

Vihaan Parikh

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Santa Clara High School, Santa Clara, CA | Class of 2027

Education & College Coursework

Santa Clara High School, Santa Clara, CA

Aug 2023 - Jun 2027 (expected)

GPA: 4.0 unweighted / 4.49 weighted | SAT: 1550 | PSAT/NMSQT: 1520/1520 (National Merit Semifinalist)

College Coursework (taken outside my high school, for credit)

- **Calculus III** (MATH 265, multivariable) - University of North Dakota Fall 2026 (in progress)
- **Calculus II** (MATH X400.19) - UC San Diego Extended Studies Summer 2026
- **Data Abstraction and Structures** (CIS 22C) - De Anza College Spring 2026
- **Software Development With Java Programming** (CIS 043) - Mission College Summer 2023
- **Linear Algebra** (MAT 004C) - Mission College Spring 2027 (planned)

Robotics & Research

Research Intern - LC Lab, University of New Mexico

Apr 2026 - Present

Learning & Control Lab; PI Dr. Leilei Cui; mentored by PhD student S. Mondal; the lab's only high school researcher

Grades 11-12 | 28 wks to date | remote | hours shared with research below

The LC Lab studies how robots learn to move and act through reinforcement learning and control theory.

- Train and deploy reinforcement learning (PPO) policies in MuJoCo/MJX, JAX, and Brax for 20+ agility behaviors on quadruped and humanoid robots (box jumps, handstands, stair climbing); velocity tracking error below 0.09 m/s and 2°/s.
- Trained Unitree Go1/Go2 policies for joystick control, stair climbing, jumping, and cooperative carrying; built gait reference generators and rendering pipelines to review deployed policies.
- Built damped-least-squares inverse-kinematics arm control and a grasping pipeline for a Go2 quadruped with a D1 arm, debugging gripper geometry, wrist orientation, and contact forces.
- Diagnosed simulation failures (physics divergence, NaN cascades) that blocked training runs.

Team Captain (2026-27); Software Lead & Mentor (2024-27)

Aug 2022 - Present

FIRST Tech Challenge (FTC) Robotics | Grades 8-12 | 12 hrs/wk | 34 wks/yr | Captain (appointed)

- **Captain:** coordinate the hardware, software, outreach, and finance subteams using the Scrum project management framework; designed and built 5 robots.
- **Software Lead:** programmed self-correcting autonomous navigation with an Extended Kalman Filter (fusing encoder, gyroscope, and vision data) and a Pure Pursuit path follower, reaching under 2 cm accuracy; wrote a path follower 33% faster than our previous one; built TensorFlow object detection and OpenCV vision pipelines; used Roadrunner spline paths and inverse kinematics for motion planning.
- **Results:** top 150 of ~8,400 teams worldwide (points ranking); 1st in Northern California twice (Inspire Award); at the World Championship (231 teams, 80+ nations), Control Award 2nd place (best autonomous system, grade 9) and Motivate Award 3rd place (outreach, grade 10).
- **Mentoring:** mentored 15 FTC and FIRST LEGO League teams in software (150+ hours); 11 advanced to regionals.
- **Outreach:** Co-wrote the curriculum for SLAM, a robotics outreach program across 3 Title I schools (61 classes, 70+ students); students' interest in STEM careers rose from 20% to 70% in pre/post surveys, earning support from our district's Board of Special Education. Co-organized a robot "petting zoo" at Central Park Library (200+ attendees, mayoral recognition).

Independent Researcher (Sole Author)

Aug 2024 - Present

Two peer-reviewed papers (Springer, IEEE); each through 2 rounds of anonymous PhD review and 5 revisions

Grades 10-12 | 10 hrs/wk total incl. LC Lab | 110 wks to date | 6 months from first draft to acceptance per paper

Presented at 2 academic conferences (340+ attendees, 48 countries); early versions presented at science fairs to ~30 judges over 18 hours (awards under Honors).

