

SWARIT SHEEL

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EDUCATION

University of Illinois Urbana-Champaign

Champaign, IL

Bachelor of Science in Computer Engineering | GPA: 3.4/4.0

Expected May 2029

- Relevant Coursework: ECE 220 (Systems Programming: C, LC-3 Assembly), ECE 120 (Digital Logic & Computer Design: Verilog, FSMs), ECE 110 (Electronics: MOSFETs, BJTs, PWM Circuits, Sensors)

PROJECTS

CAT Time Machine | 1st Place, UIUC Product Hackathon 2026 | MCP, AI Agents, Simulation

Oct 2026

- Placed **1st of 60 teams** as a 4-person team in 24 hours with a replayable 3D jobsite simulator for Caterpillar's "Memory for Physical AI" challenge that records every truck, load, and decision
- Built a deterministic simulation engine with fixed 1-second steps, keyframe recording, and exact replay, so any moment can be rewound and branched
- Exposed site history to external AI agents through a dependency-free Model Context Protocol (MCP) server for querying days, roadblocks, and per-second snapshots; covered by **74 automated tests**

Homelab Server | Linux, Docker Compose, Tailscale, Nginx Proxy Manager

Jul 2026 - Present

- Converted a Dell Latitude 5420 into an Ubuntu Server host running a Docker Compose stack managed through Portainer: Pi-hole network-wide DNS ad-blocking, Paperless-NGX OCR document archive, Navidrome, and Uptime Kuma
- Secured remote access with a Tailscale mesh VPN and an Nginx Proxy Manager reverse proxy, with **zero ports open** to the internet

Vending Machine Controller | ECE 120 | Xilinx Vivado, Digital Logic, D Flip-Flops

Oct 2025

- Designed a 3-bit, 8-state sequential finite state machine (FSM) for a coin-accepting vending controller in Xilinx Vivado from NAND, NOR, and NOT gates and D flip-flops; packaged the output logic as a reusable IP block
- Rebuilt the FSM on a breadboard with 7474/74175 DIP flip-flops and verified **all 16-step state transition sequences** with LED outputs, including reset and coin-input operation

Straight-Run Car with Speed Control | ECE 110 | PWM, nMOS, Oscilloscope

Mar 2026

- Designed a microcontroller-free dual-motor pulse-width modulation (PWM) circuit from Schmitt trigger oscillators, nMOS transistors, and potentiometers for independent wheel balance and speed control
- Combined two PWM signals at an **8:1 frequency ratio** through a two-nMOS logical AND; validated duty cycle and frequency on an oscilloscope and extended the design to a light-seeking car with photoresistors

Systems Programming in C and C++ | ECE 220 | C, C++, LC-3 Assembly

2025

- Implemented a recursive depth-first search (DFS) maze solver, backtracking Sudoku solver, 2048, and Game of Life in C with pointers and manual memory management
- Built a C++ binary search tree (BST) with anagram detection, a sparse matrix in C, and an LC-3 reverse Polish notation calculator on a hand-rolled stack

Space Jumper 3D | Arduino, Unity, C#, Serial Communication

2024

- Built a 3D Unity game controlled by an Arduino joystick with LED matrix feedback; programmed collision detection, physics, and scoring in C# and handled Arduino-to-Unity serial communication

Study Space Occupancy Detection | TE 200 | Python, OpenCV, Figma

Nov 2025 - Dec 2025

- Built a real-time computer vision pipeline in Python and OpenCV that counts occupants in study spaces for live busyness estimates; designed the app in Figma

EXPERIENCE

Liebherr Canada

Burlington, ON

Logistics Intern

Jul 2024 - Aug 2024

- Operated Kardex automated storage and retrieval systems to track inventory and distribute parts
- Shipped orders for customers, vendors, and suppliers; worked with engineers on process improvements

SKILLS

Languages: C, C++, Python, Verilog, LC-3 Assembly, Java, C#, JavaScript, HTML/CSS

Hardware & Embedded: Arduino, Raspberry Pi, Field-Programmable Gate Array (FPGA, Basys3), Xilinx Vivado, KiCad, Oscilloscope, MOSFET/BJT, Breadboard Prototyping

Software & DevOps: Git/GitHub, Linux (Ubuntu Server), Docker, Docker Compose, Portainer, Tailscale, Nginx, SSH, VS Code, Unity

AI: Claude Code, Cursor, Ollama, Model Context Protocol (MCP), Gemini API, OpenCV