

Profiles

[NEWS](#)
[PROFILES](#)
[ARCHIVES](#)
[EXPERTS DIRECTORY](#)
[CALENDAR OF EVENTS](#)
[PRESS ROOM](#)

LEAPFROG: USC Engineering Students Developing a Vehicle to Explore Lunar Ventures

Can USC student talent not only produce a working space vehicle, but an ingenious risk reduction platform for small companies to explore/develop revenue generating business on the lunar surface?

Yes! A group project called LEAPFROG (Lunar Entry and Approach Platform for Research on Ground) has been doing just that. The LEAPFROG team created a prototype module and its full flight system which was tested in September of 2006. Later a second prototype was created and tested with a, more sophisticated follow-on unit, and work will now commence on the first generation vehicle.

While the context is educational, the project has already attracted wide attention because of its innovative approach, sophisticated and novel applications, and early success. Based on the idea of creating a repeatable and low cost prototype flight vehicle that simulates the key techniques required to descend and land on the lunar surface. By doing this, new technologies and processes can be tested on Earth, reducing the significant risk of returning to the lunar surface. Further, the call for sustainable exploration on the lunar surface will ONLY be supported through development of revenue generating business ventures, which LEAPFROG will be able to test directly on earth.

Kristina Rojdev is a PhD candidate for Astronautical Engineering and a member of the LEAPFROG team. Kristina took a few minutes to explain what the imaginations of USC Engineering students are creating:

Help us understand what you are up to:

LEAPFROG is an Earth-based lunar landing test bed. The basic idea is to create a repeatable and low cost prototype flight vehicle that simulates the key techniques required to descend and land on the lunar surface. Its objectives are to provide students with hands-on research and to provide industry with a test bed for performing risk-reduction tests on their instruments.

What drives you to continue pursuing this area of study?

The students working on this project are people that are excited about engineering and space. Many of us are moved and impressed by what the nation was able to accomplish in the 60's when John F. Kennedy announced the goal of getting to the Moon within a decade and doing it with the limited technology that they had at that time. Now, we are faced with a similar goal which is incredibly exciting, challenging, and motivating. The team of students working on this project has a common goal to step up to this challenge and prove that we can contribute to the objective of putting humans back on the Moon.

Describe how your work might impact people's lives, now and in the future.

By doing this research, new technologies and processes can be tested on Earth, reducing the significant risk of returning to the lunar surface. Further, the call for sustainable exploration on the lunar surface will ONLY be supported through development of revenue generating business ventures, which LEAPFROG will be able to test directly on earth.

How did you come up with the idea?

It was a combination of two historical precedents one of which the project lead had direct experience in. The first was the experience from the actual Apollo days of the Lunar Lander Training Vehicle (LLTV) that the astronauts would train on Earth to fly the challenging descent and landing trajectory they would encounter flying to the moon for the first time. It used a jet engine, but had all other elements of a spacecraft. The second was testing done at Edwards AFB Rocket Propulsion Laboratory (RPL) on flight testing kinetic kill vehicles, inside a building! This was the modern day version of the LLTV without a man onboard, but was no-less exciting as it was flying spacecraft in a way that had never been considered, and it was all done inside a hanger-like building. Ironically, both of these program occurred at Edwards AFB in the Southern California desert....which makes them perfect templates for work at USC!

Has anyone ever doubted that your idea could work?

There are many people across the country working on this type of device. There has been constructive criticism and suggestions regarding some of the subsystems on LEAPFROG, and some have doubted that a student team can achieve success on such a complex project.

What is the next step in the innovation process for you (and how might people help)?

Since this is a student project, each year a more sophisticated vehicle and higher performance testbed is developed, building upon the previous years' experiences, successes and failures. So, in the following semester we will be upgrading the vehicle to a more powerful jet engine. In the following years, we would like to tackle the task of using a rocket engine. Of course, all of this requires funding due to the high expense.

What mistake taught you the most?

One of the biggest issues when working with large systems and dangerous hardware is safety. It's easy to become complacent when things are working well, but there is always a failure lurking close by. Usually a failure is due to something that is overlooked or not thought of from the beginning. We always learn from our failures and it makes us safer in the future. However, since we can't always predict the future, it is always best to be as prepared as possible for those unforeseen failures.



GET CONNECTED!

[MORE PROFILES>>](#)

[Site Map](#) | [Privacy](#) | [Careers](#) | [Press](#) | [Contact Us](#) | [USC Home](#)

© 2008 USC Stevens. All rights reserved.