Letter from the President
Princeton Rocketry Club is a young but highly active club dedicated to pursuing cutting-edge projects in aerospace engineering and bringing STEM outreach into the local community. Our 40 members span engineering and the sciences, but are united by their talent for hands-on work and passion for the aerospace field. Club members have interned at almost every major aerospace employer, and many will continue on as full-time employees after graduation.

- David Prilutsky

Isabel Cleff - Vice President
Isabel Cleff (MAE ’18) is a big ol’ fluid mechanics nerd. She has spent a summer debugging space 3D printers for NASA and another testing rocket parts at Virgin Orbit.

Matt Romer - Treasurer
Matthew Romer (MAE ’18) is a Guidance, Navigation and Control enthusiast. He has worked on cubesats at the Air Force Research Laboratory and spacecraft GNC at Lockheed Martin.

Mark Scerbo - High Power Rockets Lead
Mark Scerbo (MAE ’18) once considered moving his bed to the MAE machine shop, but has since worked on the much larger SpaceX production floor and would rather stay there.

Caleb Gum - Head of Community Engagement
Caleb Gum (COS ’18) is a co-founding officer of Princeton Rocketry Club. He is also the vice-president of Sustainable Software Initiative, and has interests in robotics and sustainability.
Mike Fuerst (MAE ’18) is passionate about mechanical, electrical and software aspects of robotic exploration. He has worked at JPL on the Mars 2020 rover mission and is currently developing a ROV to study Great White Sharks.

Jorge Reyes (MAE ’19) wants to bring farming to space after watching the Martian. He is currently working on mini autonomous farming robots.

Amanda Brown (ORFE ‘19) is interested in modeling, data science, and mission planning. She has previously worked for JPL’s astrophysics department and SpaceX’s satellite program.

Whitney Huang (MAE ’19) is a huge fan of robots and 3D printing. She has built an underwater ROV and worked the development of a modular soft robot at Seoul National University.

Hemani Kalucha (MAE ’19) is trying to get on that first rocket to Mars. Until then, she’s been working on robotics in airplane production this summer in Germany.
Ariel Chen (COS ’20) is interested in rockets, software engineering, and applications of computing to biology research.

Nina Arcot (MAE ’20) is interested in space exploration and hopes to one day design something that goes into outer space. Her past projects include a water detection system for asteroids.

Bhaskar Roberts is a Junior in Electrical Engineering with interests in optics, data science, and signal processing. He designed and prototyped an optical communication system at NASA Langley and is currently doing independent work in optical soliton computing.

Carter Green (MAE ’20) is co-leading the Intercollegiate Rocket Engineering Competition with Jorge Reyes. He really loves rockets.

Coleman Merchant (MAE ’19) loves building and dreaming about all things that go fast – from hypersonic suborbital sounding rockets to high-performance electric cars.

Nina Arcot (MAE ’20) is interested in space exploration and hopes to one day design something that goes into outer space. Her past projects include a water detection system for asteroids.

Ariel Chen - Vice Treasurer

Nina Arcot - Vice Head of Community Engagement

Bhaskar Roberts - CANSAT Avionics Lead

Carter Green - Rocket Engineering Co-Lead

Coleman Merchant – High Altitude Launch Lead
In our second year of existence, the PRC team completed four long-term projects, each one testing our technical skills and affirming that our young organization can compete on an international stage. For the coming year, we have planned an ambitious set of projects that will further develop our expertise and push the boundaries of what a student aerospace team is capable of.

**PROJECTS 2016-17**

**CANSAT**

Competition to build a solar-powered Venus glider for atmospheric sampling which would be launched on a high-power rocket for an Earth-based test.

**SKILLS** CAD, 3D Printing, PCB design and manufacturing, RF communications design, fluid mechanics analysis, microcontroller programming

**TOOLS** Creo, KiCAD, EAGLE, Fritzing, Arduino, Stratasys and MakerBot 3D printers, Epilog laser cutter, electronics shop tools, machine shop tools, wind tunnel

**RESULTS** Placed 25th out of 87 teams in international competition
HIGH-POWER ROCKETRY

Developed high-power rockets with avionics and sensor payloads and obtained high-power rocketry certifications from the NAR for several members. Also developed 3D-printed rockets, boost gliders, and other experimental projects.

