

IET Travel Award 2021 – IAC Conference Attendance

The purpose of my recent IET travel award was to attend and present at the 72nd International Astronautical Congress (IAC) in Dubai between the 25th - 29th October 2021. The IAC is one of the largest space conferences across the world, attracting over 6000 participants annually. The opportunity to present our University of the West of England (UWE) paper to such an audience has already led to significant benefits for the project.

The premise of the paper, “The Design of a 3U CubeSat to Monitor the Great Pacific Garbage Patch Following a Systems Engineering Approach”, surrounds a real global environmental issue causing widespread damage to ocean ecosystems, the Great Pacific Garbage Patch (GPGP). The paper presents a preliminary Systems Engineering solution, a space mission devoted to tracking the growth and movement of the GPGP. Various systems engineering tools and techniques have been used to reach a suitable design through an iterative process. A 3U CubeSat form was chosen for the mission to accommodate multiple forms of system redundancy within the data handling and attitude control subsystems. The CubeSat will be placed into a low-earth sun-synchronous orbit with an inclination of 97.7 degrees to provide a consistent high level of light exposure during observation, in addition to a capture and downlink process whereby the data collected during the observation phase will be stored and then downlinked during multiple passes over the ground station. The mission will initially be used solely for monitoring the GPGP for research purposes, however following proof of concept the same design has the potential to observe all six garbage patches therefore providing huge benefits to the conservation of marine wildlife and the environment.

The project has been split into two papers, one which outlines the details of the mission, and the other (of which funding was awarded) which presents the systems engineering approach used to satisfy the mission requirements. Both papers were accepted into two independent conferences; the first paper has been published in the 35th Small Sat Conference, of which the conference took place virtually. Fortunately, the opportunity was granted for a co-author and I to present the second paper at the 72nd IAC conference in front of international industry experts.

I attended the conference as a *Young Professional*, which granted me access to the full suite of symposiums, as well as the exhibition hall that showcased a plethora of space-related companies. Within the exhibition hall I had the opportunity to meet and talk with some of our key suppliers for the design of the CubeSat; this included seeing a fully assembled 3U CubeSat, a very rewarding experience after designing one for months on end! We had some great conversations with some suppliers around the latest innovations and product ranges, that in some cases could lead to an even cheaper design for our satellite. We were also fortunate to meet three other young professionals that were presenting papers of their own, we shared details of each other’s papers and exchanged contact information for future networking.



Our presentation was a part of the Earth Observation symposium, a selection of papers showcasing the latest technological space advancements and missions observing the Earth. It was most interesting listening to the other companies and research organisations completing sustainability-related missions similar to our own. After presenting our paper to the symposium, we received positive feedback and well-thought questions from topical experts. Altogether, this has given us further inspiration and motivation to seek funding to enable our design to be developed further.

My visit to the IAC conference in Dubai has also granted the project significant publicity within my own network and has led to initial conversations of an aerospace company partnering with myself and the University for funding.

I would like to sincerely thank the IET for granting me the incredible opportunity to attend the 72nd IAC conference. Without the IET's support, it would have been difficult for me to attend and most importantly, the project would not have gained so much publicity.

James Passmore
MEng MIET