Student Space Systems

At the University of Illinois

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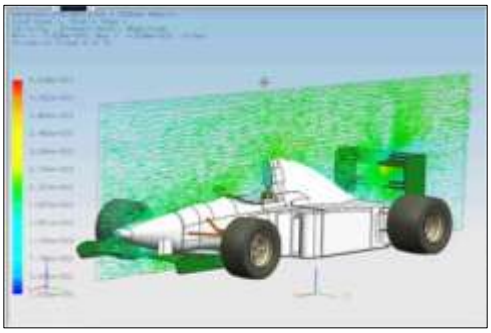
Mission Statement: To engage students in modern high power rocketry and to promote the advancement of rocket research. We also give students the experience with working in propulsion, avionics, launch systems, structures, safety, and outreach while maintaining a professional setting.

Outlook

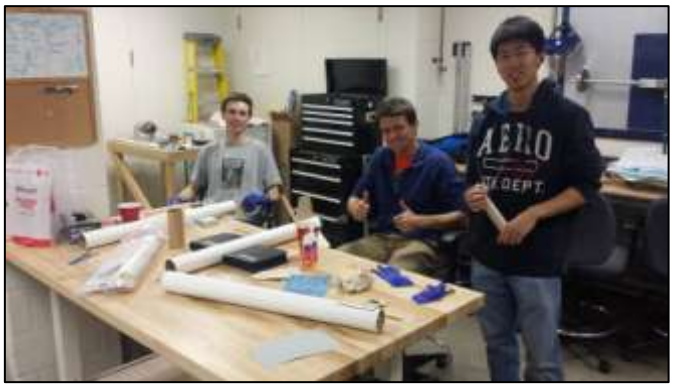
- Sierra to launch from Ash Grove, IN on 11/15 (rain date: 11/16). All are invited to watch!
    - Here are driving directions: www.indianarocketry.org/sites/ash-grove/
    - Sign up to carpool! First come, first serve. https://docs.google.com/spreadsheets/d/1oMyFizZ5l0p4Y3QaP4VxrnoYIvm_WNUNshulxBelv90/edit?pli=1#gid=0
- General meeting in 103 Talbot on 11/13 at 8pm

Structures

Structures is currently researching materials and the model software necessary to design the Phase III rocket, which will be of original design and feature composite materials. This rocket has an altitude goal of 30,000 feet and will achieve supersonic speeds thanks to an O-class motor. It will be the largest and most powerful rocket the school has ever produced. Research is ongoing, and a design may be ready as early as the end of the semester. Structures also puts out training events like CAD workshops to assemble rapidly a team of skilled builders prepared to fabricate the Phase III rocket.