SKILLS
CAD, 3D Printing, PCB design and manufacturing, microcontroller programming, trajectory simulation

TOOLS
Creo, KiCAD, Arduino, Raspberry Pi, MakerBot and Ultimaker 3D printers, electronics shop tools, machine shop tools

RESULTS
Multiple club members obtained NAR certification (levels 1 to 3). Avionics and sensor payloads successfully tracked rocket flights and obtained atmospheric data.
PROJECTS 2016-17

ROCKET-CATCHING DRONE

Developed a 7-foot diameter octocopter capable of autonomously tracking and recovering rockets during their parachute descent.

**SKILLS**  Mechanical design, power systems design, autonomous trajectory planning, RF communications design

**TOOLS**  Creo, QGroundControl, MAVLink, PX4 flight stack, electronics shop tools, machine shop tools

**RESULTS**  Drone flies on autonomous trajectory, tracks rockets in flight. Currently working on blending GPS data from the rocket with computer vision on the drone to enable high enough accuracy for capture.

UNIVERSITY STUDENT ROCKETRY COMPETITION

Competition to build a multi-stage rocket capable of reaching the maximum altitude on a limited total motor impulse (640 Newton-Seconds).

**SKILLS**  Composites manufacturing, precision machining, avionics design and manufacturing, mechanical design

**TOOLS**  Creo, CNC lathe, CNC router, OpenRocket, Stratasys 3D printer, soldering equipment, hand tools

**RESULTS**  Currently awaiting fall 2017 launch
PLANNED PROJECTS 2017-18

CANSAT

We’ll be competing in CanSat for the second time. Leveraging our experience from last year, we aim to place in the top 10 of competitors.

LEADS Amanda Brown, Whitney Huang and Bhaskar Roberts
BUDGET $5,000 and 10 project members
SKILLS CAD, 3D Printing, PCB design and manufacturing, RF communications design, fluid mechanics analysis, microcontroller programming
TOOLS Creo, KiCAD, EAGLE, Arduino, Stratasys and MakerBot 3D printers, Epilog laser cutter, electronics shop tools, machine shop tools, wind tunnel

INTERCOLLEGIATE ROCKET ENGINEERING COMPETITION

Design, build and launch payload and rocket to 10,000 ft. The rocket will implement roll control throughout the flight and the payload will be used to conduct a science experiment.

LEADS Jorge Reyes, Carter Green
BUDGET $6,000 and 15 project members
SKILLS CAD, 3D Printing, PCB design and manufacturing, RF communications design, flight trajectory simulations, microcontroller programming, control systems design
TOOLS Creo, KiCAD, EAGLE, Fritzing, MATLAB, Arduino, Stratasys and MakerBot 3D printers, Epilog laser cutter, electronics shop tools, machine shop tools, wind tunnel
PLANNED PROJECTS 2017-18

NASA CUBESAT LAUNCH INITIATIVE

Collaborate with laboratory at Princeton Plasma Physics Lab to assist in the design and manufacturing a cubesat that will test a PPPL-designed plasma thruster. Cubesat will compete for a launch slot via NASA’s cubesat launch initiative.

LEADS Mark Scerbo, Jacob Simmonds (PhD at PPPL)
BUDGET $5,000 and 10 project members
SKILLS CAD, PCB design and manufacturing, RF communications design, flight computer programming, thermal/vacuum and vibration testing, spacecraft systems engineering
TOOLS Creo, KiCAD, MATLAB, CNC mill, Epilog laser cutter, Stratasys 3D printer, electronics shop tools, machine shop tools

MARS RESEARCH STATION

The research station is one of two simulated Mars base habitats, which enables scientists to conduct field exploration operations in the same style and under many of the same conditions as they would on the Red Planet.

