

ILLINOIS SPACE SOCIETY

Corporate Sponsorship

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Meet the Illinois Space Society

The Illinois Space Society (ISS) is a SEDS chapter at the University of Illinois at Urbana-Champaign. Throughout its 15 year history, ISS has been involved with multiple technical projects ranging from designing, building, and flying high powered rockets, to constructing a nitrous oxide and paraffin wax hybrid rocket engine. Members are trained through workshops to expand their knowledge during their time working on these projects. The society also enriches its members through professional development opportunities. During the school year, society members are provided the opportunity to attend a variety of trips, such as the Goddard Memorial Symposium, to network, learn, and speak with professionals already in industry. Finally, the society works to educate and inspire the next generation of engineers through a multitude of educational outreach events such as Illinois Space Day (ISD) and space workshops at local schools.

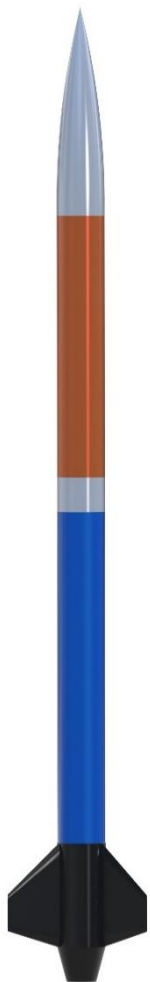


What's Next: IREC

In 2018, the Illinois Space Society plans to participate in the Intercollegiate Rocket Engineering Competition (IREC). IREC has been hosted by the Experimental Sounding Rocket Association since 2006 and has been the main event at the annual Spaceport America Cup (SA Cup) since 2017. It is the world's largest rocket competition and has doubled in size every year since 2013. Last year, 116 teams from all over the world competed in six categories differentiated by altitude and propulsion systems. The Illinois Space Society plans to take part in the 10k ft SRAD Hybrid/Liquid category. This would involve reaching an altitude of 10,000 feet using a student researched and developed hybrid or liquid propulsion system.



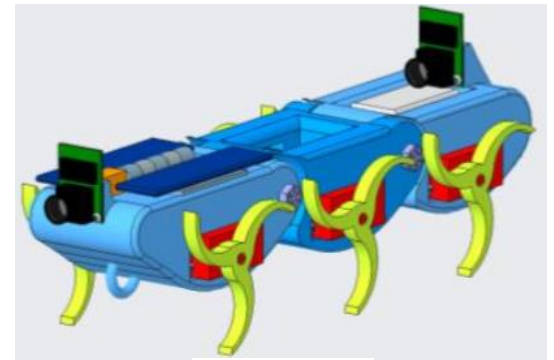
Overview of Preliminary Vehicle Design



The Illinois Space Society will attempt to build its most complex rocket ever. This rocket, yet to be named, will carry a payload weighing at least 8.8 lbs to an altitude of 10,000 ft. It will be powered by a hybrid engine. The solid fuel is a pressure-casted, paraffin wax grain and the liquid oxidizer is nitrous oxide, the same oxidizer used in high performance drag cars. Its structure will be composed of carbon fiber and glass fiber composites due to their incredible strength and low weight.

There are many possibilities for what the team will send to that altitude, including an autonomous drone, a deployable rover, or alternative ideas inspired by other organizations here at UIUC. In order to accomplish all of this, we will need to coordinate with other student organizations, such as Formula SAE, and with outside organizations such as Central Illinois Aerospace to ensure that we are effectively using the pool of knowledge that is available.

Design Specification Objectives	
Length	12 ft
Weight	70 lbs
Altitude	10,000 ft
Propulsion	Paraffin Wax/Nitrous Oxide Hybrid Engine
Structure	Carbon Fiber/Glass Fiber Composites and Aluminum
Payload	TBD



MORRTE

Payload Ideas and Past Payloads

In the past, the Illinois Space Society has built a variety of payloads for the NASA Student Launch competition. From a robotic arm that attaches a piece of the upper airframe before launch, to an image detection camera system with vertical landing legs. Last year's payload was a deployable rover, lovingly named MORRTE. The rover managed to survive a premature ejection from the rocket at 1000 ft and is still in perfect working condition.

IREC presents the Illinois Space Society with the opportunity to choose any payload. Possibilities include a roll stabilization system, a deployable glider, a scientific payload, or a image detection device. Currently, the team is very attached to MORRTE and is strongly considering upgrading it for next year. The team is considering the addition of a challenging deployment scheme such as a parachute or multicopter sky crane!

