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NANOSATELLITE PLATFORM FOR THE UNIVERSITY OF NAIROBI (NASPUON) STUDENT PROJECT

Abstract

The Kenya Space Agency, on the 18th of September 2020, launched a research chair on Nanosatellite development for capacity building at the university level. NaSPUoN, which is funded by this research chair, is a CubeSat model that is currently under development by undergraduate students at the University of Nairobi. It is a demonstrational 1U (10cm x 10cm x 11cm) model. NaSPUoN has two missions: The camera and LoRa missions. The objective of the camera mission is earth observation. From the remote sensing images captured, the team will collect information over large spatial areas. The objective of the LoRa mission is to demonstrate a store and forward mission, where data from sensors on the ground is sent to the nanosatellite for downlink at the ground station during a pass. The mission also seeks to evaluate the suitability of LoRa communication as a backup for the primary communication system. To facilitate the operation of these two payloads, NaSPUoN has three subsystems: Electrical Power Subsystem (EPS), On-board Computer (OBC) and Communication Subsystems. The EPS will ensure optimal generation and distribution of electrical energy for the entire CubeSat. The OBC and Communication subsystem oversees the control of the other electronics on the CubeSat and communication between the CubeSat and the ground station. The development team for this project is comprised of undergraduate students from three departments at the School of Engineering. These are: Electrical and Information Engineering; Mechanical and Manufacturing Engineering; and Geospatial and Space Technology departments. They are guided by faculty members of the same departments. The members from different teams work closely with one another to ensure that a cohesive design is realised. The undergraduate students in the development team are greatly benefitting from this opportunity. The members of the EPS, LoRa, and OBC and Comm. sub-teams have designed their first functional PCBs and broadened their knowledge in embedded systems. The Structure sub-team has been exposed to 3D design and printing and deepened their structural design skills. The Camera sub-team has furthered their remote sensing skills. The collaboration of students from 3 different engineering fields in a single project has helped the students gain a greater appreciation of each other's fields. In this presentation, we will be aiming to present this team project and the lessons learned in its course. We will also present the challenges faced especially as students from a developing country, working during the Covid-19 pandemic.