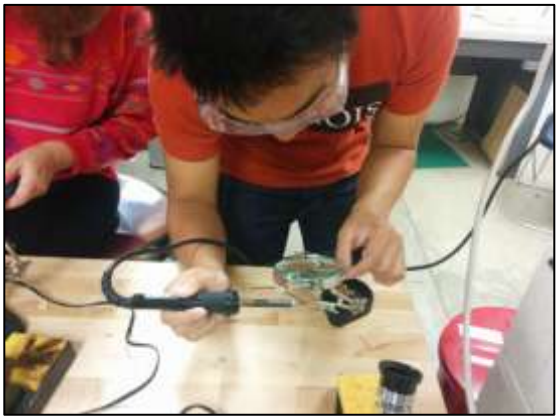
Propulsion

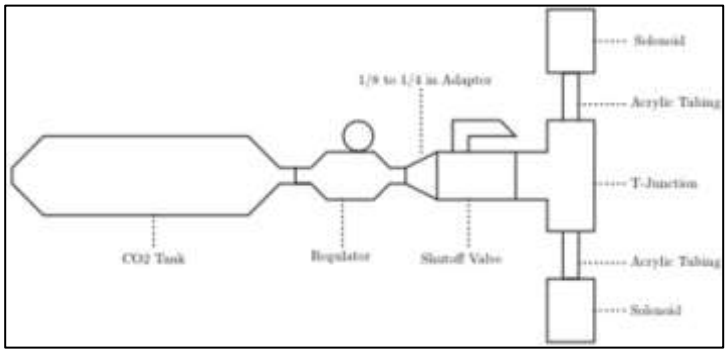


Propulsions is at work developing the hybrid engine for the Phase IV rocket. Hybrid motors borrow characteristics from solid and liquid motors; yielding advantages in handling, throttling, and safety while limiting otherwise pernicious obstacles. Subdivisions of Propulsions include the propellants, nozzle, structure and ground structures teams. As of now, the propellants team has decided on testing HTPB and paraffin wax with O_2 and N_2O and is now entering the design review phase. The nozzles and structure teams are choosing materials for the engine and starting their designs. The ground structure team is cooperating with Illinois Space Society (ISS) on a test stand concept and with the structure team to integrate this system.

Avionics

The Avionics team has four ongoing projects: Hummingbird, Sierra Avionics Bays, Robust Sensor Package, and Launchbox. Project Hummingbird is creating a quadcopter from scratch which features GPS and telemetry. It will also feature Kalman filtering, a common algorithm for guidance and navigation of vehicles. The Sierra team is currently constructing one avionics bay for a redundant parachute ejection system and another for telemetry-enabled imagery and measurement package to go on the Phase II 'Sierra.' Robust Sensor Package will effectively create a reusable avionics package on a chip, and Launchbox will yield a long range, NAR compliant electronic ignition system for future launches. These two projects are in the design phase.





Special Projects

The Reaction Control System project is well under way! The system will allow for increased handling in-flight by expelling jets of compressed CO_2. The RCS team has a complete design for the prototype system, and is awaiting funding to be approved for the project to continue. A prototype is slated to be built by the end of the semester and testing will follow. A working iteration will fly as early as next semester.

Launch Systems

Launch Systems is focused on fabricating the launch rails and support structure for the launch tower, which will be instrumental in future launches. Designs are expected to be complete by December; actual construction is scheduled for completion in the Spring. This will require a broad array of disciplines like welding, grinding, cutting, drilling.

Outreach

Recognizing that our biggest legacy will be those whom we inspire by our work, our focus on Education Outreach through activities with younger students at local schools is paramount. This past Sunday, three SSS members traveled to Sadorus, IL to present to a local 4-H youth group. The students were challenged to identify the basic components of a rocket and their purposes. The kids were awed by a live demonstration of the thermal properties of a real tile from Space Shuttle Atlantis as they learned the importance of choosing proper materials. The day's event culminated with a true engineering challenge in which they had to build an apparatus to transport ping-pong balls across containers using only household items like straws, clay, and paperclips. The supervising SSS members were impressed by the ingenuity, teamwork, and creativity of the 12-year-olds, especially of team "Scoopers," which managed to transport a total of 24 ping-pong balls in just 90 seconds!

In the news…

- Orbital 'Antares' rocket launch failure destroys Wallops facility and delays cargo resupply to ISS
- Virgin Galactic SpaceShipTwo in-flight engine failure kills pilot, injures another.
- SpaceX files FCC application to land CRS-5 first stage on floating barge

Get involved! Here are the upcoming department meetings:

- Structures – Team lead: David Degenhardt, degenha2@illinois.edu
    - Tuesday 7pm, Talbot 225A
- Propulsion – Team lead: Florin Ghinet, ghinet2@illinois.edu
    - Saturday 7pm, Talbot 225A
- Avionics – Team lead: Mathew Halm, mhalm2@illinois.edu
    - Wednesday 8pm, Talbot 225A
- Special Projects – N/A
    - Thursday 7pm, Talbot 225A
- Launch Systems (formerly 'Ground Systems') – Nick Campbell, nickcampbell94@gmail.com
    - Tuesday 6pm, Talbot 104
- Educational Outreach – Team lead: Jake Goldrich, jjgoldr2@illinois.edu