

Portland State Aerospace Society: SEAS Recruitment Grant

A branch of the **IEEE Aerospace and Electronic Systems Society**
at Portland State University

About the PSAS

The Portland State Aerospace Society (PSAS) is a student branch of the IEEE's Aerospace and Electronic Systems Society at Portland State University. Although most of our group is made up of ECE students, the society is open to all of the PSU community. Currently, the PSAS is a group of over 20 students in many disciplines, from electrical and mechanical engineering to chemistry and physics and computer science.

Created in 1998, the PSAS started off as a small group of committed ECE students who wanted to participate in a real-world systems-level aerospace design project. The PSAS became the first student branch of the AESS in the United States later that year, and in early 1999 won the IEEE AT&T Enterprise Award. This \$1000 grant enabled the PSAS to choose an ambitious project: the development of an amateur rocket with a proof-of-concept inertial measurement unit, the foundation to an actively guided inertial navigation system.

Within six months the PSAS launched a first proof-of-concept rocket (Launch Vehicle 0, or LV0) with a small microcontroller and a black-and-white video camera. Almost a year later, Launch Vehicle 1 (LV1) was launched near Bend, Oregon to 3.6km (12,000ft). This vehicle contained a RISC microcontroller flight computer, one of the first amateur-built solid-state inertial measurement units, a color video camera, and a complete bi-directional communications system using amateur radio frequencies.

In addition to these technical projects, the PSAS has been active in educational activities at the university and within the community:

- Group members organized a very successful 'PIC Microcontroller Workshop' to provide an introduction to PIC technology and to share the groups experience with the use of these microcontrollers in two generations of avionics systems.
- The PSAS has sponsored two Capstone Senior Projects in the ECE department at PSU, and plans are in the works for a multi-disciplinary project next year involving the ECE and ME departments.
- For two years the PSAS has represented PSU at the 'Space Days' event at the Oregon Museum of Science and Industry (OMSI), a weekend event which draws thousands of people interested in aerospace and technology, and OMSI has asked the group to return for the 'Space Days' and 'Russian Rockets' events scheduled in the upcoming year.
- The PSAS has also more directly assisted Portland State University's recruitment efforts by actively supporting PSU at the National Engineering Week banquet and the SEAS Open House recruitment event.
- The PSAS website provides a convenient source of information about the group, including technical documentation and movies of the launches.

For more information about the PSAS please visit our website at <http://www.ee.pdx.edu/~aess>.

Current Projects

The PSAS is currently working on a second launch of LV1 with a redesigned flight computer and a more accurate inertial measurement system, scheduled for a Spring 2000 launch near Bend, Oregon. The revised LV1 vehicle (now called LV1b) will again reach 3.6km (12,000ft) using new avionics circuitry and mechanical stabilizers.

In parallel with the work on LV1b, the group is developing the next generation launch vehicle, LV2. This launch vehicle embodies design refinements we have made based on our experience with previous launches, such as a distributed CANbus controller network and a modular airframe. With a planned single-stage apogee of 16.8km (55,000ft), LV2 will be the PSAS test bed for future active guidance and advanced avionics systems.

LV2 also has a large payload space reserved for other university projects, such as the PSAS' Autonomous Recovery System - an autonomous parafoil system that uses a magnetic compass and GPS to navigate recoverable sections of the rocket to a pre-determined recovery site. Other university groups have also expressed interest in using LV2's

payload capabilities for atmospheric sampling and aerodynamics research.

Future Plans

Once LV1b and LV2 have been flight-tested, LV1's inertial measurement unit will be upgraded to a GPS-aided inertial navigation system to be used on LV2 for active guidance. By removing the fins and relying on thrust vectored control and steering jets, LV2 will become one of the first actively-guided amateur rockets. Also, the modular design of LV2 allows for multi-stage launches which will raise LV2's apogee to 30km (100,000ft).

Impact on Recruitment and Retention

Student clubs and available extra-curricular activities are an important component of student life at Portland State University. Unfortunately, few options exist for engineering students. While large student clubs (such as the ASME, IEEE, etc.) exist, very few of these organizations sponsor student projects.

The PSAS provides a multi-disciplinary project framework that provides students with an engaging addition to the academic process. For many students, involvement with PSAS represents an initial exposure to project-based engineering that utilizes the engineering principles and concepts they have learned in school. In addition, these projects provide the type of experience with in-depth sophisticated team design work that hiring managers hope to see on a resumé.

The group has already seen a sizable increase in membership from community involvement and word-of-mouth advertising. The PSAS has proven to be a good draw for local talent, from high-school students who intend to choose PSU as their university to transfer students who first join the PSAS as community members, then transfer to PSU to continue working on the project. The PSAS focuses on the exciting aspects of engineering, which is a major attraction to potential students who are daunted by the 'dry' appearance of engineering education.

Another mode of outreach is the PSAS website, which has proven to be a successful advertising tool for the group and for PSU. The site receives a large number of hits each month, largely from academic and industry domains. As the Web becomes an increasingly more important communications medium, prospective students spend more time scouring academic webpages for information that will help them choose a university. The PSAS site presents to the world a face of PSU that can attract not only more students, but also more of the type of students who will help to make the PSU engineering department a success.

The upcoming launch of LV1b provides an opportunity for the engineering department to capitalize on the PSAS' ability to reach and spark the interest of the local community and indirectly the national community. We are working on obtaining local television and other media coverage during the launch, as well as writing technical articles for nationally distributed magazines such as the IEEE's 'Potentials'. The spring launch will demonstrate the type of engineering projects being done at PSU and will generate interest in the PSU engineering program.

A Need for Funding

To most successfully position the group for maximum effective advertising capability, we feel that it is time to develop a Press Kit and focus on more public relations activities. The benefits of this affect everyone involved: the group can attract new talent, the SEAS gets assistance in recruiting new members, and Portland State University gets the type of media attention that money just can't buy. Or can it?

We are looking for funding to help facilitate the upcoming launch, primarily in the area of public relations. A grant of \$2000 in addition to our own 'out of pocket' funding will be enough to allow us to advertise, prepare, and conduct a professional and safe launch of our LV1b project. The following page shows a budget for the proposed use of the funds.

Please address any questions to aess@ee.pdx.edu.