Rodin Mahvar Hooshiyar

Los Altos High School

ACCOMPLISHMENTS & ACTIVITIES	SCHOOL YEAR(S)	HRS PER WK/ WKS PER YR	POSITIONS/HONORS OR LOCATION
HONORS AND AWARDS			
Invited Presenter - American Society for Histocompatibility and Immunogenetics (ASHI) - 52nd Annual Meeting	11		International
FIRST World Championship Qualifier & Undefeated SF Regional Champion (15-0)	10		International
Google-Sponsored Autonomous Award & District Finalist (FIRST Robotics)	12		Regional
National Merit Commended Scholar	11		National
AP Scholar with Distinction	11		National
Aviation Club PTSA Project Grants	10, 11, 12		Los Altos High School
Creative Thinker Award (Los Altos High Engineering Department)	9		Los Altos High School
National Honor Society, California Scholarship Federation, Société Honoraire de Français	10, 11, 12		National / State
SCIENTIFIC RESEARCH			
LLM Augmentation Strategies for Safe Oncology Treatment Planning	11, 12	8 hrs/30 wks	**Lead Researcher**

Research Data Science

- **Title:** ***Deciding How to Augment Language Models: Comparing Retrieval Strategies for Safe Oncology Decision Support***
- **Overview:** Investigated whether compact, locally deployable AI models (2B–31B parameters) can safely assist in clinical oncology treatment planning while preserving patient privacy on hospital hardware, comparing zero-shot, upfront retrieval-augmented generation (RAG), and autonomous tool-calling strategies.
- **Execution:**
  - Built a longitudinal benchmark of 150 composite oncology patients across 21 cancer types evaluated over two clinical visits (300 total decisions, including 217 with injected clinical hazards).
  - Unified five biomedical databases (CIViC, ClinVar, CPIC, DDInter, and FDA drug labels) to compare upfront RAG agentic and tool-calling strategies.
  - Evaluated 11 open-weight models (including the Gemma 4 family) against 2 frontier Gemini models for pre-defined non-inferiority tests using a cross-family LLM judge (Claude Haiku 5.5) to eliminate self-preference judging bias.
  - Engineered a deterministic post-generation plan check that audits finalized treatment plans against reference databases.

- **Impact & Status:** Showed that Gemma 4 31B with agentic tools matched the safety of zero-shot frontier Gemini 4 Argon, whereas smaller models lagged behind. Found that upfront retrieved evidence (RAG) helps smaller models avoid hazards, but makes them overly hesitant on routine cases. Pairing agentic tools with a deterministic post-generation audit proved to be the best strategy, maximizing safety without causing clinical over-caution. This research is currently ongoing and, following clinical review, will be submitted to the Journal of Emerging Investigators.
- **Skills Learned:** AI safety evaluation, agentic workflows, RAG architecture, multi-registry clinical data synthesis, biostatistics, and scientific paper authoring in LaTeX.
- **Advisors: Clinical:** Uri Ilan, MD (Pediatric Oncologist, Visiting Faculty at Google Research, and AI Innovation Lead at Princess Máxima Center for Pediatric Oncology); **Computer Science:** Liron Yatziv, PhD (Research Engineer, Health AI Developer Foundations at Google Research).
- **Pre-Print:** https://zenodo.org/records/23870759
- **Source Code:** https://github.com/technological/oncology-safety-bench

Clinical Data Analytics System for Organ Transplantation (Epitope Finder) | 10, 11 | 5 hrs/30 wks | **Full-Stack Software Engineer & Co-Author**

Research Social Good Data Science

Invited Presenter: The American Society for Histocompatibility and Immunogenetics (ASHI) - 52nd Annual Meeting

