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Educational Pico and Nano Satellites (4)

Author: Mr. Daniel Robson
University of Nottingham, United Kingdom

Ms. Yasmin Ferreira
Universidade de Brasília, Brazil

Mr. Henry Cope
University of Nottingham, United Kingdom

Mr. Pedro Luiz Kaled Da Cás
Universidade de Brasília, Brazil

Mr. Luis Cormier
University of Nottingham, United Kingdom

Mr. Guilherme Lionço
Universidade de Brasília, Brazil

Mr. Samuel Thompson
University of Nottingham, United Kingdom

Mr. Rodrigo da Silva
Universidade de Brasília, Brazil

Mr. Marco Ghelfi
University of Nottingham, United Kingdom

Mr. Angel Arcia Gil
Space Generation Advisory Council (SGAC), Panama

THE WORMSAIL CUBESAT - AN INTERNATIONAL EDUCATIONAL PROJECT TO ELEVATE
SPACE SCIENCE AND EDUCATION**Abstract**

The University of Nottingham (UoN, UK) and Universidade de Brasília (UnB, Brazil) - wish to establish themselves as one of the top Universities in their respective countries for space education by providing hands-on, flight-capable projects to its students. This forward-thinking approach to training the next generation of the global space workforce has begun with the joint development of the 2U CubeSat, "WormSail". As a pathfinder mission, WormSail aims to use a cost-effective, lean-sat project management strategy, demonstrating that the partner universities have the ability to design, develop and fly a full CubeSat mission on a budget. WormSail includes several collaboratively developed payloads - including vital contributions from students and different international partners as well.

WormSail is the first of a series of satellites the two institutions will develop together, taking advantage of the expertise and training offered by both partners. This paper describes how the teams working together were able to achieve significant success, within a limited time and impacted by various external factors. Cooperating on WormSail during such unprecedented times as the 2020 COVID-19 crisis created various, novel constraints, which were further impacted restricted timescales. Going from initial design to an integrated and tested, ready to ship, CubeSat in little over 4 months with an inexperienced student team is a remarkable accomplishment, and highlights the accessibility of the lean-sat approach and CubeSat sector.

Student involvement in this project has begun with a core team of PhD level, Masters and Undergraduate students drawn from various faculties at UoN and UnB, all freely volunteering to be involved. It is the universities' ambition to further grow and diversify the teams' recruitment for these educational projects. Furthermore the students are eligible to use the work contributed to WormSail in various of their other accredited university modules and coursework pieces.

A further aspect to the WormSail project is the international collaboration between UoN and UnB. Not only was expertise and experience among students and staff members shared throughout the project, but both Universities have agreed to invest in private ground stations to be sited at their respective campuses. These are to cooperatively support the flight missions from both Universities - which is particularly beneficial given their spread across the globe under the flight path. Additionally, these will further cement the mutually beneficial working relationship, educate their students further with forward-thinking real-world projects and support the further developments of both Universities' CubeSat programmes.