IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
In Orbit - Postgraduate Space Education (4)

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HANDS-ON EDUCATION AND STUDENT RESEARCH AT TU BERLIN: SATELLITES, ROVERS, ROCKETS AND SPACE SYSTEM EXPERIMENTS DEVELOPED BY STUDENTS IN AN INTERNATIONAL ENVIRONMENT

Abstract

Technische Universität (TU) Berlin offers a variety of hands-on courses to develop and strengthen knowledge in mission planning, (sub) system design, manufacturing, assembly, integration, testing and operations. The main focus of TU Berlin's Chair of Space Technology is small satellite research and miniaturization. The Berlin Experimental and Educational Satellite (BEESAT) program has launched four satellites to date with four more BEESAT satellites to be launched in 2018. The operation of these satellites is taught in courses where students have the chance to take the spacecraft commander's seat, guided by experienced operators. The background for operations licenses in amateur radio bands is introduced in radio amateur courses specialized for satellite operations. A hands-on electronics course widens the knowledge on electronic circuitry and hardware-related low level programming, enabling the students to better understand satellite hardware and bring in own designs. The TUPEX (TU Berlin Picosatellite Experiment) program has implemented various experiments in the past. In its sixth iteration,

a REXUS experiment which will deploy a free falling unit from a sounding rocket is being developed. The MarconISSta experiment is TU Berlin's first step on board the ISS to investigate RF spectrum use from orbit. Complementing the satellite systems are the Small Exploration Assistant Rover (SEAR) and its robotic family (SEAR 2, BEAR, NEAR, POLARIS). Their objective is to autonomously explore planetary surfaces and compete with other student and professional teams in national and international robotic challenges. The DECAN sounding rocket program works on a two-stage rocket incorporating environmentally friendly water engines.

In addition to the German lecture courses, TU Berlin introduced an international master of space engineering study program that offers 20 to 30 students from all over the world the opportunity to participate in the chair's activities and learn in an international environment. Whenever possible, both study programs are brought together to encourage technical and cultural exchange.

This paper will introduce the various hands-on courses and experiments that are conducted at TU Berlin. It will highlight educational insights and technical details of the projects along with lessons learned.