Matthew Vernacchia

Ph.D. Candidate, MIT Department of Aeronautics and Astronautics

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Core expertise: design, analysis and prototyping, applied to rocket propulsion systems and robotics software.

Programming: python, C++, git

CAD: Solidworks, Onshape, GD&T

Fabrication: 3-axis CNC mill, CNC lathe, additive manufacturing (plastic and metal), composite layups, polymer casting, solid rocket propellant production.

Education

Massachusetts Institute of Technology Cambridge, MA

Ph.D. in Aeronautics and Astronautics, Space Propulsion Aug 2017 – Present

Develop a transonic rocket propelled UAV. Design, produce and test ultra-slow-burn solid rocket motors. Manage a team of undergraduate research assistants.

Key classes: 22.611 Intro to Plasma Physics I, 2.s998 Additive Manufacturing, 18.6501 Statistics.

S.M. in Aeronautics and Astronautics Feb 2015 – June 2017

5.0/5.0 GPA. Thesis focus: solid rocket propulsion for small UAVs.

S.B. in Aeronautics and Astronautics with Information Tech. Aug 2011 - Feb 2015

4.9/5.0 GPA.

Work Experience

Space Exploration Technologies Hawthorne, CA

Dragon Propulsion Intern July – Sept 2017

Develop propulsion FDIR algorithms. Automate flight-critical propulsion component tests. Model thermal response of spacecraft thrusters. Design & build pneumatic test hardware.

Guidance, Navigation and Control Intern June - Aug 2015, 2014, 2013

Model uncertainty in spacecraft docking maneuvers. Simulate human interactions for control interface testing. Integrate a flight simulator in C++. Train NASA astronauts to fly a simulator and collect feedback on UI/UX and handling qualities. Simulate lighting conditions using ray tracing. Design and execute tests for a LiDAR sensor. Program and operate a large (400 kg) robot arm.

NASA Jet Propulsion Laboratory Advanced Robotics Controls Group Pasadena, CA

Robotics Intern June - Aug 2012

Develop a hand gesture UI for human-robot interaction in MATLAB and C. Decode hand gestures from muscle activity signals using machine learning in MATLAB. Publish in IEEE International Conference on Robotics and Automation.

Projects and Conferences

Caltech Space Challenge Pasadena, CA

Spacecraft Concept Subteam Lead March 2017

Develop system architecture for a lunar propellant depot in an intense weeklong hackathon with top students from around the globe. Conceptualize a spacecraft to ferry propellant from lunar surface to orbital depot. Present concept to Caltech Faculty and JPL engineers.

MIT Rocket Team Cambridge, MA

Lab Safety Manager Aug 2015 – June 2016

Plan lab renovation. Identify safety hazards and implement protection and mitigation.

Propulsion Lead May 2014 – June 2015

Design, manufacture and test-fire a 2 kN liquid bipropellant rocket engine with an aerospike nozzle. Win 1st place in Intercollegiate Rocket Engineering Competition.

President May 2013 – May 2014

Manage a team of classmates. Grow team membership from 3 to ~40. Educate team members about rocketry and help them to earn High Powered Rocketry certifications.