

Yilun Huang

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EDUCATION

M.S in Electrical Engineering, Area Focus: Circuit design & Embedded System
University of California, Los Angeles
Cumulative GPA 3.72/4.00

09/2022-Present

B.S. in Electrical Engineering
Iowa State University
Cumulative GPA 3.80/4.00

Aug 2019-May 2022

SUMMARY OF RESEARCH SKILLS

Project management * Research methodology & design* Data collection * Statistical analysis * Oral presentations * Cost effectiveness analysis * Data Analysis & Interpretation * Literature Review & Synthesis * Hypothesis Testing * Scientific Writing * Critical and Analytical Thinking * Problem-Solving * Innovative Solution Development * Collaborative Research * Interdisciplinary Research Leadership * Quantitative & Qualitative Analysis * Innovative Technology Utilization * Adaptability to Emerging Fields

RESEARCH INTERESTS

VLSI Design * Embedded Systems * Wearable Health Technology * Analog/Digital Circuit Design* Biomedical Device Development * Low Power Circuit Design * Smart Sensor Development * Wireless Communication * System on Chip

RESEARCH EXPERIENCE

Graduate Level Research

May 2023 - Present

UCLA I2BL LAB at Circuit Team (Supervised by Professor Sam Emaminejad)

- Engaged in pioneering research focused on developing advanced antennas for implantable and wearable devices, aiming to optimize their functionality in various human tissue conditions and integrate biocompatible materials for enhanced performance.
- Collaborated with material scientists to integrate novel, bio-compatible materials into antenna structures, targeting the creation of effective yet minimally invasive antennas for biological applications.
- Led electromagnetic simulations and size optimization of antenna designs, utilizing HFSS for comprehensive parametric studies to assess the impact of design variables on performance.
- Conducted specialized research on tags for implants, using commercial mobiles as a receiver, and addressed challenges associated with standardized NFC readers and devices.
- Led in the theoretical and experimental study of Wireless Power Transfer (WPT) systems, focusing on 2-coil and 3-coil configurations. Implemented a 3-coil system with a relay antenna on the skin to mitigate low coupling coefficient effects and increase implant depth and reliability.
- Achieved a maximum implant depth of 15 mm with the 3-coil system, surpassing the 11 mm depth of the standard 2-coil system, and demonstrated a significant increase in non-energy harvesting read range.
- Engaged in PCB design and validation of antenna circuits in Cadence, ensuring the virtual model closely matched the physical design and provided valuable insights for future design adaptations.

Microelectronics (Semiconductor) Fabrication Research

Jan 2022 – May 2022

Iowa State University Microelectronics Research Center (Supervised by Professor Lu Meng)

- Specialized in advanced semiconductor fabrication using CMOS 70nm technology, focusing on the synthesis of nanoscale electronic devices. This involved intricate lithography, etching, and doping processes, pushing the boundaries of miniaturization in semiconductor technology.
- Researched method to improve nanoscale device manufacturing efficiency and yields.
- Utilized Cadence Virtuoso and PSpice to design, simulate, and optimize circuit performance (exploring Design Space), achieving low power consumption and high-speed operation
- Delved into a variety of advanced semiconductor processing techniques. Gained expertise in thermal wet and dry oxidation, UV-photolithography, wet etching, diffusion doping, and physical vapor deposition for metal films. This exploration enhanced my understanding of complex fabrication processes, contributing to the development of more efficient semiconductor devices.

Digital Stethoscope Design

Aug 2021 - May 2022

Iowa State University (Supervised by Ashfaq Khokhar, Department Chair)

- Led the innovative design and development of a digital stethoscope, marking a significant leap forward in medical diagnostic technology with its advanced real-time signal processing and adaptive filtering capabilities.
- Developed Low-Noise Amplifier (LNA), Bandpass Filter Circuit, Signal Conditioning Circuit Design and Anti-aliasing Filter Design to explore the best design for device.
- Implemented a sophisticated Analog-front-end (AFE) design with a two-stage amplification process and a tailored low-pass filter to suit heart sound frequencies (20-200 Hz).
- Developed a custom PCB using Altium Designer ensured the small sized on device
- Led the development of the stethoscope's embedded system, demonstrating advanced proficiency in programming languages C, python and MATLAB.
- Conducted extensive testing, including unit, interface, and integration tests, and used MATLAB for data analysis.
- Strategically employed advanced networking protocols to ensure secure and efficient transmission of sensitive medical data.