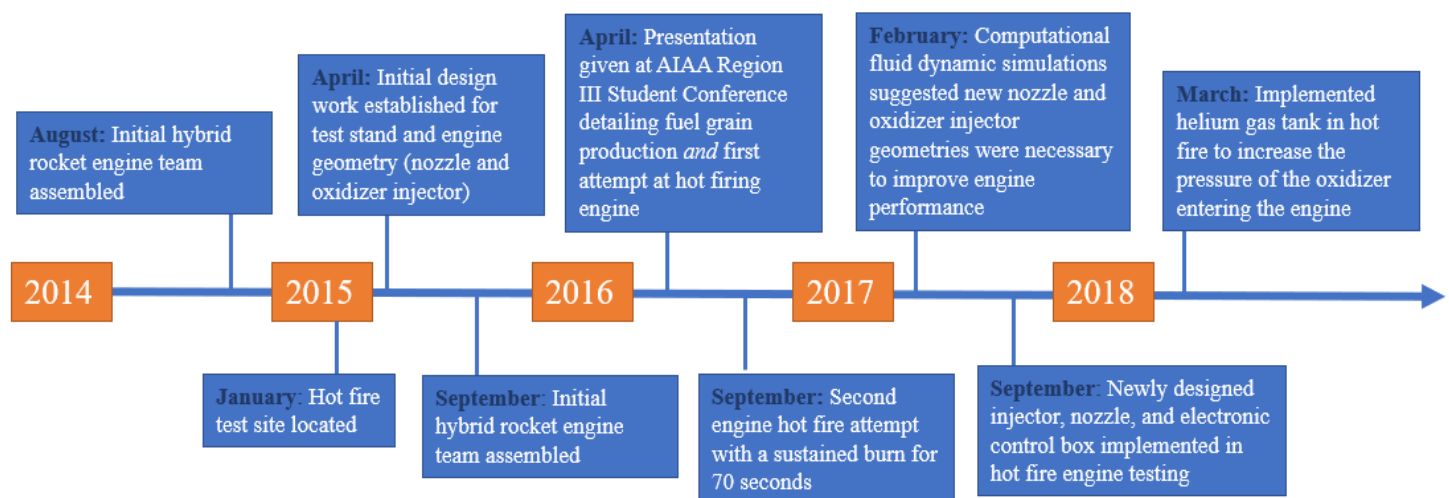
Hybrid Rocket Engine Progress



The hybrid rocket engine team was created in the fall of 2014 as an experimental pilot project within ISS. The society had been primarily focused on competition-based technical projects at the time and its members wanted to expand the appeal of ISS to cutting-edge research driven students. The team spent the first year compiling an extensive collection of research papers and graduate theses pertaining to liquid, solid, and hybrid engine design, fuel grain production techniques, and oxidizer properties. By the end of the 2014-15 school year, initial engine design work was completed, a test stand was built, and a test site was located, just south of the University of Illinois' campus in a retired jet-testing bunker at Willard Airport.

The following two years presented more opportunities for growth and development. In the spring of 2016, the team wrote and published a paper detailing their method for creating paraffin wax fuel grains using a lathe. The method was also presented at the AIAA Region III Student Conference in April 2016. Around that same time, manufacturing of engine components and the test stand was completed, and the team was ready for the engine's first hot-fire test. While the first test in April suggested a significant amount of work still needed to be done, it proved that the team had been moving in the right direction. Soon after, in the fall of 2016, the team had proof that their work was paying off with a one-minute sustained engine burn during a hot fire test.

During the 2017-18 school year, more improvements to the engine and hot fire procedure were made. These improvements included new nozzle and oxidizer injector designs, new electronic control box with automated countdown sequence, and oxidizer tank pressurization to increase flow velocity through the engine. With each successive hot fire, the team learns more about hybrid engine performance. Working throughout the summer of 2018 will enable the hybrid engine team to perfect the design of the engine and transition into designing a full-scale hybrid rocket.



Project Budget Summary

IREC Structures Projected Cost	
Composite Research	\$200
Composite Materials	\$2,000
Avionics	\$500
Nosecone	\$100
Miscellaneous Materials	\$250
Recovery System Costs	\$200
Total Structures Costs	\$3,250

IREC Payload Projected Cost	
Overall Payload Structure	\$500
Overall Payload Electronics	\$500
Total Payload Costs	\$1,000

IREC Hybrid Engine Projected Cost	
Engine Fabrication	\$2,000
Test Stand Improvement	\$500
Hybrid Electronics	\$1,000
Plumbing and Tanks	\$2,000
Sensors	\$500
Miscellaneous Materials	\$250
Total Hybrid Engine Costs	\$6,250

IREC Travel Costs (~10 team members)	
Total Plane Ticket Cost (\$150/person)	\$1,000
Car Rental	\$1,250
Lodging - 3 Hotel Rooms	\$1,000
Total Travel Costs	\$3,250

IREC Competition Fees	
Entry Deposit	\$200
Rocket Fee	\$500
Rocketeer Fee	\$500
Total Competition Fees	\$1,200

Total Project Cost	\$14,950
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Why Sponsor?

While the Illinois Space Society receives some university support, our continued success relies upon generous sponsors like you. With your help, we hope to continue providing enriching educational experiences to students and community members alike. By participating in the largest university level rocketry competition in the world, we will expand on our current engineering skills and challenge ourselves to grow

Sponsorship Levels:

Bronze	Silver	Gold	Platinum
\$100	\$500	\$1500	\$3000

Sponsorship Perks:	Bronze	Silver	Gold	Platinum
Logo on Homepage	Small Format	Medium Format	Large Format	Prominent Format
Logo on Team Shirt		Small Format	Medium Format	Large Format
Logo on Rocket			Medium Format	Large Format
Logo on Sponsors Banner				Large Format
Monthly Team Updates	I	I	I	I
Access to Teams Resume Book			I	I
On-campus Info Session with Team				I
Vote on Rocket Name				I

Other Forms of Sponsorship

There are several ways to support this project other than monetary donations. Whether through information, part machining, tool donations, or any other form of expertise; the society will provide some form of the sponsorship perks listed above decided on a case by case basis.

Closing Remarks

The Illinois Space Society's IREC team would like to extend its gratitude to those who support our vision regarding this project. By lending your support, you invest not only in the project, but also in the individuals behind the rocket. As participants of the IREC competition, lifelong skills of teamwork, communication, decision making, and leadership are developed and strengthened. Any amount of support will help us design, manufacture and launch a rocket in this competition as well as take great steps towards excellence in the field of engineering. Your support is greatly appreciated.

Sincerely,

The Illinois Space Society