SHASHIKANT LAHADE

Ph.D. Candidate, Electrical Engineering, University of Notre Dame, IN

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SUMMARY

- Ph.D. candidate with 8+ years of hands-on experience in **embedded hardware design, analog and mixed-signal circuit development, and prototyping of medical devices.** Proficient in lab-based testing, hardware bring-up, and system validation.
- Proficient in **PCB design** using Altium and KiCad; hands-on with schematic capture, layout, and debugging; experienced in **DFM practices** for reliable and manufacturable hardware systems; and working knowledge of **product lifecycle** and commercialization strategies.
- Skilled in **embedded programming** (C, C++, Python) and signal processing with experience in **microcontroller and sensor integration**, and **firmware development for diagnostic devices**.
- **Collaborates** effectively with **cross-functional teams**, including firmware, SoC, and mechanical engineers, with a strong passion for **developing innovative diagnostic technologies in healthcare** and industrial applications.

EDUCATION

- **Ph.D. in Electrical Engineering,** **2021- Present**
  University of Notre Dame, Notre Dame, IN, USA
- **Master of Science (M.S.) in Electrical Engineering,** **2019- 2021**
  Florida International University, Miami, FL, USA
- **Master of Technology (M.Tech.) in Electronics and Tele-Communication,** **2010- 2012**
  Amravati University, India
- **Bachelor of Engineering in Electronics and Tele-Communication,** **2006- 2010**
  Amravati University, India

SKILLS/EXPERTISE

- Hardware & Circuit Design: **Analog and mixed-signal circuit design**, power delivery (DC-DC converters, regulators), sensor integration, **microcontroller**-based systems, schematic capture, rapid prototyping
- PCB Design & Validation: **Altium, KiCad**, multilayer PCB layout, parasitic-aware routing, impedance control, **DFM** for manufacturability, board bring-up, signal and power integrity
- Embedded Systems & Firmware: Embedded **C/C++, Python, Verilog**, **microcontroller** programming, **sensor interfacing**, **digital communication** protocols (I2C, SPI, UART), **firmware development**
- Simulation & Analysis: SPICE, **MATLAB**, Simulink; frequency response, signal integrity analysis, stability analysis, risk assessment
- Product Development & Lifecycle: Familiar with **productization, DFM/DFT practices**, reliability engineering, **product lifecycle, and commercialization strategy** (via Product Management 101 – Udemy)
- **Instrumentation & Test**: Oscilloscope, vector network analyzer (VNA), logic analyzer, TDR, signal generators, power supplies, hardware debugging, and validation

RESEARCH EXPERIENCE

- **Graduate Research Assistant, University of Notre Dame, IN, USA** **May 2021– Present**
  - Designed and developed a **compact wearable optical imaging system** for biomedical diagnostics, integrating custom CMOS ASICs, analog/mixed-signal front ends, VCSEL lasers, and SiPM photodetectors for high-speed physiological monitoring.
  - Developed and validated **multi-layer PCBs** using **Altium and KiCad**, incorporating parasitic-aware routing, impedance control, power integrity, and EMI-aware layout; performed hardware bring-up and system debugging using **oscilloscopes, VNAs**, and **signal generators.**
  - Executed calibration and **reliability testing** of optical sensor modules, achieving <13% error in tissue optical property recovery and 5× data acquisition **speed improvement through optimized firmware** and timing synchronization.
  - Demonstrated wearable device functionality for **measuring oxygen saturation and pulse rate** during occlusion tests, validating clinical accuracy and potential applications in real-time **healthcare diagnostics.**
  - Programmed embedded **firmware** in **C/C++** and implemented signal processing algorithms in **MATLAB and Python** for physiological data calibration, filtering, and wireless acquisition over WebSockets.
  - Designed a scalable and modular signal routing architecture for high-density FD-NIRS arrays, supporting 16-source/16-detector control for **brain imaging and multi-channel optical data acquisition.**
  - Mentored an undergraduate student in iOS app development for a mobile application to receive and display physiological data from the wearable device **wirelessly over WiFi.**

- **Presented research outcomes** at conferences and interdisciplinary forums, **demonstrating the translational potential of wearable diagnostic systems** in clinical and industrial environments.

