

Xiping Sun

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EDUCATION

University of Pennsylvania

M.S.E. in Robotics (GPA: 3.87/4.00)

Philadelphia, PA
Aug 2025 – May 2027 (expected)

University of Illinois at Urbana Champaign

B.S. in Computer Science (GPA: 3.87/4.00)

Urbana, IL
Aug 2021 – May 2025

SKILLS

Languages: Python, C++, C, Java, SQL, HTML, CSS

Framework & Tools: ROS, ROS2, PyTorch, TensorFlow, scikit-learn, React, Node.js, Blender, Unity, Git

RESEARCH EXPERIENCE

Interactive Display Lab | University of Illinois

Urbana, IL

Advised by: Prof. Craig Shultz

- NailBender: Explore Nail Flexion Jan 2025 – Mar 2026
 - Built and evaluated a **nail-mounted piezoelectric haptic interface** that supports both tactile input sensing and localized haptic output without obstructing the user's fingerpad
 - Led hardware testing and user-study design across sensing, actuation, pinch-force input, and localized feedback tasks, validating the system with **0.91 pinch-force accuracy** and **0.83 tactile-pattern recognition**
 - Developed application scenarios for real-world navigation, MR control, and gaming to show how nail-based haptics can support practical hands-busy and wearable interactions
 - Trained a **transfer-learning MLP model** for personalized micro-gesture recognition, achieving 0.98 accuracy after small per-user fine-tuning
- Strain2Force: Nail-Based Sensor for 3Dof Contact Force Estimation Jan 2025 – Apr 2026
 - Built and validated a **compact nail-mounted sensing system** for continuous 3DOF fingertip force estimation using strain-gauge signals and machine learning
 - Performed experiments from hardware validation to user study, collecting synchronized strain and ground-truth force data across directional gestures and force levels
 - Developed an **MLP-based regression pipeline for real-time force estimation**, achieving high prediction accuracy across shear and normal forces with up $R^2 = 0.955$

RoboTouch Lab | University of Illinois

Urbana, IL

Advised by: Prof. Wenzhen Yuan

- Social Physical HRI with Fabric-Based Tactile Sensing May 2024 – Sep 2024
 - Evaluated sensor sensitivity, calibrated sensing range, and assessed repeatability through comprehensive testing
 - Developed and curated a **physical social gesture dataset** by organizing participant studies, recording six distinct gestures, and compiling 900 training samples and 180 testing samples
 - Designed and implemented an **MLP model to classify social gestures** achieving over 0.8 accuracy
- Vision Based Tactile Sensor Oct 2023 – May 2024
 - Developed the foundational components of OptiSense Studio using Blender by utilizing Python's ImGui-Bundle
 - Designed and implemented a **light optimization pipeline** to determine the optimal lighting configuration
 - Conducted testing and performance evaluations on three GelSight sensors

PUBLICATIONS

- [1] Y. Chen, **X. Sun**, J.-H. Youn, and C. Shultz, "NailBender: Exploring Nail Flexion for Haptic Input and Output," *ACM Symposium on User Interface Software and Technology (UIST) 2026*.
- [2] Y. Chen*, **X. Sun***, J.-H. Youn, and C. Shultz, "Strain2Force: Compact Nail-Based Sensor for 3DOF Contact Force Estimation," *IEEE Haptics Symposium 2026 (Best paper finalist)*.
- [3] D. Crowder, K. Vandyck, **X. Sun**, J. McCann, and W. Yuan, "Social Gesture Recognition in spHRI: Leveraging Fabric-Based Tactile Sensing on Humanoid Robots," in *International Conference on Robotics and Automation 2025*.
- [4] A. Agarwal*, M. A. Mirzaee*, **X. Sun**, and W. Yuan, "A modularized design approach for vision-based tactile sensors," in *International Journal of Robotics Research*, 2025,
doi: <https://journals.sagepub.com/doi/10.1177/02783649251339680>.

WORK EXPERIENCE

LifeFoundry, Inc.