SSD Testing Method Research

Aug 2020 – Jan 2021

Yangtze Memory Technologies, San Jose & Wuhan

- Conducted in-depth environmental testing on SSDs, playing a crucial role in ensuring product reliability under various operational conditions.
- Researched automated test software installation method and designed hardware testing platform, achieving a 32% reduction in testing duration and reduced product development cycle.
- Conducted comprehensive reliability testing of solid-state drives (SSDs) under varied environmental conditions, employing advanced testing methodologies to assess endurance and data integrity. This research is vital in understanding and improving the lifespan of memory storage devices.
- Collaborated with a global engineering team to troubleshoot and resolve complex compatibility issues in SSDs. This involved meticulous analysis of SSD architecture and interface protocols to enhance interoperability across different computing platforms.

TEACHING & MENTORING EXPERIENCE

Team Engineering Mentor, First Robotics Competition

Aug 2018 - Present

- Founded and led two successful robotics teams (Team 8214 and Team 8583). Implemented a robust project management system to efficiently manage team performance, ensuring systematic progress and timely completion of projects.
- Provided hands-on mentorship in engineering design and robotics to high school students. Assisted in developing and building competitive robots, instilling fundamental principles of mechanical, electrical, and software engineering.
- Cultivated a supportive and collaborative team environment, encouraging open communication and teamwork among students. Played a key role in developing interpersonal skills and team spirit within the group.
- Encouraged students to engage in creative problem-solving and critical thinking. Guided them through design challenges, brainstorming sessions, and practical implementations of their ideas.

Teaching Experience

Jan 2022 - May 2022

Iowa State University EE330 Integrated Electronics

- Supervised laboratory exercises, guiding students in the use of CAD tools for circuit design and simulation, with a focus on Cadence software.
- Mentored students in executing design projects, from conceptualization to physical layout, fostering practical skills in standard cell usage and circuit implementation.
- Provided one-on-one guidance and academic support during office hours, addressing individual learning needs and promoting academic excellence.
- Implemented interactive teaching methods in lab section to increase student engagement and understanding, resulting in a 60% improvement in average student grades/performance.
- Delivered engaging lectures and practical sessions, simplifying complex concepts in device modeling, circuit simulation, and synthesis for undergraduate/graduate students

SELECTED PROJECTS

Product Manager Role in Gestational Diabetes Prevention App Business Project

Jan 2023 – Apr 2023

UCLA

- Led the product development of Glucose Mommy, an AI-driven mobile application aimed at preventing gestational diabetes, ensuring the product met both user needs and market demands.
- Orchestrated interdisciplinary team efforts, including researchers, developers, and healthcare professionals, to create a tailored nutrition guidance solution for pregnant women.
- Spearheaded market research and stakeholder analysis to identify key user segments, focusing on at-risk ethnic minority groups, and defined the product's unique value proposition.
- Managed the integration of continuous glucose monitoring (CGM) technology with the app to implement effective machine learning algorithms for real-time nutrition advice.
- Devised and executed a strategic go-to-market plan, targeting insured U.S.-based pregnant women at risk for gestational diabetes, which included marketing strategies, pricing models, and distribution channels.

ALU Design and RTL Design

Sep 2022 – Dec 2022

UCLA

- Utilized Synopsys Design Compiler for transforming the RTL design into a gate-level netlist, optimizing for both efficiency and functionality.
- Conducted extensive static timing analysis using Synopsys PrimeTime, ensuring the ALU met all critical timing constraints such as setup and hold times, and identifying optimization points for critical paths.
- Performed detailed power analysis to evaluate static and dynamic power consumption, employing Synopsys tools to identify opportunities for enhancing energy efficiency.
- Executed a thorough gate-level simulation in ModelSim to validate the ALU's functional correctness and adherence to specified timing constraints, simulating real-world operational scenarios.
- The architecture demonstrated proficiency in digital design principles, synthesis optimization, and functional verification, achieving a balance between performance, power, and timing requirements.

