Henry Demarest

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Education

Yale University: New Haven, Connecticut (*August 2021 - May 2025*); GPA: 3.98
- ***Major(s)****:* Mechanical Engineering (ABET), BS Computer Science
- ***Mechanical Engineering Coursework*:** Aerodynamics, Thermodynamics, Fluid Mechanics, Materials, Statics, Mechatronics, Mechanical Design, Machine Design, CAD, Linear Algebra, Differential Equations, Robotic Modeling and Control
- ***Computer Science Coursework:*** Data Structures, Computer Architecture, Algorithms, Intelligent Robotics, Graphics
- ***Non-Technical Groups/Activities:*** Tau Beta Pi, Vice Chair of Yale ASME, MechE Peer Mentor, Engineering Tour Guide, Yale Club Running, DPops Orchestra, Freshman Orientation Backpacking Trip Leader, Intramural Sports Secretary

Irvington High School: Irvington, New York (*September 2017 - June 2021*); Weighted GPA = 4.58; SAT = 1600
- ***Awards*:** Valedictorian *(2021)*, National Merit Semifinalist *(2021)*, U.S. Presidential Scholar Semi-Finalist *(2021)*

Experience

Astrobotic Technologies – Mechanical Engineering Intern (*Summer 2023*):
- Designed fixture for vacuum testing of a Roll-Out Solar Array (ROSA) in cryogenic & elevated temperatures using 304 SS
- Iterated upon the design of a spacerless MLI thermal enclosure to enable spacecraft survival of the lunar night
- Developed, manufactured, and tested a motorized test fixture for cryogenic fabric testing for in-space robotic applications
- Created CAD models in consultation with a customer for the production of renderings of a custom lunar rover design
- Communicated with part vendors/customers, presented to project managers, and created documentation for my designs

Yale Undergraduate Aerospace Association – Executive Board President (*2023 - Present*):

  Project Liquid – Chief Engineer (*2023 - Present*), **Co-President** *(2022 - 2023),* **Propulsion Lead** (*2021 - 2022*):
- Lead technical development of a bipropellant liquid rocket engine designed for use with Nitrous Oxide and Ethane
- Coordinate and assist subteams to ensure design/manufacturing progress meets deadlines and technical objectives
- Teach other club members about concepts related to fluid mechanics, 3D design, and rocket engine operation
- Communicate with teams at other schools, research previous engine designs, and learn from industry contacts
- Led design of a coaxial shear injector that used a stacked manifold design as the Propulsion Lead

  CubeSat Team – Attitude Determination and Control System (ADCS) Lead (*2022 - 2023*), **Member** *(2021-2022)*:
- Led the ADCS Subteam to prepare CubeSat for launch as part of NASA's CubeSat Launch Initiative Award
- Designed algorithm to control CubeSat's active stabilization efforts (see research below)
- Collaborated on the design of an attachment system for the Gravity Gradient Boom (GGB)

Yale University – Undergraduate Learning Assistant for Computer Science Course (*2022 - 2023):*
- Worked as a member of the teaching staff for CPSC 223 (Data Structures & Programming Techniques)
- Held office hours and taught students topics ranging from specific programming syntax to general problem solving strategies

Research

Yale Nanoprobe Research Group – Researcher (*2023 - Present*):
- Conducting research on the microstructural effects on bulk properties of aging MP35N, a nickel-chromium superalloy
- Using tools, such as nanoindentation, scanning electron microscopy, x-ray diffraction, and other material analysis techniques

Cube Satellite Detumbling Research Project – Researcher (*Summer 2022*):
- Spent 10 weeks working on a detumbling algorithm for a 2U CubeSat with a limited suite of sensors and control hardware
- Used TRIAD algorithm for attitude determination and B-dot controllers paired with magnetorquers for attitude correction
- Created MATLAB simulations to experiment with various control system parameters and assess algorithm performance

Machine Learning Science Research Project – Student Researcher with Mentors at IBM (*2019 - 2021*):
- Assessed the performance of different reinforcement learning algorithms with a bipedal walking task using Python code
- Earned 1st Place at the NYS Science and Engineering Fair (NYSSEF) and attended the Regeneron ISEF competition

Volunteering

Fuller Center for Housing – High School Chapter Founder, Volunteer Supervisor, Intern (*2018 - 2021)*:
- Worked on a construction crew to repair and remodeled local homes to be used as affordable housing in local communities

Skills

Computer Programming: C, C++, Java, Python, MATLAB
CAD: Solidworks, Autodesk Inventor/Fusion 360, OnShape
Manufacturing: Lathe, Mill, CNC, 3D-Printer, Hand Tools

Software: Project Organization (ClickUp, Slack, Confluence), Project Sharing (GrabCAD, GitHub), Microsoft Office
Language: Conversational Spanish