- **Background:** After discovering that a transplant immunology lab faced a manual bottleneck interpreting complex Human Leukocyte Antigen (HLA) data due to limited engineering resources, I volunteered alongside a peer to develop a free, open-access software solution to automate and refine their patient evaluations.
- **Execution:**
  - Engineered a standardized and scalable web platform that integrates the two most recognized global Human Leukocyte Antigen (HLA) registries. Implemented an automated pattern recognition system and unique matrix display mechanic.
  - The tool was used to conduct validation studies in five complex clinical cases at UCI School of Medicine, demonstrating its ability to convert fragmented testing data into a single matrix. The platform reliably identifies the weak signals often ignored and high-complexity targets, effectively replacing subjective interpretation with an automated system that increases the accuracy of pre-transplant risk assessments, directly improving organ matching outcomes.
- **Skills Learned:** HLA antibody pattern recognition, clinical pathology workflows, multi-registry data integration, web platform development, pre-transplant risk assessment metrics, and developing data analysis pipelines on Google Cloud (BigQuery and Cloud Run).
- **ASHI Entry:** https://ashi52ndannualmeeting.eventscribe.net/fsPopup.asp?efp=RlIYREFPS1MyNTEyMA&PosterID=816412&rnd=0.2352822&mode=posterInfo
- **E-Poster PDF:** https://e732fa66e3fe6db28bf3-86df353d44a6c65fafef6090f322fde2.ssl.cf1.rackcdn.com/3491880-1792177808.pdf

ASI (Advanced Scientific Investigation) Class Research: Passive RIS Radio Mapping | 12 | 6 hrs/42 wks | **Co-Researcher**

Research Engineering

- **Title:** Active Sensing with Passive Surfaces: Physics-Informed Path Planning and Radio Mapping for Mobile RIS Swarms
- **Overview:** Designing a low-power indoor radio frequency (RF) mapping system for 6G and warehouse robotics where a stationary 5.8 GHz hub transmits signals and small ground robots carry unpowered 1-bit Reconfigurable Intelligent Surfaces (RIS). Using reflected time-of-flight, angle-of-arrival, and signal-strength data, a physics-informed Gaussian process model reconstructs Channel Knowledge Maps (CKM) and Radio Environment Maps (REM) while informative path planning steers robots to high-uncertainty regions.
- **Execution:**
  - Engineered a containerized simulation pipeline linking NVIDIA Isaac Sim (robot physics/LiDAR), NVIDIA Sionna RT (GPU ray tracing), and ROS 2 navigation across 600+ batch jobs (~590 GPU-hrs, 3,400 CPU core-hrs, and S3 storage) on the National Research Platform (Nautilus) cluster.
  - Validated autonomous LiDAR SLAM and navigation across four progressively complex indoor environments up to a full multi-aisle warehouse.
  - Verified core mapping feasibility: reconstructed a simulated room's Radio Environment Map to within ~1.4 dB of ground truth from just 100 passive RIS reflection measurements.
  - Developing the custom 8x8 1-bit RIS PCB, non-ray-traced hub-placement solver, and uncertainty-driven planning loop for real-world hardware validation and the Synopsys Science Fair.
- **Impact:** The aim is to demonstrate that inexpensive, unpowered reflective surfaces on mobile robots can accurately map complex indoor RF environments for 6G and industrial Wi-Fi networks without the heavy, battery-draining active radio transceivers required by conventional methods.
- **Skills Learned:** RF and microwave engineering, advanced circuit design, electromagnetic simulation (Sionna RT, openEMS), physics-informed machine learning and Gaussian processes, robot navigation and SLAM (ROS 2, Nav2), robotics simulation in Isaac Sim, Docker and Kubernetes on a GPU cluster, experiment design, and research documentation.
- **Progress Report**: https://drive.google.com/file/d/1w7c-DbWJBH8M-uHBwmki7j1veD8VvmdF/view

ENGINEERING DESIGN & LEADERSHIP

Robotics (FIRST Robotics Competition)
Los Altos High School | 9, 10, 11, 12 | 10 hrs/30 wks | **Prototyping Lead (2 yrs)**
World Championship Qualifier

Engineering Leadership

FIRST Championship (World Championship) Qualifier (2024)

San Francisco Regional Champion - 15-0 undefeated record (2024)

Innovation in Control Award (2024)

District Finalist - San Francisco District Event (2026)

Google-Sponsored Autonomous Award (2026)

- **Overview:** 4-year member of FIRST Robotics Competition (FRC) Team 114, a premier competitive robotics team.
- **Leadership:** Served for two years as Prototyping Lead, directing rapid prototyping efforts and mentoring team members. Acted as a key contributor to the CAD and 3D design sub-team, coordinating design workflows for critical robot mechanisms, in Fusion 360, Onshape, and Solidworks.

- **Software & Systems:** Developed and deployed custom software tools to streamline team operations and inventory management systems. Built operational infrastructure that improved data accessibility and match-strategy decision-making alongside hardware development.
- **Outcomes & Skills Learned:** Expertise in rapid prototyping, mechanical design, mastery of 3D CAD software (Onshape, Fusion360), control systems optimization through iterative testing, machine learning, and collaborative project management.