- **ROCA** - "A Dynamic Metaheuristic Framework for Route Optimization Using Context-Aware Ant Colony Systems," *ECTA 2026 (Springer CCIS)*; shortlisted for the IJCCI 2026 Best Paper Award. Over 8 months, built a framework that turns a dispatcher's plain-language instructions into route constraints (SentenceTransformers intent parsing, ant colony optimization in NetworkX) to get emergency responders on-site faster. Tested on real Bay Area streets and global airport networks beyond standard benchmarks: 3.5% better routes, 9% less deviation. Now extending it to split incident sites across multiple responders.
- **BioFlap** - "Multi-Axis Flight Control Software for a Biomimetic Ornithopter in Confined Space Navigation," *IEEE CCE 2026, Mexico City*. Over 9 months, built flight-control software for a 50-gram flapping-wing drone to inspect pipes and bridges, on a self-imposed \$150 budget. Rebuilt 4 generations, redesigning the gearbox and wing linkage after each breakage; the final cicada/fruit-fly-inspired wing flexes at the base for lift but stays stiff at the tip. Held $\pm 10^\circ$ stability across 5 flight tests.
- **AP Capstone** (AP Seminar Department Award, top student, selected by teacher): in AP Seminar (grade 11), researched the ethical limits of vision-language-action models in end-of-life caregiving and wrote an Individual Written Argument on robotics-assisted caregiving for aging adults. In AP Research (grade 12), building a performance matrix comparing state-of-the-art neural solvers and a classical metaheuristic baseline across routing variants, extending the routing work behind ROCA.

Research Collaborator & Co-Author

Jun - Aug 2026

Age-Inclusive Design Research with Dr. Matteo Zallio, University of Cambridge

Grade 12 (summer) | 10.5 hrs/wk | 13 wks | remote

- Built an AI pipeline (BM25/FAISS hybrid retrieval, LLM claim validation, ICF disability-taxonomy mapping) linking 72 international accessibility classes (mobility, vision, hearing) to building codes across 31 countries; verified 1,350 extracted claims.
- Co-author of 2 papers under internal review by colleagues at the University of Cambridge: a domain-agnostic claim-extraction and validation framework, and a cost-bounded framework for retrieving accessibility requirements.

Participant - Imitation & Reinforcement Learning Reading Group

Feb - May 2026

University of Arizona, led by Dr. Chicheng Zhang; 15 Master's/PhD students and faculty reviewing research on how AI learns from human examples and trial and error

Grade 11 | 1.5 hrs biweekly | 16 wks | group's only high school student

- Discussed 7+ recent papers and prepared discussion questions for group debate; asked questions at 2 thesis-defense rehearsals; applied the methods to my RL work at the UNM LC Lab.

Assistive Engineering & Design

Member (2021-27); Peer Mentor; Elder-Assistive Device Capstone

Summer 2021 - Present

49ers STEM Leadership Institute (selective 6-year district STEM program, 60 students, fabrication lab)

Grades 7-12 | 6 hrs/wk | 48 wks/yr (~300 hrs/yr) | selected by application

- Learned CAD and laser cutting from my math teacher the summer before grade 7; built 15+ engineering projects since; taught 120+ younger students CAD, laser cutting, and 3D printing in the fabrication lab.
- **Capstone - GripPy:** interviewed older adults with arthritis, then designed and built a portable electric opener for a senior who could no longer open jars on her own. 3D-printed most of the body and wired and programmed the electronics, including the motor drivers and a touch sensor; cuts required grip force $\sim 17\times$.

Student Engineer

Jan - May 2024

Project Invent - National Fellowship | Grade 9 | 4 hrs/wk | 18 wks

A national nonprofit fellowship (2,000+ high schoolers) that pairs student teams with community partners to design technology for real problems.

- Ran empathy interviews with Ms. Kim Hunter, a Peterson Middle School teacher, about her outdoor nature-center classroom, then designed and built a pond-monitoring rover: temperature/pH sensors on a custom publish/subscribe software architecture, flipper drive, and a live-streaming underwater camera so students can explore the pond safely. Used by ~ 30 students per year.
- Won the NorCal DemoDayX Explorer Award for the software framework, with a \$500 grant to keep developing it.