VLSI 8-Bit DAC Design

Jan 2022 – May 2022

Iowa State University

- Led the development of an 8-bit charge redistribution DAC in CMOS, achieving precise linear output from 0V to 5V with high DC differential open-loop gain.
- Implemented a Transmission Gate design for wide voltage range switching and designed a custom Operational Amplifier using MOSFETs for optimal gain and low output impedance, enhancing DAC performance.
- Developed and tested a 3-to-8 decoder in ModelSim for precise capacitor control in the DAC, ensuring accuracy and linearity.
- Performed comprehensive simulations and layout designs, including transient analysis and DRC/LVS adherence, using advanced EDA tools.
- Validated DAC functionality with extensive test benches, analyzing INL and DNL metrics in MATLAB to confirm design specifications.

VLSI CMOS Two Stage Op-amp

Jan 2022 - May 2022

Iowa State University

- Engineered a fully differential two-stage operational amplifier in a CMOS process, focusing on high-gain, bandwidth, and phase margin characteristics. Achieved a DC differential open-loop gain >65 dB, a unity-gain bandwidth >1.5 MHz, and a phase margin between 45-60 degrees.
- Implemented a Continuous Mode Feedback (CMFB) circuit, ensuring stability across operating conditions with a CMFB loop phase margin >45 degrees. Operated within a power supply constraint of $V_{DD}=2.5V$, $V_{SS}=-2.5V$.
- Demonstrated adeptness in balancing conflicting design parameters such as power consumption, area efficiency, and performance, leading to an optimized amplifier design suitable for low-power, high-precision applications.
- Utilized Cadence tools for design verification. Set up test benches for the main amplifier and the CMFB circuit, confirming stability and achieving desired operational parameters.

VLSI CMOS Design – Programmable Digital Potentiometer/Amplifier

Jan 2021 - May 2021

Iowa State University

- Utilized Cadence and ModelSim to design a mixed-signal integrated circuit including inverting and non-inverting amplifier, a DAC and a Digital Potentiometer
- Implemented Cadence to create and test the amplifier and ensure it meet performance characteristics (gain, phase margin, bandgap, sizing, etc.)
- Designed and verified the layout using DRC and LVS tests, ensuring all components met design rules and fabrication requirements, including robustness against process variation and electromigration

Automated Mars Rover

Jan 2021 – May 2021

Iowa State University

- Led the development of an embedded C program for a Roomba-based autonomous vehicle, simulating a Mars Rover's navigation system, focusing on real-time processing and sensor fusion algorithms.
- Integrated multiple sensor modalities (Sonar, IR, Cliff, Bumper) to facilitate a SLAM (Simultaneous Localization and Mapping) approach, enabling obstacle detection and avoidance without direct visual cues.
- Designed and implemented a C++ GUI for telemetry and command & control, leveraging Bluetooth communication protocols for low-latency data transmission and rover command execution.

CORE SKILLS

Scripts and Programming Languages

Matlab · C · VHDL · Verilog · System Verilog · Python · Unity · Embedded Systems Programming

EDA/CAD

Cadence Virtuoso · HFSS · ADS · Intel Quartus Prime · Altium Designer · OrCAD · PSpice · Synopsys Design Compiler · Xilinx ISE · VLSI CAD · RTL Coding

Simulation and Application Software

ModelSim · Xilinx Vivado · Simulink · LabVIEW · COMSOL

Other Skills and Software

Proficient with Microsoft Office · Unix operating System · Fusion 360 · SolidWorks · Inventor · Multisim · FPGA · Circuit Measurement devices (Oscillator, Parameter Analyzer, etc.) · Machine Learning · Business Analyze Mixed-Signal Integrated Circuits · Printed Circuit Board (PCB) Design · Layout Design · Circuit Design · Integrated Circuits (IC) · Transistors · Circuits · Schematic · Analog · Analog Circuit Design

AWARDS AND HONORS

- Honor Magna Cum Laude at Iowa State University
- Award Senior Design Project: Spring 2022, 2nd Place
- Iowa State University Dean's List Every Semester