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SPACE EDUCATION IN NEPAL: TRANSITION FROM CANSAT TO NEPAL-PQ1, NEPAL'S FIRST PICO-SATELLITE

Abstract

This paper presents the system engineering of a CanSat and a Pico-satellite built in Nepal, and its importance in space education in universities of Nepal. CanSat is a model of pico-satellite which helps to understand the main subsystems of a pico-satellite. But CanSat is not designed for a space mission, thus it is not required to fit the launch criteria, and its design is not required to survive the space environment. The main advantage of using CanSat for educational purpose is it is cheaper, less complex but contains the pedagogical material to teach about the satellite technology at the university level. The activities related to CanSat have been submitted to the 68th International Astronautical Congress 2017. This paper focuses on the transition from CanSat to the pico-satellite that the team is building.

After the CanSat project, to advance towards the real pico-satellite which can be launched into space, the authors along with 20 other volunteers from Kathmandu University, Khwopa Engineering College and Tribhuwan University started to build a PocketQube. A PocketQube is 5cm x 5cm x 5cm cubed pico-satellite, which was also introduced by Prof. Bob Twigs, who introduced the CubeSat.

A pico-satellite called Nepal-PQ1 was built with a target to launch into space in 2020. It is Nepal's first picosatellite which is built in Nepal. Its primary mission is to measure Nuclear Beta and Gamma radiation of Space using BG51SM sensor. The secondary mission is to test the "store and forward" application, where the satellite will collect the data from Earth-based sensors, store the data on-board, and then transmit it to ground stations. NepalPQ1 is currently in the phase of Engineering Model. It transmits data in UHF Band and operates in half-duplex mode. It uses CW and RTTY-FSK for transmitting housekeeping and payload data whereas uses GFSK for store and forward application. It is powered by trisolx solar cells in five faces and uses 3 MPPT chips to charge the 3.7V, 1100 mAh lithium-ion battery. The On-Board-Computer consists of ATMEGA328 microcontroller and RFM26W is used as the transceiver chip in PocketQube and the ground station.

This paper consists of the transition of education from CanSat to Pico-satellites, the challenges faced by the authors while building and the Pico-Satellite kit that will be built for providing hands on trainings and conceptual know how about satellites to university level students of Nepal.