Eagle Scout; Patrol Leader, Historian, Troop Guide

2019 - 2026

Scouting America, Troop 466

Grades 5-12 | 3.5 hrs/wk | 46 wks/yr | 50+ campouts, Philmont backpacking | Eagle project: ~ 180 hrs

- **Troop Guide:** mentored a patrol of newer Scouts for 6 months toward rank advancement. **Leave No Trace instructor:** replaced slideshow lessons with a gamified curriculum and rewards system, reused for the Citizenship in the Nation merit badge (grades 6-8).
- **Eagle project - ScrapStation:** planned and led the build of a modular scrap wood/metal organizer for the 49ers STEM Leadership Institute fabrication lab (~ 240 students/yr), directing 30+ volunteers from CAD to assembly. After my former teacher retired and joined Men's Sheds (workshops for older adults), shared the CAD files and build guide; the design reached 33 elder woodshops in 24 countries and was featured in an Australian Men's Shed newsletter, and I am adapting it with that shed's CNC lead for their machines.

Software, Startups & Hackathons

Software Engineering Intern

Jun - Aug 2026

Altera Strategy Foundry Inc. | Grade 12 (summer) | 10 hrs/wk | 10 wks

An AI hiring startup automating candidate screening (resume claim extraction, interview question generation, candidate scoring); cut screening time $\sim 90\%$ across 1,700+ real applications in 6 job categories.

- Built a recruiter-facing transparency feature explaining why candidates rank where they do, doubling recruiters' reported likelihood of adopting the tool in demo testing; optimized the retrieval pipeline, raising resume claim-extraction accuracy by 11%.
- Designed a SHAP-based bias audit that flags disparate-impact risk across protected attributes in model predictions; built and published the company's companion mobile app on my own.

Software Engineering & Game Co-Developer

Apr - Sep 2025

Ping Pong Club - mixed-reality game for Apple Vision Pro | Grades 10-11 | 15 hrs/wk | 22 wks

- Reached out to and partnered with a Google engineer to build the game (RealityKit, Firebase); built hand tracking, the opponent AI, and 3D assets, and integrated HealthKit fitness tracking and WishKit feature requests. My update grew weekly active users $10\times$ (to ~ 500).
- Featured by Apple's App Store editors (1 of 5 visionOS apps that week, out of 4,200+ on Store); covered in 3 articles/video reviews with 11.5K+ views.

Other Projects

- **Tailrd** (VikingHacks 2026, 2nd Place EdTech; 24 hrs total): IEP-driven curriculum generator; special-ed teachers upload general-ed materials plus a student's disability and state-mandated plan to get an individualized curriculum (AssemblyAI speech-to-text, OpenAI API document parsing, chained LLM generation, Next.js backend).
- **Cognito** (Founder & Pitch Lead; GYEC international finalist, 1 of 59 finalists from 287 teams in 32 countries; May-June 2026; two 12-hour competition rounds): OS-level platform embedding AI-readable pixel-signature watermarks in photos so image models can detect and refuse deepfake prompts that use them.
- **Kidney Tumor Detection** (grade 9; 10 hrs/wk, 38 wks): trained a CNN object detector on 500+ de-identified NCI KiTS CT scans annotated under physician guidance; a second version added contrast equalization and brightness/blur augmentation (3× data), fine-tuned over 170 epochs: 97.8% precision, 98.7% recall, F1 0.98, under 0.5 s inference; deployed to a scan-upload website.

Leadership & Community Service

Founder & Lead Interviewer

2024 - Present

The Aging Atlas | Grades 10-12 | 1.5 hrs/wk | 35 wks | Founder

An oral-history organization that pairs seniors' life stories with loneliness and accessibility survey data, giving aging research, engineering, and policy evidence grounded in seniors' own experiences.

- Recruited 4 senior living communities; conducted and transcribed 30 life-story interviews on independence, each paired with the 8-question UCLA Loneliness Scale; published a consented, anonymized open dataset.
- Completed the University of Tasmania's *Understanding Dementia* course and independent gerontology coursework to prepare for interviews: dementia neuroscience, caregiver support, delirium, and case studies on recognizing symptoms and communicating with people with dementia.

