Xiaorui Gu

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Education

University of Illinois at Urbana-Champaign   August 2021 – May 2025

B.S., Mechanical Engineering | Minor, Electrical & Computer Engineering
- GPA: 3.72/4.00

Research Experience

Mobility and Fall Prevention Research Laboratory   June 2024 – Present
Carle Illinois College of Medicine, Research Intern (Hardware)
– Advisor: Dr. Manuel E. Hernandez, Carle Illinois College of Medicine

- Collaborate with a multidisciplinary team to prototype a "Smart Mat" for analyzing walking patterns.
- Enhance system performance by optimizing wireless data transmission.
- Design an interactive LED-based visual aid synchronized with mobile device UI.
- Developed and prototyped a pressure sensor array using piezoresistive and conductive materials.
- Developed and tested firmware for sensor integration, ensuring precise data acquisition.
- Investigated ESP32-based controller designs to support sensor integration.

Bahl Research Group   August 2023 – Present
University of Illinois at Urbana-Champaign, Undergraduate Lab Assistant
– Advisor: Dr. Gaurav Bahl, Department of Mechanical Science & Engineering

- Designed and constructed experimental setups for a fully levitated 6-DOF system as a signal generator.
- Assisted in assembling and debugging a PID temperature control circuit.
- Assisted in designing and manufacturing a vacuum chamber, including supplier research and training on CNC machining, laser cutting, and water jet cutting.
- Designed a temperature sensing circuit with operational amplifiers and RTD, diagnosing voltage instability issues and assessing the feasibility of PID and LQR control algorithms on an ESP-series micro-controller.
- Explored the application of machine learning for predicting experimental data outcomes.
- Provided general manufacturing support across multiple semesters, including 3D printing, laser cutting, water jet cutting, and PCB soldering.

Garg Group   May 2023 – Present
University of Illinois at Urbana-Champaign, Undergraduate Research Assistant
– Advisor: Dr. Nishant Garg, Department of Civil & Environmental Engineering

- Reconstruct point clouds from image with OpenCV and Open3D, and explore real-time object tracking in dynamic 3D reconstructions involving flowing paste.
- Develop a near-realtime video object tracking application utilizing kernelized correlation filters and SIFT algorithm on a Android mobile device.
- Prototype a micrometer-scale displacement sensor based on capacitance-to-digital converters.
- Designed PCBs to support advanced research requirements.
- Developed a sensor array for temperature and humidity monitoring.
- Implemented a wireless data collection system integrated with Firebase and AWS.

Project

Object Recognition via SIFT, K-Means, and SVM on Mobile DSP
September 2024 – December 2024

- Develop robust object recognition software based on the scale-invariant feature transform (SIFT) algorithm and support vector machine (SVM), leveraging mobile DSP capabilities for real-time applications.
- Explore potential real-world applications, such as enhancing accessibility for visually impaired individuals through object recognition in mobile devices.

Skills

Programming - Python, C++, Java, MATLAB
Frameworks/Tools - ROS, TensorFlow, Gazebo, Drake, PyTorch, OpenCV, PCL, Open3D
CAD/Simulation - KiCAD, Fusion 360, SolidWorks, SiemensNX