

IAF SPACE POWER SYMPOSIUM (C3)
Space Power System for Ambitious Missions (4)

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DEVELOPMENT OF AN ENGINEERING MODEL OF THE ELECTRICAL POWER SUBSYSTEM
FOR A MEXICAN NANOSATELLITE.**Abstract**

Nanosatellites have changed the global industry of satellite technology in the last decade. Nowadays, many universities and developing countries around the globe have the opportunity to access a space project through the nanosatellites, because of its dimensions, cost and development time. At the High Technology Unit (UAT-FI-UNAM) is currently being developed a TubeSat moniker KuautiliSat the Ulises 2.0. The mission is to take low-resolution photos for training of Mexican space engineers and technological demonstration. This work is focused on the design, analysis and prototype testing of the Electrical Power Subsystem (EPS) which is in charge to supply energy to the cameras (payload), on-board computer (OBC) and communication subsystem. The methodology is based on the space mission analysis. Which consists in prepare a power budget for the spacecraft, selecting a solar-array approach, sizing the array, sizing the batteries and develop the electronics circuits to regulate, control and distribute the energy. The peak power requirement for transmission mode was budgeted in 2W, for taking photos mode 1W and for standby mode 100mW. To collect energy 8 panels mounted around the structure were considered. Each panel consists of 6 GaAs triple junction TASC from Spectrolab. One cylindrical Li-Ion battery cell (VARTA LIC 18650-26 HC) was used for peak power demands and power storage, providing 9.5Wh of energy storage. The EPS for power distribution to the other satellite subsystems was done via 5V buses. The EPS was able to perform measurements of voltage and current to monitor panel's health, subsystems current and battery voltage. The printed circuit board (PCB) was manufactured and tested at the UAT-FI-UNAM. The EPS prototype is presented as a low cost, viable, student-built option designed with widely available components that encourage the involvement of Mexican and Latin-American universities in a space project.