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HEPTA-SAT TRAINING PROGRAM: INTERNATIONAL KNOWLEDGE TRANSFER USING
HANDS-ON TYPE CUBESAT EDUCATION

Abstract

In this paper, we introduce a hands-on type knowledge transfer program using HEPTA-Sat Training Kit in which university faculties and teaching assistants visit universities or high schools, or inviting participants, and teach the fundamentals of space engineering through the assembly, testing and integration of the Training Kit. This visiting class is available for technical/science/managerial education as the first step on the nano-satellite development. HEPTA-Sat is a small satellite educational kit, realizing low cost by using an inexpensive consumer hardware analogs to real CubeSat concept and architecture. The teaching material is composed of a textbook containing information from the foundation to application of electric / electronic circuits / software required at each subsystem level, and a small-satellite hardware which can be repeatedly disassembled / assembled / tested from component level to system level. This makes possible to use for technical/science/managerial education by providing a hands-on experience of all stages and aspect of a real satellite mission from mission and subsystem design, component selection, assembly and integration and tests at low cost and in short term (several days to several weeks). HEPTA-Sat Training Program offers an international knowledge transfer network consisting HEPTA-Sat Training Kit, HEPTA-Sat instructors (university faculties) and students with appropriate knowledge sharing methods. The uniqueness of this proposal is 1) decomposition of nano-satellite education and visualization of major architecture. 2) It presents a learning process using hardware and software called kit and text for each visualized item. Based on this proposal, we conducted a hands-on program for engineers and researchers of space sector at universities (Katmandu University (Nepal) and Sofia University (Bulgaria)), United Nations/South Africa Symposium on Basic Space Technology "Small Satellite Missions for Sci-

entific and Technological Advancement” and also accepted CLTP8 (CanSat Leader Training Program 8 cycle in Japan) in 2017. Altogether, 62 participated from 15 countries (Egypt, Tukey, Bolivia, El-Salvador, Malaysia, Nepal, South Africa, Namibia, Sudan, Ghana, Nigeria, Kenya, Mauritius, Brazil and Japan) in these programs. Interviews and questionnaire results showed that this program was effective for knowledge transfer of CubeSat development at various background regardless of arts or science, space law, space science, or satellite system. This paper describes these international hands-on education activities and purpose and methodology and results. This work is part of a project funded by the Ministry of Education, Culture, Sports, Science and Technology of Japan, in cooperation with UNISEC (University Space Engineering Consortium).