

Student Space Systems

at the University of Illinois at Urbana-Champaign



December 2015

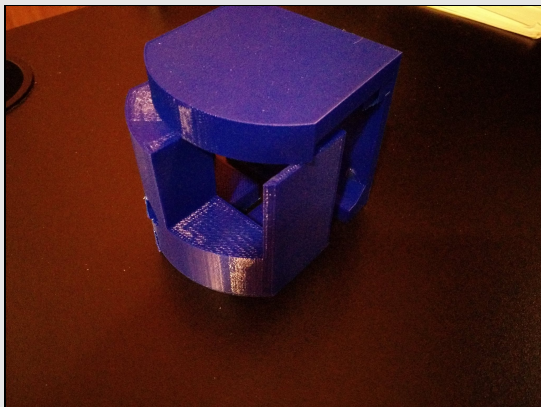
Mission Statement: To engage students in modern high power rocketry and to promote the advancement of rocket research. In addition, we aim to allow our members to gain experience working with propulsion, avionics, structures, safety, and outreach while maintaining a professional setting.

Outlook

- We have a new External Director, Sean Nachnani!
- Olympus (Phase III) launch delayed to February 6th at Friends of Amateur Rocketry site in California.

Structures

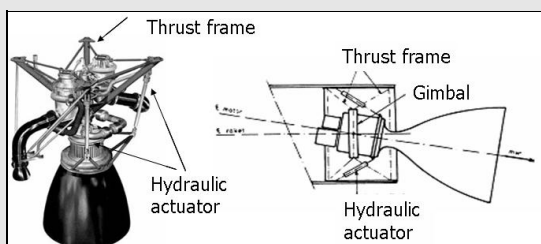
The Department of Structures is currently wrapping up work for this semester and preparing to start construction when we return from winter break. The three Phase IV teams, Airframe, Payload Integration, and Engine Integration are all about to complete their Preliminary Design Review. The Launch Tower team is working on an innovative design for ground architecture, and the Flight Simulation team is currently working on analysing previous rockets in ANSYS Fluent. We are looking forward to bring together all of these projects next semester to complete the Structures aspect of the Phase IV rocket.



A 3D prototype of the camera mount for Phase III printed in the BIF MakerLab.

Propulsion

The Department of Propulsion has recently carried out its departmental Preliminary Design Review. This summarizes the concept for all the projects this year. Hybrid Engine is designing a O-class system that runs on Paraffin and Nitrous Oxide and will fly on Phase IV; meanwhile, the liquid engine team is designing a Q-class system that runs on Methane and Oxygen. The teams are looking to utilize Laser Sintering technology to build the components. Finally, the Motor Controller team has recently built the controller for hybrid. The fuel for GORE has arrived, so testing will take place in the remainder of the semester.



The Thrust Vectoring subsystem is researching the use of a gimbal mechanism to alter the direction of thrust.

Avionics

The Department of Avionics is researching it's nine projects at full speed. The Architecture teams are currently focusing on introducing fault tolerance capabilities into their Phase-IV motor controller with redundancies and emergency kill switches, and the Phase III avionics bay is nearing completion. Through range testing, the department achieved a 7-mile long transmission with the bay. A partially functional version was already put on display for engineers from Rockwell Collins and SpaceX, and additional functionality including Kalman-filtered altitude sensing is being developed.



Several SSS members take a trip to the "corn" to conduct range tests.

Special Projects

The Department of Special Projects has continued to develop interesting technology this summer, adopting Project Hummingbird from the department of Avionics. Hummingbird is a project to build a fully autonomous quadcopter. Special Projects's other group, Stage Separation, is researching explosive separators as opposed to mechanical separators, as well as the fundamental risks involved with stage separation. As always, Special Projects is pushing SSS's knowledge and experience by devoting many engineer-hours to R&D.

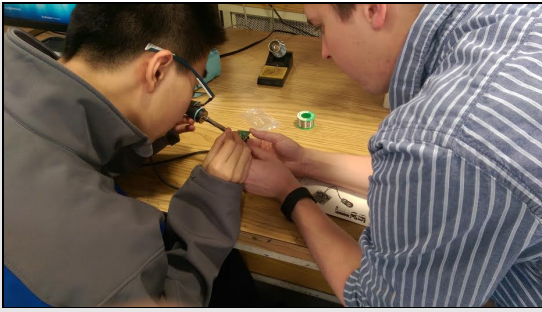


New members may participate in the Level One Project in which they can build their own kit rocket.

Outreach

SSS and Alpha Omega Epsilon sorority held a soldering workshop at STEMx for high schoolers! The students learned the basics of soldering and assembled interactive LED kit panels.

The external department is engaged with corporate outreach, educational outreach, and recruitment. If you are at all interested in joining, contact External Director, Sean Nachnani at nachnan2@illinois.edu.



Featured: David Degenhardt assists a high school student in soldering a LED board.

In The News...

- SpaceX completes static fire of its SuperDraco thrusters as development testing for NASA's Commercial Crew Transportation Capability Program (CCtCap). The company is expected to return to flight next month with OrbComm OG2. [For further reading.](#)
- Blue Origin New Shepard rocket completes historic flight to Karman line (100km) and vertical landing at Texas launch site. [For further reading.](#)
- NASA and Boeing award contracts nearing \$1.4b to Aerojet Rocketdyne to build engines for CST-100 capsule and SLS. [For further reading.](#)

Department Meetings

- Special Projects - Director: Nick Johanson, njohans2@illinois.edu
 - Monday 8pm, Talbot 225A
- Structures - Director: David Degenhardt, degenha2@illinois.edu
 - Tuesday 7pm, MEB 335
- Avionics - Director: Mathew Halm, mhalm2@illinois.edu
 - Wednesday 7pm (biweekly), Talbot 225A
- Propulsion - Director: Florin Ghinet, ghinet2@illinois.edu
 - Thursday 8pm, MEB 135
- Outreach - Director: Sean Nachnani, nachnan2@illinois.edu
 - Thursday 7pm, MEB 135

Contact Us

- Check out our [Facebook page!](#)
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- Learn more through our [website](#). It is currently in development.
- Send us any comments, concerns, or questions at [uiuc.sss@gmail.com!](mailto:uiuc.sss@gmail.com)