FRC Autoscout: Automatic FIRST Robotics Scouting Data 11, 12 5 hrs/25 wks **Co-Founder & CTO**

Engineering Leadership

- **Background:** Every FRC team needs to know how other robots perform, and this is done through the process of "scouting" to collect quantitative and qualitative data on robots. Typically, scouting is done by hand with students watching matches and tallying what they see. It often takes many volunteers hours, and it's inconsistent, especially at large events where people are set to analyze matches for long durations causing them to lose focus. The team set out to design a system that is publicly accessible to provide scouting data to everything using only the publicly accessible match statistics already available (broad, not team specific) and match videos.
- **Execution:**
  - Currently designed for the 2026 season, and intended as an early stage startup.
  - The system tracks the robots using computer vision models, determines team numbers automatically, aligns cameras for field homography, and produces position readings for each robot at every tenth of a second. This is the part of the system that is modular and reusable over seasons (besides camera alignment).
  - Tracks and allocates shots to specific robots, and determines accurate data such as exact number of shots made by a robot, data typically impossible or highly inaccurate when calculated by human scouters in matches with over hundreds of balls launched in minutes.
  - Designed a simple beta web app and launched the system for interested team clients, where they can access not only quantitative data, but qualitative data such as how well teams played defense, heatmaps of where robots travel, and aids for picklist selection.
  - Planning an official announcement on FRC related social media, and official launch when we rebuild the system for the 2027 game.
- **Impact:** Built to cut hours of manual match watching down to a few minutes per match while still capturing rich qualitative insights. This gives smaller teams the same caliber of scouting data as 60+ member legacy teams, leveling the playing field so competitive data isn't monopolized by teams with custom manual scouting apps.
- **Skills Learned**: Computer vision, large-scale video analysis, data pipeline design, cloud deployment (Cloudflare, Modal), security and cost control, product design for non-technical users.
- **Site**: frc-autoscout.com

Aviation Club
Los Altos High School 9, 10, 11, 12 5 hrs/35 wks **Founder and Co-President**
Lead Hardware Engineer

Engineering Leadership

- **Overview:** Co-founded a highly active aerospace club to provide a dedicated space for students to discuss, design, build, simulate, and fly aviation projects.
- **Leadership:** Directed operations for 40+ active members and secured $1,800 in total funding by authoring successful school grant proposals and organizing campus fundraising initiatives.
- **Key Projects:**
  - American Rocketry Challenge (TARC) participation, 9th grade and currently in 12th grade.
  - Engineering an autonomous quadcopter proof-of-concept for remote injury assessment, utilizing AI-based diagnostic pipelines for real-time reporting and modular mounting systems for resource delivery.

- Developing a research process to train computer vision models using real-world flight telemetry. By incorporating diverse flight dynamics and environmental data into synthetic training environments, this research aims to improve model accuracy and robustness in erratic, real world conditions.
- Working on a micro drone swarm using my independent circuit designs, aiming to map rooms collaboratively using low cost 8x8 grid time of flight sensors.

- **Skills Learned:** Complex project management, leadership, fundraising, Ardupilot flight systems, advanced 3D CAD, Computer Vision, ML pipeline optimization and fine-tuning, and NVIDIA Isaac Sim.

ACADEMIC ENRICHMENT

Circuits I 11 summer 10 hrs/8 wks
Stanford Undergrad Summer Session

- Received grade 'A'.
- Completed an intensive foundational Stanford undergraduate electrical engineering course (EE 101A), mastering circuit analysis techniques including nodal and mesh analysis, and applying these concepts to the design, simulation, and testing of linear circuit components.
- Gained hands-on laboratory experience characterizing electronic components, including LEDs, diodes, and solar cells. Constructed a functional AC-DC power converter, utilizing oscilloscopes, calculated component values, and soldering techniques to ensure signal integrity and proper assembly.

How We Will Build on Mars 11 summer 3 hrs/8 wks
Stanford Undergrad Summer Session

8-week seminar examining the engineering, radiation shielding, life-support, and habitat design challenges of establishing a sustainable human colony on Mars, culminating in a collaborative feasibility presentation.

Biomedical Engineering 11 summer 2 hrs/4 wks
Stanford Summer Institute

Investigated the integration of mechanical and electrical engineering with biological systems to improve diagnostic innovation and patient outcomes.

