

# Xiangbo (Bo) Cai

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## EDUCATION

**Michigan State University – College of Engineering, Honors College**

May 2027

*Bachelor of Science, Electrical Engineering & Computer Engineering (Double Major)*

GPA: 3.9/4.0

**Awards:** *Tau Beta Pi, Wielenga Research Scholar, Winters Research Scholar, Dean's Showcase of Stars*

## WORK EXPERIENCE

**Non-destructive Evaluation Laboratory**

Oct 2023 – Present

*Research Assistant*

- Co-authored manuscript under review for journal IEEE Transactions on Instrumentation and Measurement; Research topic received \$250,000+ funding from U.S. Department of Transportation
- Developed an innovative flexible Magnetic Flux Leakage (MFL) method, resulting in higher resolution (<1.5 mm defect detection) and flexible sensing capability on curved pipelines
- Engineered a multi-channel sensing electronics system with circuit schematic design, PCB design, and embedded C programming in STM32, enabling real-time data acquisition through Hall sensors
- Designed and 3D-modeled mechanical connector in the MFL system, using SolidWorks and OnShape, creating a flexible joint capable of going across 15+ different geometrically pipeline shapes

**Edge Intelligence and Networking (EIN) Group**

Aug 2024 – Apr 2025

*Research Assistant*

- Implemented Bluetooth Low Energy (BLE) connectivity on the nRF52840 platform by programming in C++, achieving BLE communication between iOS, Android, and other compatible devices
- Applied MATLAB/Python noise cancellation algorithms and signal processing to PDM data, resulting in >15% less noise in recorded audio and improved system stability compared to initial prototype

**Smart Sensing Laboratory**

Jan 2025 – May 2025

*Research Assistant*

- Curated 2,000+ agricultural images in Roboflow by performing data augmentation and annotation, creating high-quality datasets for training deep learning models in TensorFlow and PyTorch
- Constructed feedback control systems for an agricultural application by modeling system dynamics and tuning PID parameters in MATLAB/Simulink, producing a 20% improvement in transient response

**Michigan State University**

Aug 2024 – Present

*Teaching Assistant*

- Served as teaching assistant for core electrical engineering class ECE 202 (Circuits & Systems II) and MTH 103 (College Algebra); Delivered tutoring, graded homework, and exams for 200+ students

## PROJECTS

**NDE Pipeline Robotics**

Feb 2024 – May 2024

- Designed and implemented NDE robot's control system using finite state machine (FSM) modeling and Verilog simulation, achieving a 15% improvement in navigation precision within pipeline environments
- Conducted system-level testing and validation through debugging and adaptive tuning of PID parameters in MATLAB/Simulink, reducing operational errors by 25% and turn results in an SSRN paper

## SKILLS

*Programming Language:* Python, C, C++, ARM Assembly, MATLAB/Simulink, System Verilog

*Hardware:* nRF52840, ESP32, STM32, BLE 5.x, RTOS (FreeRTOS/Zephyr), UART/SPI/I<sup>2</sup>C, Raspberry Pi

*Software:* Altium Designer, LTspice, SolidWorks, Cadence OrCAD, Git, Linux, Vivado, Keil uVision, LaTeX