Current Plans

Nova 6

By the end of October we hope to have made another Nova launch, mainly to test several different GPS chips at high altitude. We will also be testing a new design of parachute ejection charge and an IMU (inertial measurement unit) which will provide information about the stability of Nova 6 throughout its flight.

SEDS Space Vision Conference 2007

On the weekend of the 10th November we have been invited to present our work at the Students for the Exploration and Development of Space (SEDS) Space Vision 2007 international conference at MIT, Boston. This is an amazing opportunity to bring our project to the attention of space professionals and sponsors.

SEDS Innovation Challenge 2008

It was at the end of the summer that we became aware of the 2008 SEDS Innovation Challenge. This international competition is for students to launch a rocket an extra 10,000 feet from a balloon above an altitude of 75,000 feet, with complete recovery of all equipment, telemetry and carrying of a school-built payload. The launch date is currently scheduled for early October 2008 to coincide with the week of the X-Prize Cup and will be held in New Mexico. This competition was too close to our own plans to ignore, and we have a one year advantage over all other student teams as we have already developed much of the hardware needed for the project and have experience of working at over 100,000 feet.

We have decided to enter jointly with the MIT Rocket Team, and have already put design processes into motion. This next university term will be spent designing, building and testing the full scale launch-platform that will be flown in the competition. The Lent and Easter terms will be spent developing a full scale companion rocket that will be ground and wind tunnel tested before being tested at altitude. We will also be spending a lot of time studying the aerodynamics and creating computer programs to optimise the flight performance and simulate flight parameters.

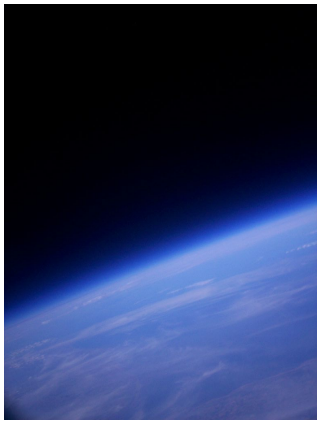
Outreach

We are committed to raising the profile of engineering, aerospace in particular, to the next generation of engineers and we have already carried out several successful school talks in and around Cambridge. We launched one of our flights, 'Nova 5', in front of a large crowd as one of the opening acts of the Cambridge Science Week and ran an all day event with members of the public helping to track the flight. By demonstrating our achievements to our peers and young people in general we hope to show that you don't necessarily need a big budget and a PhD to get involved in exciting projects! In May, we were delighted to be invited to speak about our project to a large group of experienced engineers at the annual joint meeting of the RAeS and the IET (Cambridge branches).

History

CU Spaceflight is a student-run society founded in the summer of 2006, with the aim of lowering the cost of carrying payloads to high altitudes and putting a rocket into space next year. The system that we intend to build is one that is reusable, can accommodate small scientific experiments and will cost less than £1000 per launch.

The official boundary of space is 100km altitude, which presents many problems for low budget projects. However, most of the energy used by a rocket is not used in battling gravity, but in forcing its way through relatively high density air near the Earth's surface, so we decided not to launch from the ground.



The solution that we have reached is to launch a small, light rocket from 30km altitude (around 100,000ft), having passively raised the rocket and ultra-lightweight launch platform with a helium weather balloon. This high altitude experimentation apparatus would be the first of its kind and we have already had interest from the Department for Atmospheric Chemistry and British Antarctic Survey in using the results of our work.

At the time of writing, CU Spaceflight has carried out 5 launches and we have evolved our design concepts, avionics and mechanical systems after each recovery. All systems are designed and fabricated by the CU Spaceflight team. We have had a great deal of success in developing prototype launch, tracking, monitoring and recovery methods that will be used directly in creating the full size rocket and launch-platform.

Above: A photograph taken by a test payload at 32km (105,000 ft), the altitude at which the rocket will be launched.

The launch-platform that we have designed is completely autonomous, and is controlled by PIC microcontrollers, with GPS and status data being relayed to ground over radio. This allows for smooth monitoring and recovery after its parachuted descent, and a very similar system will be used in the rocket. The PIC also controls the three onboard cameras, and systems to cut-down from the balloon and deploy parachutes, depending on real-time parameters such as altitude and position. All exact telemetry and decisions that the PIC processes are stored on a SD memory card for download and analysis after recovery, and all important events such as landing are recorded on video by the onboard cameras. This gives us a huge amount of data from which we can improve systems continually and compare against predictive simulations.

In July of this year we won the Owlstone Photography competition and our work has been featured by journalists across the world including The BBC, C4, New Scientist, Nature, The Guardian, The Times and The Boston Globe.

Right: The photograph that won the Owlstone Photography Prize 2007, entitled "Earth from 32km", that was taken from our first launch, Nova 1