



Student Research and Development

The University of Stuttgart's First Small Satellite is Being Launched into Space

On Friday, July 14th, 2017 at 8:36 (CEST), the University of Stuttgart's first small satellite will be launched. The small satellite, called Flying Laptop, will be launched into space from Baikonur in Kazakhstan with a Soyuz-2 / Fregat rocket. The one-failure-tolerant satellite bus was designed, built, and qualified almost entirely by students from the University of Stuttgart.

Flying Laptop's in-orbit mission goals are earth observation and verification of new space technologies. It will carry out multi-spectral Earth observation, detect Near Earth Objects, and use signals from ships to identify ship traffic.

Some of the technologies being verified in orbit are equipment using commercial components (COTS), a novel on-board computer, an innovative release mechanism for the solar panels that was developed in house, and the FPGA-based payload computer that gave Flying Laptop its name. In addition, the satellite's data transmission system OSIRIS shall demonstrate high speed data downlink capabilities using an optical terminal. This device as well as the ship signal receiver AIS were developed by institutes of the German Aerospace Center (DLR).

"The project's main pillars are education, scientific research, and the verification of new technologies. In terms of education, the launch is an accomplishment not only for the university but for each and every student who worked hard to apply what they learned in class to a real project," says Project Lead and Professor for Satellite Technology Sabine Klinkner from the University of Stuttgart's Institute of Space Systems. "Over 120 student

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theses and more than 20 Ph.D. theses have been written based on the Flying Laptop project. This is a great educational accomplishment for them, as most people have to wait until after their studies to be part of a project like this.”



Flying Laptop-Team. Foto: University of Stuttgart / Jonas Keim

To realize a project of this size and complexity within an academic environment was a demanding task. However, the use of commercial components whenever possible and the involvement of students through their theses (diploma, bachelor, and master) and doctoral dissertations made it possible to build a robust yet affordable small satellite.

The additional tasks relating to the Flying Laptop Project varied broadly: While developing the satellite, the team also focused on the installation of a ground station and a cleanroom for integration. An optics laboratory for the calibration of payloads, a thermal vacuum chamber for the qualification of the components, and a satellite simulator for software verification and operations training were installed, as well. This infrastructure, which is necessary for the development, qualification, construction, and operation of small satellites, paves the way for future satellite projects at the University of Stuttgart.



During the launch and early orbit phase as well as in emergency cases, the students who operate the satellite from the control room at the University of Stuttgart will receive assistance from the German Space Operations Centre (GSOC).

The Flying Laptop Project was supported by multiple partners: Experts in the regional space industry, e.g. Airbus Defence and Space and TESAT, helped with the design process, while the German Space Agency DLR (with funds from the Federal Ministry for Economic Affairs and Energy) and the Baden-Württemberg Ministry of Science, Research and the Arts helped support the launch and the satellite's operation.

On July 14th, the University of Stuttgart's Institute of Space Systems will accompany the launch via Live Tweets through the small satellite's account, @Flying_Laptop. Starting at 8:36 (CEST), you can watch the launch via live stream from Baikonur at <http://www.tv-tsenki.com/live.php>. A press event will be held during one of the satellite's flyovers about three weeks after the launch.

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