LEAD Hemani Kalucha
BUDGET $2500 and 5 project members
SKILLS Depends on the design of the experiment but can include robotics, biological sampling, payload development, psychological testing, and other aspects of life on a new planet
TOOLS Depends heavily on the type of the experiment
PLANNED PROJECTS 2017-18

HIGH-ALTITUDE BALLOON LAUNCH
INTERNAL CLUB PROJECT

Design, build, and launch a high-altitude balloon with a payload capable of sampling the atmospheric microbiome. Collaborating with a laboratory in the Princeton Department of Geosciences to analyze the collected samples.

LEAD Mike Fuerst

BUDGET $1,000 and 10 project members

SKILLS CAD, RF communications design, microcontroller programming, scientific payload development

TOOLS Creo, KiCAD, Arduino, electronics shop tools, machine shop tools, thermal/vacuum testing

HIGH-POWER ROCKETRY
INTERNAL CLUB PROJECT

Provide new members with a hands-on introduction to high-power rockets, CAD, and electronics while enabling interested new members to obtain L1 (and higher) certifications with the National Association of Rocketry (NAR).

BUDGET $2,000 and 15 project members

SKILLS CAD, 3D Printing, PCB design and manufacturing, microcontroller programming, trajectory simulation

TOOLS Creo, KiCAD, Arduino, Raspberry Pi, MakerBot and Ultimaker 3D printers, electronics shop tools, machine shop tools

RESULTS Freshmen and sophomores with NAR L1 certification, as well as experience in designing payload structures in CAD, developing electronic sensor payloads, and writing code to automatically collect, store, and transmit data and telemetry.
PRINCETON SPACESHOT

Design, test, build, and launch a two-stage high performance sounding rocket to over 100 km in altitude. Will be the first college-built rocket to reach outer space, break the record for the highest altitude reached by an amateur rocket, and break the altitude record at Spaceport America. Design philosophies of elegant simplicity, extreme performance, low cost, and reliability. High performance materials and electronics allow for unprecedented peak altitudes for a given impulse. Second stage based off of the highly successful Project Stratos single stage design which reached M3.05 and 39,125 ft on less than 5,000 n-s of impulse.

LEAD  Coleman Merchant

BUDGET  $10,000 materials, $10,000 launch cost

SKILLS  CAD, FEA, rapid prototyping, CNC machining, prepreg composite construction, basic electronic design, thermal/aero simulation

TOOLS  Creo, SolidWorks, CNC machines, 3-D printers, autoclave, electronics shop tools, machine shop tools
COMMUNITY ENGAGEMENT

MONTHLY COMMUNITY ROCKET LAUNCHES

We invite everyone on our email list - over 300 Princeton students and 150 local families - to monthly launches on Princeton’s campus. We give demonstrations of our rockets and introduce people to the aerospace engineering field, as well as giving them an opportunity to build and launch their own small rocket kits.

VISITING LOCAL ELEMENTARY SCHOOLS

We make regular visits to local elementary schools in the Princeton area, where we launch rockets and explain the scientific principles of rocketry. Last year we engaged 250 students in these demonstrations, and we hope to increase that number in future years.

INVITING SPEAKERS TO PRINCETON’S CAMPUS

We invite a major speaker to give a public lecture on Princeton’s campus at least twice every year. Last year, we were visited by Astronaut Brian Binnie and Virgin Orbit propulsion engineer Josh Ellis. This year, our fall speaker is ESA Director Johann-Dietrich Wörner.

COLLABORATION WITH SWE

Each semester, we partner with SWE (Society of Women Engineers) to help host more than 70 high school students on Princeton’s campus. At these events, we give talks on the science and engineering behind rocketry, demonstrations of rocket flights, and information about careers in aerospace.
To support our ambitious goals, the Princeton Rocketry Club is seeking sponsors for the 2017-2018 school year. In return for monetary and in-kind donations, PRC provides several sponsorship packages to help thank our sponsors. The chart below details the various benefits sponsorship provides. If you would like to provide in-kind donations such as hardware or materials for our projects, we will attribute the value of those donations to your sponsorship level. Additionally, if you’d like to sponsor a specific project, please let us know.

As a student organization within Princeton University, PRC is a 501c3 Nonprofit. All donations are tax deductible.

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If you are interested in sponsoring Princeton Rocketry Club, please send an email to rockets@princeton.edu.