Volunteering and Technology for Social Good

MoodMeter 11, 12 3 hrs/35 wks **Founder and President**
Youth Led Service Initiative **501(c)(3) Non-Profit**
Research Social Good **Lead Researcher and Engineer**
Data Science App Dev

- **Problem & Purpose:** Being driven by a concern for the youth mental health crisis, I created a privacy-focused digital tool to help peers navigate emotional self awareness and practice daily management as a stress free and routine habit.
- **Execution:**
  - Developed and launched an ongoing behavioral study on a mobile-adaptive web application, scheduled to conclude by the end of Jan 2027 and targeted for publication. The system turns daily self-reflection into wellness habits while comparing several novel methods to ensure effectiveness before full rollout.
  - Founded a 501(c)(3) non-profit.
  - Recruited student cohorts for developing the behavioral study
- **Skills Learned:** Non-profit business management, fundraising, user study design, behavioral data analysis, user recruitment and onboarding, funding, running engagement campaigns, minimal and intuitive user interface design, privacy-preserving technique for session affinity management, integration with Google analytics.
- **Site:** mood-meter.org

Commercial Web Platform 12 summer 5 hrs/15 wks **Pro Bono Engineering**
Nuny Sourdough
App Dev Social Good

- **Background:** When I learned that a single mother running a home micro-bakery was quoted $10,000 to launch a commercial website, I saw an opportunity to apply my software engineering skills for a meaningful cause. Today, Nunysourdough.com drives steady customer traffic, and has helped establish a small business.
- **Execution:**
  - Conducted client interviews to define product requirements and created a robust, scalable, commercial-grade web application.
  - Developed the system specifically to run within Google Cloud's free tier to ensure zero operational costs.
  - Provided all design, development, launch services, and ongoing technical maintenance pro bono.
- **New Skills:** product requirement gathering, user experience design, database design, frontend vs backend, web security, integration with financial platforms like PayPal and Square, Docker container management, application architecture on Google Cloud (scalability, security, high availability, cost-efficiency, maintainability)

TECHNICAL SKILLS

Programming and Software Architecture

Python, Java, C++, Flutter, SQL, Git; AI safety evaluation, agentic workflows, RAG architecture, computer vision, physics-informed machine learning, Gaussian processes; architecting and deploying scalable, containerized solutions using Google Cloud Platform and Docker

3D Design/CAD, Hardware & Simulation

- 3D CAD & Prototyping: Onshape, Fusion 360, Solidworks; rapid prototyping, FDM 3D printing.
- Robotics & Autonomous Systems: ROS 2, Nav2, LiDAR SLAM, Ardupilot autopilot systems, control systems optimization.
- Hardware & Electronics: KiCAD PCB design suite, microcontrollers, 1-bit RIS PCB design, RF & microwave engineering, circuit analysis (EE 101A).
- Simulation & Electromagnetic Modeling: NVIDIA Isaac Sim, NVIDIA Sionna RT (GPU ray tracing), openEMS.

MUSIC

Piano 9, 10, 11, 12 2.5 hrs/52 wks **Classical Pianist**

- Royal Conservatory of Music (RCM) Level 6.
- 13+ years of classical piano study, developing advanced technique, music theory knowledge, sight-reading proficiency, and interpretive performance skills through regular practice and performance.
- Perform in solo repertoire mostly from classical composers such as Bach, Mozart, Beethoven, and Chopin and some contemporary composers such as Ludovico Einaudi in recitals and evaluations.

SPORTS

Tennis 9, 10, 11, 12 4 hrs/8 wks **NTRP 4.0-Rated Player**

- Competitive player with 10+ years of training and match experience.
- Gave up junior varsity tennis in favor of high school robotics while continuing independent singles play and other opportunities.
- Coached foundational tennis skills for family friends' young children (ages ~10) in summer sessions.

PERSONAL INTERESTS

- Build detailed scale models of civil and military aircrafts, combining research on aviation history with visits to aerospace museums to study physical designs up close.
- Fly civil and military aircraft in advanced flight simulators, practicing navigation, instrument procedures, and emergency routines.
- Design and 3D print custom parts using Fused Deposition Modeling (FDM), including components for self-designed drones, scale planes and cars, artwork, and household replacements.
- Landscape and outdoor photography, with a focus on capturing natural scenery during hikes and also exploring compositions that blend nature with man-made structures.