ISAAC RUDNICK

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EDUCATION

PhD in Computer Science, Worcester Polytechnic Institute — Aug 2026 - Present

Advisor: Prof. Tian Guo, Cake Lab. Research focus: Biologically-Inspired Robot Planning Approaches.

BA in Computer Science and Cognitive Science, Vassar College — 3.95 GPA, Institutional Honors — 2026

Departmental Honors in CS and Cognitive Science; Janet Holden Adams Prize for Excellence in Computer Science. Senior Thesis: *When Senses Come Online: Order Matters for Robots Too* (readers Ken Livingston, Josh de Leeuw): developmentally-ordered sensor introduction for RL arm manipulation (PPO, PyBullet), 4x faster early training than the all-sensor baseline with matched final success. Poster, departmental thesis session, May 2026. Source code. Relevant Coursework: Machine Learning, Autonomous Robotics Design, Perception and Action of Autonomous Agents, Embedded Systems Design, Algorithmic Analysis, Compilers, Computer Architecture and x86 Assembly.

SKILLS

Languages	Python, C/C++, JavaScript/TypeScript, Java, OCaml, MATLAB, x86-64 assembly
Robotics	PyBullet, Gymnasium, Stable-Baselines3/PPO, URDF, Isaac ROS, Arduino, ESP32, HPC
Systems	Docker, Node.js, MongoDB, NumPy/pandas/Matplotlib, Fusion 360, 3D printing, PCB design

EXPERIENCE

Graduate Researcher, Cake Lab, Worcester Polytechnic Institute — Aug 2026 - Present

- Designing GRACE, a receding-horizon planner that schedules a warehouse robot's sorting actions and questions to a co-worker against a forecast of interruption cost (PyBullet; Meta Quest 3 WebXR client)
- Designing a 24-30 participant within-subjects study comparing three sensing levels for the planner

Graduate Teaching Assistant, CS 1101 Introduction to Program Design, WPI — Aug 2026 - Present

Teaching Fellow, EngageU Pre-College Program — July 2026

Vassar College — *Poughkeepsie, NY*

- Helped run a two-week robotics course for high schoolers; co-developed and documented the BraitenBot GUI

Robotics Lab Research Assistant — Oct 2023 - May 2026

Vassar College — *Poughkeepsie, NY*

- HARPER (Humanoid Autonomous Robotic Platform for Experimental Research) programmer: integrated a vision system with pose estimation; object recognition, scene mapping, and systems integration
- Developed systems to run multiple ML models concurrently in NVIDIA Isaac ROS on a Jetson
- Built SPARCC and VectorPlotter (see Projects); the lab forked both and installed a plotter

Robotics Design Engineer (Summer) — May - August 2025

Vassar College — *Poughkeepsie, NY*

- URSI fellowship: low-cost open-source robotic arm with a small team; designed a robust pulley-based elbow
- Developed GUI for control of feedback-integrated servo motors.
- Developed a new approach to integrating sensors for proprioceptive-like feedback.
- Poster: *Engineering Towards an Advanced Humanoid Robot* (with Paudel, Borgstedt, Misko, Hatch, Livingston), Vassar URSI Symposium, Sept 2025

Robotics Software Developer (Summer) — May - August 2024

Vassar College — *Poughkeepsie, NY*

- URSI fellowship; created a closed-loop robotic controller in Python and C++
- Created a prototyping robotics system for testing the movement controllers
- Poster: *Programming a Humanoid Robot for Intelligent Interactions with Humans* (with Borgstedt, Kabeya, Livingston), Vassar URSI Symposium, Sept 2024

CS Teaching Assistant — Jan 2023 - Jan 2024

Vassar College — *Poughkeepsie, NY*

- Assisted students in labs and office hours (Python and Pyret); discussed course direction with professors

PROJECTS

Robotics Software Development Platform Independently designed, developed, and tested a Serial Perception-Action Robotic Control and Communication Platform (SPARCC Platform) to facilitate serial communication and control between Python and Arduino, streamlining research and education projects at Vassar College for the HARPER robotic platform. This extensible system supports control over PWM servos, stepper drivers, and sensors, with modular classes in Python and corresponding headers in Arduino C++ code. Designed for easy expansion, SPARCC allows new components to be integrated with minimal code changes on both ends. The setup is configured for optimal speed and reliability.
View the source code here.

Blood-Glucose LED Display Designed and built a complete ESP32-powered display system for visualizing real-time blood glucose data on a 32×8 WS2812B RGB LED matrix. This open-source project integrates microcontroller firmware, a custom 3D-printed enclosure, and modular configuration files to function as an alternative to existing commercial products. The display supports adjustable brightness profiles, day/night modes, and more. The enclosure, diffuser grid, and mounting hardware were designed from scratch to ensure even illumination and simple assembly, and can be reused for any LED-matrix-based project regardless of software.
View the source code here.

Whiteboard-Drawing Robot Independently designed, developed, and tested VectorPlotter, a robotic drawing system that draws images on a whiteboard or similar surface. This open-source project includes both software and hardware components. It uses the SPARCC Platform, shown above, as a base. The Python interface reads SVG files, automatically scales and positions images, and sends streamlined drawing commands to the Arduino. Developed with easy assembly and configuration in mind, VectorPlotter includes simple guides for hardware setup and software configuration, ensuring that anyone could recreate the project.
View the source code here.

BraitenBot GUI Co-developed (with Josh de Leeuw) and documented a web-based GUI (TypeScript) for programming BraitenBot robots, used in Vassar's July 2026 EngageU pre-college robotics course. Earlier, designed and 3D-printed Braitenberg vehicles for a Vassar cognitive science course.
View the source code here.

School Calendar System Independently designed, developed, and tested an application (made in Node.js with Express and MongoDB) to automatically synchronize user calendars from third-party source to respective Google Calendar to increase scheduling efficiency and simplicity. Developed for use by school students and employees, with documentation for handoff to the in-house technology department. Updates entries without webhooks, designed for >100,000 API calls/week.
View the source code here.

Blood Sugar Alert App Built a project (made in Node.js with Express, MongoDB, and Python) that reduces false positive alerts to diabetics' emergency contacts when dangerous levels are detected by first ensuring the user is non-responsive. Developed in conjunction with research on "alarm fatigue."
View the source code here.

Vassar Course Data Analysis A project to analyze the course data of Vassar College provided online by the registrar's office. This project contains analysis of trends in course offerings, course popularity, and per-department statistics meant to inform the policies of the college to promote cross-discipline learning, such as by examining departments which have overly-rigid policies for introductory courses. The project also features guidelines for further analysis of the data by other interested students / faculty, along with tools to make this analysis easier. Written in Python using pandas and Jupyter Notebook.
View the source code here.

Vassar Dining Plus An Android app to improve upon Vassar's existing dining services website. This app has more features than the official website, such as the ability to favorite dishes and check which favorites are being served, a more persistent allergen profile, and offline browsing via cached menus. The app features a MVC architecture, unit and system/integration testing, Javadoc for all functions, use cases, activity diagrams, functional and nonfunctional specifications, test reports, class diagrams for all major features, and more. Made using Android Studio.
View the source code here.