Student Space Systems

at the University of Illinois at Urbana-Champaign

4.8.2015

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

Outlook

- The last **general meeting** this semester will be this **Wednesday, April 8th at 7pm in 103 Talbot**.
- We have a new website! Any feedback or suggestions for our web developer Andrew Yang (ayang14@illinois.edu) are strongly encouraged.
- SSS booth at Engineering Open House attracts large audience!

Structures

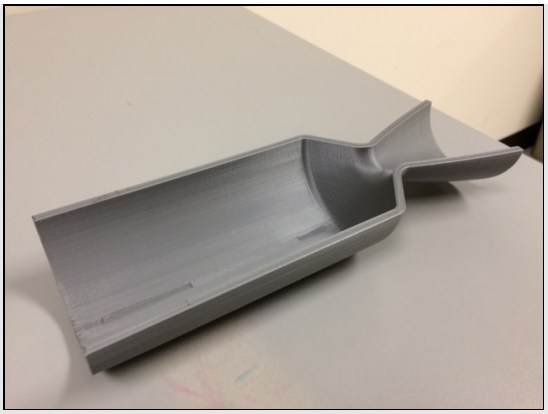
Several projects in the Department of Structures are moving along at full speed as the academic year comes to a close. The Carbon Fiber Fin group has manufactured its own composite plate in the Aerospace Composites Lab and is currently researching fin concepts for the Phase III rocket. The design team of the Phase III rocket is currently working on simulations and is expected to finish the design within a month. Once parts arrive in May, the department will move forward with construction of the rocket with the goal of meeting a launch date in Fall 2015.

Steven Jurus lays down a sheet of fiber glass in the Composites Lab.

Propulsion

*Correction: The previous issue stated that the prototype hybrid motor would be of L-class. Since then, the size of the combustion chamber was increased to allow 5kN of thrust and 15,000N*s of impulse with a 3 second burn time. This new impulse changes the motor to N-class.*

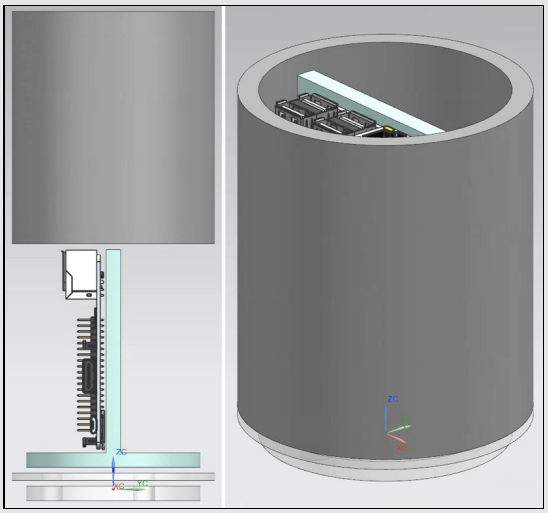
The Department of Propulsion has entirely completed the hybrid motor design review. Dubbed G.O.R.E. (Gaseous Oxidizer Rocket Engine), the motor will use HTPB and nitrous oxide to put out 5kN of thrust. With the board presentations completed, funding has been approved and allocated to all subsystems. Now, they will purchase their parts and assemble the engine shortly after. Testing will take place before the end of the semester at Willard Airport; the department expects to conduct two static test fires lasting six seconds each.



A 3D printed model at 1:1 scale of the G.O.R.E. mk1 engine.

Avionics

The Department of Avionics is currently in the build phase. The Project Hummingbird team has mostly constructed the quadcopter frame and has completely assembled the control unit. Its focus is now on the programming. The Launchbox team is taking inventory of the parts it received, courtesy of Element14, and plans to complete the construction in the next few weeks. With regards to Phase II, the programming is largely finished; the next order of business is packaging the bay. Finally, the Phase III team is finalizing designs on the payload structure and preparing a parts list.



The avionics bay that will fly on the Phase III rocket.

Special Projects

The Department of Special Projects is continuing work in all three of its sections: R&D, Space Grant, and Level 1 Certification. In R&D, the first half of the RCS prototype has been constructed. Currently, the team is focusing on integrating the electronics that allow the Arduino to control the entire system. With regards to Space Grant, the parts list has been finalized, and now those parts are arriving. Soon, the electronics will be built and tested, and the rocket itself will be assembled. As this exciting semester comes to a finish, it appears all of the designs can finally be realized.

The holding tank and regulator system for RCS along with the electronics, which are in progress.

Launch Systems

Launch Systems's main project, a scalable launch tower, is currently in the design phase. The tower needs to meet several requirements, including horizontal to vertical capabilities. If you are interested in helping with the design, send Nick Campbell an email at ncampbe2@illinois.edu.

The launch tower needs to offer low friction and be scalable to larger rockets.

Outreach

Last month, SSS took part in the annual Engineering Open House (EOH) to further its educational outreach campaign. Among the numerous exhibits were the ever popular DIY sharpie rockets, live demonstrations of the Space Shuttle Atlantis heat shield tile, and walk-throughs of the club. SSS shared its founding vision and future plans to excited crowds of students, children and parents. SSS also established connections with representatives from other colleges who requested SSS to conduct ed-out events on their behalf. Thanks to all our volunteers who contributed to our successful exhibit!

The SSS booth in the basement of Talbot Laboratory Friday morning of EOH.

In The News...

- SpaceX Falcon 9 will soon receive an improvement to the Merlin 1D engine that will yield a 30% increase in performance necessary to land the first stage from GTO missions. For further reading.
- ULA's next generation launch vehicle will be named by popular demand. Vote online here by April 9th. This rocket will eventually replace the Atlas 5 and Delta 4 (excluding Delta 4 Heavy). Its BE-4 engines are being developed with Blue Origin and its liquid hydrogen upper stage with XCOR Aerospace. For further reading.
- Virgin Galactic enters satellite launch industry with opening of new factory to build LauncherOne system. It will be launched at altitude by WhiteKnightTwo, similar to SpaceShipTwo. It is estimated to deliver 230kg to LEO for $10 million. For further reading.

Department Meetings

Special Projects now has a **new meeting** time and location.

- Launch Systems - Director: Nick Campbell, nickcampbell94@gmail.com
  - Tuesday 6pm, Talbot 302E
- Structures - Director: David Degenhardt, degenha2@illinois.edu
  - Tuesday 7pm, Talbot 302E
- Avionics - Director: Mathew Halm, mhalm2@illinois.edu
  - Wednesday 8pm, Talbot 302E
- Special Projects - Director: Max Archer, m4rch3r@gmail.com
  - Thursday 7pm, Everitt 168
- Propulsion - Director: Florin Ghinet, ghinet2@illinois.edu
  - Thursday 6pm, Talbot 302E
- Educational/Corporate Outreach - Director: Jake Goldrich, jjgoldr2@illinois.edu

Contact Us

- Check out our Facebook page!
- Follow us on Twitter!
- Learn more through our website. It is currently in development.
- Send us any comments, concerns, or questions at uiuc.sss@gmail.com!