a customized storage device that consists of an FPGA controller, 512GB of 16 SLC-NAND flash ICs, and more than 1000 other components, while ensuring signal integrity and propagation delay (media 📺).
  - Developed a dynamic voltage-scaling power backup system to extend the lifespan of capacitors in modern SSDs.
  - Implemented Extended Kalman Filter on a RISC-V MCU that processes data from a 9-DOF IMU to track 3D pose in real time, which is then combined with Parallel Tracking and Mapping (PTAM) for pose tracking in AR applications (see demo ▶).
- Research Assistant, SPARC Lab, HUST, Hanoi, Vietnam** 2015–2018
- Developed a gyroscope-based balancing system using Linear-Quadratic-Gaussian regulator for two-wheel vehicles.
  - Designed and managed the production of 100 devices for monitoring air quality and deployed around Hanoi city.

## KEY SKILLS

- Software & AI:** Python, C/C++, MATLAB; Machine Learning Models, Signal Processing, System Modeling.
- System Design:** Embedded/Real-Time Systems, Low-Power/Wireless Systems, Full-Stack System Development.

## SELECTED PUBLICATIONS

- Vu, Hien, et al., MmCows: A Multimodal Dataset for Dairy Cattle Monitoring. *NeurIPS 2024 (Spotlight paper, top 5% ratings)*.
- Vu, Hien, et al., eTag: An Energy-Neutral Ear Tag for Real-Time Body Temperature Monitoring of Dairy Cattle. *ACM MobiCom 2023 (acceptance rate 24%)*.
- Vu, Hien, et al., Simultaneous Internal Heating for Balanced Temperature and State-Of-Charge Distribution in Lithium-ion Battery Packs. *Journal of Energy Storage 2023*.