

Arin Weling

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EDUCATION

Stanford University

M.S. in Electrical Engineering; Robotics and Autonomous Systems

Stanford, CA

Sep 2026 – Present

Indian Institute of Technology (IIT) Bombay

B.Tech. in Electrical Engineering with Honors; Minor in AI and Data Science

Mumbai, India

Oct 2022 – May 2026

- GPA: 9.59/10.00, Department Rank 10/114 (top 9%)

EXPERIENCE

NVIDIA

Intern, High-Speed I/O (HSIO) Verification Team

Bangalore, India

May 2025 – Jul 2025

- Built an AI-assisted hardware debugging tool by integrating the Cursor IDE with Synopsys APIs
- Implemented a stateless-HTTP FastMCP server that exposes FSDB waveform and RTL design analysis to LLM agents
- Designed debug flows that cut manual debugging time for complex SoC designs by **30%**
- Explored multi-agent approaches using custom frameworks to coordinate multiple AI agents in collaborative workflows

Smart Sentry AI

Intern, Agentic AI Team

Remote

Aug 2025 – Jan 2026

- Engineered a custom multi-agent architecture for a MongoDB query chatbot that translates natural-language requests into optimized database operations, cutting query time by **30%**
- Integrated Redis for distributed state management and deployed the system on Kubernetes for scalable serving

3D NAND Flash Memory Reliability

Research Assistant, Advisor: Prof. Sandip Mondal

IIT Bombay

Jun 2023 – Jun 2025

- Designed a PCB interfacing an FTDI Mini Module with 3D NAND flash for byte programming and block erasure
- Characterized how medical-grade X-rays affect 3D NAND watermarks formed by wearing out targeted cells with thousands of program/erase (P/E) cycles, and how radiation disrupts the trapped charge used for physical-layer security
- Won the **Undergraduate Research Award (URA 01)** for studying thermal voltage drift and X-ray effects in 3D NAND

ROBOTICS PROJECTS

Mars Rover Team, IIT Bombay | Team Lead

Dec 2022 – Apr 2026

- Coordinated a 50-member team across software, electrical, and mechanical subteams to ensure smooth system integration
- Placed **2nd worldwide** at the European Rover Challenge 2025 (Remote Edition) and 9th in the Bio-Science Task at the University Rover Challenge 2024 in Utah
- Set up MoveIt 2 inverse-kinematics simulation for the robotic arm's URDF in RViz and Gazebo
- Integrated CAN communication and custom PCBs, and established Raspberry Pi to STM32 UART communication to offload PID control and encoder processing to the STM32
- Implemented a bidirectional 433 MHz LoRa telemetry link for real-time command transmission

Autonomous Warehouse Inventory Rover | Team Lead, Inter IIT Tech Meet 14.0

Nov 2025 – Dec 2025

- Led the team to **2nd place among 23 IITs** at the Inter IIT Tech Meet, India's national inter-IIT engineering competition
- Built a pose-graph SLAM pipeline fusing LiDAR, IMU, and wheel odometry through an EKF, and integrated Hybrid A* with Reeds-Shepp planning in Nav2 for drift-minimized navigation with **±2 cm** indoor positioning accuracy
- Developed a Gazebo digital twin to validate autonomous behavior in a simulated warehouse before real-world deployment
- Developed monocular vision algorithms for rack detection and pose estimation using a servo-mounted RGB camera, replacing depth-camera hardware while enabling QR-based shelf identification, OCR, and occupancy estimation

Dynamic Swarm Navigation | Subsystem Lead, Inter IIT Tech Meet 13.0

Nov 2024 – Dec 2024

- Placed 3rd in the event and 2nd overall at Inter IIT Tech Meet 13.0
- Implemented Conflict-Based Search (CBS) and nonlinear model predictive control (NMPC) to generate collision-free multi-robot paths, with a custom DBSCAN clustering algorithm for low-latency detection of dynamic obstacles
- Simulated multi-robot fleets in ROS 2 Humble and Gazebo to optimize task priority and execution time

UltrabotX: Robotic Ultrasound Simulation | Genesis, NVIDIA Isaac for Healthcare

May 2026 – Present

- Ported NVIDIA Isaac for Healthcare ultrasound workflows to the Genesis simulator, integrating a Franka Panda arm with OptiX-based ultrasound simulation and 6-DoF IK teleoperation at lower compute cost
- Built a CT-to-USD pipeline that uses NVIDIA medical segmentation models to turn public CT datasets into segmented 3D anatomical assets for ultrasound simulation

S.N.A.S.H. Morphobot | *ArduPilot, Fusion 360, Embedded C*

Jan 2025 – Mar 2025

- Took a simplified version of Caltech's M4 Morphobot, a transformable ground-aerial robot, from ideation to a full-stack build in 3 months, custom-designing every subsystem, with ArduPilot handling drive-to-flight transitions
- Engineered the mechanical and electrical design for a **5 s** mode transition, 3 min of flight time, and 15 min of drive time
- Won the Best Course Project Award among 40 student teams