Software Engineer, Intern

Champaign, IL | Hangzhou, China

May 2023 – Aug 2023

- Engineered a real-time dashboard to visualize multi-dimensional robotic trajectories using **React**, **@react-three/fiber**, and **URDF models**, enabling users to preview target poses with confirmation in simulation before execution, and prevent accidental motion of a collaborative robotic arm
- Designed and implemented comprehensive unit and integration tests with **Vitest** (frontend) and **pytest** (backend), covering user interactions and mocked network requests and database operations, improving test coverage by 20% and reducing UI-backend regression bugs
- Developed **Flask REST APIs** and **WebSocket**-based waypoint and position streaming services, enabling low-latency state updates that directly drove interactive frontend controls and live motion visualization
- Built a high-throughput log streaming pipeline and interactive frontend log console with **auto-refresh**, **severity-based routing**, and **source filtering** using **React-Admin**, supporting real-time monitoring and parsing of 3,000+ logs/day

PROJECT WORK

Learning Lyapunov-Stable and Obstacle-Aware Polynomial Dynamical Systems Jan, 2026 – May, 2026

- Developed a **one-step optimization framework** for learning polynomial dynamical systems with **global stability** and **static obstacle avoidance** from demonstrations
- Integrated **sampled barrier constraints** into a semidefinite program and implemented the optimization using CVXPY and the SCS solver
- Evaluated the method across circular, elliptical, and rectangular obstacles and multiple LASA trajectories, demonstrating **stable convergence and collision-aware motion generation**

Robot Drawing Aug, 2024 – Dec, 2024

- Implemented a DFS with Edge Detection algorithm to decompose any image into a robot trajectory
- Developed an algorithm to filter some waypoints from the trajectory to improve drawing efficiency

End-to-End Autonomous Driving with Imitation Learning Jan, 2024 – May, 2024

- Worked on PID controllers, pedestrian detection, and emergency brake nodes using ROS
- Developed a CNN with YOLO-P to replicate driver behavior and collected video data utilizing ROS video packages

Art Style Classification and Transfer Aug, 2023 – Dec, 2023

- Constructed a CNN to implement image style transfer and successfully replicated the paper's model
- Generated different styled images and collected images to create a database for training
- Designed a classification model to evaluate the accuracy of the CNN with differently styled images and refine its performance

Audio Garden Jan, 2023 – May, 2023

- Developed back-end functions integrated with the Google Cloud database
- Managed user data and popular songs in the database using SQL for storage and updates
- Created a front-end interface to display popular songs and visualize user selections

Find Classmates Aug, 2022 – Dec, 2022

- Designed user interfaces for home, profile, login, chat, course description, and other pages using Figma
- Developed front-end pages, including home, login, and profile, using React.js, and implemented unit tests to ensure consistency between front-end input and back-end data

TEACHING EXPERIENCE

University of Pennsylvania Philadelphia, PA
CIS 5120 Teaching Assistant Aug 2026 – Present

- Hosted projects, recitation studios and verbal assessments
- Responded to 120 students' UI/UX design questions related to homework, lectures, studios and final projects

CIS 5210 Teaching Assistant Aug 2025 – Dec 2025

- Hosted homework and content review sessions, conducted in-person office hours
- Responded to over 600 students' Python programming questions related to homework, lectures, labs, and exams

University of Illinois Urbana, IL
CS 101 Course Assistant Aug 2022 – May 2025

- Instructed lab sections, conducted in-person office hours, and responded to over 200 students' Python programming questions related to homework, lectures, labs, and exams
- Created and structured lab exercises and homework assignments to enhance student learning

LEADERSHIP EXPERIENCE

Chinese Engineering Student Association
Vice President Aug, 2021 – May, 2024

- Co-founded the CESA Alumni Association at the University of Illinois at Urbana-Champaign. Organized three alumni sharing sessions covering topics such as four-year university planning, on-campus resource sharing, and experiences with internships and research applications, attracting a total of 300 attendees
- Hosted an annual freshman meeting with participation from over 200 international students, and coordinated activities such as airport pick-ups, major selection discussions, and events showcasing traditional Chinese culture

VOLUNTEER EXPERIENCE

Sustainable Student Farm

Member

Aug, 2021 – Dec, 2023

- Constructed over 30 shelves to support the growth of plants such as cucumbers
- Cultivated and harvested various plants, including tomatoes, peppers, and cucumbers
- Sold harvested produce at the Quad Market and used the money to purchase new seeds

HONORS and AWARDS

Yunni and Maxine Pao Memorial Scholarship

Fall 2024

Illinois Engineering Outstanding Scholarship

Fall 2024

Dean's List

Fall 2021 – Spring 2023