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IRAZÚ: CUBESAT MISSION ARCHITECTURE AND DEVELOPMENT

Abstract

The Central American Association of Aeronautics (ACAE by its acronym in Spanish), in partnership with industry, academy and the government, have identified the promotion of the aerospace as a very promising strategy for economic, scientific and technological development in Costa Rica. Several studies have identified actions to enable the development of the aerospace sector in the country. Among them, a practical demonstration of the technical capabilities to develop a space engineering project is considered mandatory. The Irazú project is an innovative mission taking place in Costa Rica, which aims to launch the first Central American satellite in orbit by 2017. This mission, declared of national interest by the president of the country, is being led by ACAE and the Costa Rican Institute of Technology. This project has two main objectives: going through the space project lifecycle, and demonstrating a platform to measure the effects of climate change in Costa Rican rainforests, amid the efforts of this country to become the first carbon-neutral state of the world. The mission is divided into three segments: the remote station, the space segment and the ground segment. The remote station is in a rainforest located at the northern section of the country. Sensors will be placed there to measure trees growth, soil humidity and other weather variables. These will be transmitted to the space segment, consisting of a 1 unit (1U) CubeSat in Lower Earth Orbit (LEO). The space segment will be able to communicate with the ground station approximately 4 times per day. The ground segment includes the ground station, mission control and a data visualization center, which will collect the scientific data and make it available to the general public. In order to validate the execution of the project and strengthen international cooperation, international partners from the United Kingdom (Surrey University), the Netherlands (Delft University of Technology) and Japan (KyuTech) have been incorporated in the process of training, evaluating the

work, providing independent testing facilities and launching services. The Irazú mission follows the NASA project lifecycle as a reference, dividing the mission into seven phases. This paper presents the results of Phases A to C, including the definition of requirements, the preliminary and the final design. Moreover, the roll of the stakeholders and international partners in this process is explained. Finally, the lessons learned are detailed, focusing on the relevant ones to developing countries aiming for similar developments.