Inverted Pendulum and Active Noise Control | *MATLAB, Course Project*

Aug 2024 – Nov 2024

- Implemented a Linear Quadratic Regulator (LQR) to stabilize the dynamics of an inverted pendulum
- Built a closed-loop noise cancellation system with a custom compensator, achieving 20 dB attenuation at 100 Hz

AstroTinker Bot | *e-Yantra Robotics Competition, IIT Bombay*

Sep 2023 – Jan 2024

- Built a miniature FPGA-driven robot on a DE0-Nano board with infrared sensors, writing the Verilog stack from a ripple-carry adder, sequence detector, and UART up to a RISC CPU
- Implemented a C path-planning algorithm to route the robot between arbitrary specified points

MACHINE LEARNING RESEARCH AND PROJECTS

Falsification-Driven Robust Training | *PyTorch, CARLA, VeriAI, auto_LIRPA*

Aug 2025 – Nov 2025

- Built a CARLA and VeriAI pipeline that synthesizes adversarial examples for training provably more robust models
- Computed certified L2 robustness radii with CROWN, chosen over the tighter alpha/beta-CROWN variants whose memory and latency demands made verification infeasible at this scale on a 6 GB GPU
- Falsification-guided augmentation improved certified L2 robustness across weather conditions over 3 training cycles, with better sample efficiency than random sampling

WaveX: Frequency-Domain Explainability of CNNs | *Advisor: Prof. Amit Sethi*

Jan 2026 – May 2026

- Developed frequency-aware Integrated Gradients in the Fourier and wavelet domains, using Fourier-filtered baselines and subband interpolation with IDWT reconstruction to isolate class attribution across spatial-frequency bands
- Built activation-matching masks with a GradCAM-guided loss to produce compact, class-preserving CNN explanations, then extended the optimization to polar-frequency Fourier and level-wise wavelet masks

Foundations of Intelligent and Learning Agents | *Course Project*

Aug 2025 – Nov 2025

- Implemented UCB, KL-UCB, and Thompson Sampling for regret minimization, with a computationally optimized KL-UCB
- Modeled a card game as an MDP solved via Howard's Policy Iteration and Linear Programming; built a Minimax Microchess agent

PUBLICATIONS AND PRESENTATIONS

- Co-author, "Design and Fabrication of Mars Rover Prototype," 5th Symposium on Space Educational Activities (SSEA 2026), TU Munich, Germany
- Oral presentation, "Thermal-Induced Threshold Voltage Distribution Changes in 3D NAND Flash Cells: Experimental Characterization," Electronic Materials Conference (EMC) 2025, Durham, NC
- Presentation on 3D NAND watermark reliability, 2nd Annual SemiX Summit, IIT Bombay

TECHNICAL SKILLS

Languages: C++, Python, C, MATLAB, SQL, C#, Verilog, VHDL

Robotics Software: ROS 2, Nav2, MoveIt 2, Gazebo, RViz, Genesis, NVIDIA Isaac for Healthcare, CARLA, ArduPilot

Autonomy and Controls: SLAM, EKF sensor fusion, Hybrid A*, CBS multi-agent planning, MPC, LQR, PID, inverse kinematics

Perception and ML: OpenCV, monocular pose estimation, DBSCAN, PyTorch, scikit-learn, Pandas, auto_LIRPA, VeriAI

Embedded and Hardware: STM32, Raspberry Pi, CAN, UART, LoRa, LiDAR, IMU, PCB design, FPGA (Quartus), Fusion 360

Tools: Git, Kubernetes, Redis, MongoDB, FastMCP, LTspice

RELEVANT COURSEWORK

Robotics, Controls, and Estimation: Control Systems, Estimation on Lie Groups, Probability and Random Processes, Linear Algebra, Signal Processing, Differential Equations

Perception and Machine Learning: Digital Image Processing, Wavelets, Introduction to Machine Learning, Formal Methods in Machine Learning, Foundations of Intelligent and Learning Agents

Hardware and Systems: Analog Circuits, Digital Systems, Microprocessors Lab, Advanced Processor Design, Computer Architecture for Performance and Security

HONORS AND ACTIVITIES

- JEE Advanced 2022: All India Rank 356 among 100,000+ candidates in India's national engineering entrance exam
- Technothon 2019 (IIT Guwahati): All India Rank 3 in a national logic and problem-solving contest
- KVPY Fellowship (All India Rank 993) and NTSE Scholarship, both national Government of India science awards
- Introduced robotics and space technology to underprivileged students in a STEM awareness drive; volunteered in the Dahisar River March and Gorai Beach cleanups
- Chess: FIDE rating 1434