- **Graduate Research Assistant, Florida International University, Miami, FL, USA** **May 2020- May 2021**
  - Designed and validated a **battery-powered wearable biosensing system** for **real-time wound monitoring**, integrating an analog front-end, electrochemical sensors, and embedded signal acquisition for **healthcare diagnostics**.
  - Developed a **sensor-integrated gauze platform** using micro-slit and via-based designs, enabling clinical usability without compromising sensor accuracy.
  - Gained hands-on experience in **medical device prototyping**, power optimization, embedded firmware, and healthcare-centered product development.
  - Implemented TinyML models using TensorFlow Lite Micro for **on-device calibration**, achieving a 20% improvement in sensor accuracy through drift compensation in resource-constrained systems.

- **Graduate Research Assistant, Government College of Engineering, Amravati, India** **Aug 2010- May 2012**
  - Designed and simulated a **microcontroller-based control system** and Proteus for high-voltage single/three-phase converters, achieving ±2° firing angle precision and stable operation under industrial loads.
  - Delivered a complete **embedded hardware-software** solution in **collaboration** with Bedare Electronics, reducing calibration time by 30% and enabling automated testing for real-world converter applications.

TEACHING EXPERIENCE

- **Graduate Teaching Assistant, University of Notre Dame, IN, USA** **Aug 2024- Dec 2024**
  - Biophotonics and Biomedical Optics
    - Supported lab-based instruction for optical and **embedded systems**, including **real-time physiological monitoring** using MATLAB and **microcontroller-**based pulse oximeters, reinforcing skills in **medical device prototyping**.
    - Streamlined lab execution, refining **MATLAB** code for compatibility with newer software versions, and coordinating hardware readiness, demonstrating strong **organization**, **debugging**, and **lab management** abilities.

- **Graduate Teaching Assistant, Florida International University, Miami, FL, USA** **Aug 2019- May 2020**
  - Microcomputer lab-I and Electronics lab-II
    - Mentor students in **Embedded systems design,** focusing on system design and hardware-software integration.
    - Guided students through **analog circuit design** and analysis using hands-on experiments and **simulation**.

- **Assistant Professor, Electronics and Communication Engineering, KITS, Ramtek, Maharashtra, India** **June 2012- July 2019**
  - Taught **analog/digital circuit design** and **embedded systems**; mentored 200+ project teams in hardware prototyping, validation, and documentation.
  - Designed and implemented **FPGA-based digital systems** in **Verilog,** including simulation and state machine control, with research presented at an IEEE conference.
  - Led a robotics team to the national finals of IIT Bombay's e-Yantra challenge**,** and **secured a ₹0.25 million grant** to **establish an embedded systems lab** supporting 100+ students annually.

LEADERSHIP/CERTIFICATION

- **Leadership:**
  - **Vice President**, Graduate Student Government (GSG), University of Notre Dame (2023–2024)
    Led cross-department initiatives, managed three teams for campus-wide events, and represented graduate students
  - **Secretary**, SPIE Photonics Club, University of Notre Dame (2022–2023)
    Organized talks, lab tours, and outreach events to advance optics education and interdisciplinary collaboration
- **Certification:**
  - **Product Management 101** – Gained foundational knowledge in product lifecycle, new product development, market strategy, and cross-functional collaboration for hardware and medical technology commercialization.
  - **Risk Management – FMEA & ISO 31000** Trained in system-level reliability evaluation, risk identification, mitigation planning, and failure mode analysis aligned with ISO standards.
  - **Six Sigma Green Belt** Skilled in DMAIC methodology, statistical process control, and continuous improvement for quality and performance optimization.