Chapter Co-President (2025-27); Treasurer (2023-25)

Aug 2023 - Present

Key Club International, Santa Clara High School chapter (208 members)

Grades 9-12 | 2 hrs/wk | 34 wks/yr | Co-President & Treasurer (appointed)

- **Founded Wise Bytes:** a Saturday tech-literacy program for seniors at Central Park Library, adopted by the full chapter. Taught ~35 older adults AI and online safety in workshops; wrote the training materials and trained 25 volunteer tutors.
- **Co-President:** coordinate 1,200+ volunteer hours; connect members to Adopt-a-Grandparent virtual visits. **Treasurer:** tracked \$2000+ funds throughout 2 years, ran regression analysis on fundraiser sales data (boba vs. cookies) to choose what to sell.

Team Co-Captain (2026-27); Defense Pretrial Attorney (2023-27)

Aug 2023 - Present

Santa Clara High School Mock Trial (19 members)

Grades 9-12 | 5 hrs/wk | 23 wks/yr | 14 scrimmages + official rounds/yr | Co-Captain (elected)

- As pretrial attorney, argue motions directly to the presiding judge; won every motion I argued (9 hearings, 2 invitationals).
- Build case theories; coach teammates on prosecution closings and witness examinations; ran summer workshops for 25+ students on end-of-life law affecting older adults. Named Team MVP (2025-26).

Athletics & Employment

Team Co-Captain (2026-27); Starting Middle Blocker (2024-27)

2024 - Present

Santa Clara High School Boys Varsity Volleyball | Grades 10-12 | 10 hrs/wk in season | 14 wks/yr | Co-Captain (elected)

- Started every varsity match at middle blocker; Coaches' Best Middle Blocker award 2 consecutive years.
- Co-ran practices for the 17-player varsity team; organized and led summer blocking/hitting training for JV players; mentored the Cabrillo Middle School volleyball team at the local Youth Activity Center.

Scooper & New-Hire Trainer (paid)

Jun 2026 - Present

Pints of Joy LLC (Indian American ice cream shop), Sunnyvale, CA | Grade 12 | ~7 hrs/wk | 19 wks to date

- Serve 50-100+ customers per shift in English, Gujarati, and Spanish; noticed the shop had no training resources and wrote its onboarding guide (menu, flavors, packaging, register), now standard for new hires; trained 2 new scoopers.

Other Honors & Awards

- **CA Science & Engineering Fair**, 1st Applied Mechanics (1 of 17 winners; 701 entries, 351 schools) Gr. 10, State
- **Synopsys Science Fair:** 1st Mechanical Engineering, IEEE Special Award (2025); 2nd Computer Science, ACM Grand Prize for Student Research (1st of 119) (2026) Gr. 10-11, Regional
- **AP Scholar with Distinction** Gr. 12, National
- **AP Seminar Department Award;** AP Capstone Diploma program Gr. 11-12, School/National
- **California Scholarship Federation** (4 years); **State Seal of Biliteracy (Spanish)** Gr. 9-12, State

Technical Skills

Robotics & Simulation: MuJoCo/MJX, Brax, JAX, reinforcement learning (PPO), inverse kinematics, Kalman filtering, Pure Pursuit, Roadrunner, microcontrollers | **AI/ML:** TensorFlow, OpenCV, HuggingFace Transformers, SentenceTransformers, OpenAI CLIP, LangChain, RAG, BM25/FAISS retrieval, SHAP, VLM/VLA models, AssemblyAI, Whisper | **Languages, Data & Backend:** Python, Java, C, C++, JavaScript/Node.js, Swift/SwiftUI; NumPy, Matplotlib, Plotly, NetworkX, Apache Commons, EJML, Firebase, REST APIs, React/Vite, Next.js, OpenStreetMap | **Tools & Fabrication:** GitHub, VSCode, Android Studio, Vim, LaTeX, Blender, RealityKit, Fusion 360/Onshape (CAD), laser cutting, 3D printing