WUSAT Newsletter

Member of the Midland Innovation Space Group

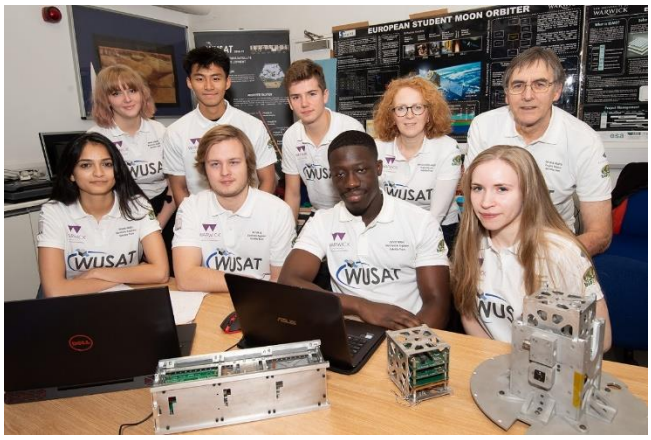
SPAN SPACE ACADEMIC NETWORK

April 2020 WUSAT-3 TEAM 5

University of Warwick Satellite Engineering Team 2019-20

No Lock-up in Lock-down for WUSAT!

It's a miserable time for everyone, not being able to do all the things we would normally be doing and see all the people we would normally be seeing during the Covid-19 lockdown. At WUSAT we much prefer old fashioned face-to-face meetings whenever possible as we invariably find it much more productive.



HOWEVER, I've been amazed at how much we have achieved during recent weeks! It's almost as if the lockdown has released more time, energy and opportunity to pursue things we've had planned for ages! (See below)
Of course the current 2019-20 team (left) are now mostly busy completing assignments and preparing for the strangest of final terms where they won't go into university, but complete everything online.
Sadly, it's unlikely that Julia and I will see them again this term, as there will be no graduation ceremony either.

Nevertheless we will produce something to highlight the tremendous progress they have made with WUSAT-3 this year, and we hope we may be able to organise something with them when we are able to. We wish them all the very best with everything they have to do in the coming months!

So have a look below to see how the WUSAT programme is expanding and leading to some very exciting developments!

Warwick Space Strategy Group (WSSG)

As WUSAT Co-Directors, Bill and Julia, have become more involved in UK Space organisations (see below), it has been a concern for some time that Warwick could be missing out on many lucrative opportunities that now exist in the UK Space environment. Warwick has enormous resources that can make it a major player within the UK Space Academic Community, but as Julia and I can only really represent Space Engineering through WUSAT, we need someone to help us pull together all the Warwick researchers that exist in Engineering, WMG, Physics, Chemistry, Computer Science, Maths, or anywhere else!

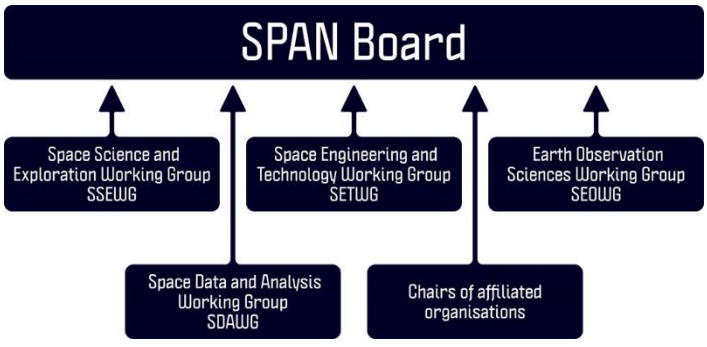
Fortunately during coronavirus lockdown, the cavalry has arrived in the form of **Prof Kerry Kirwan** (WMG – Sustainable Materials and Manufacturing), and **Rachael Kirwan** (Innovative Manufacturing Global Research Priority Administrator). *Yes it was very thoughtful of them to get married so we only have to do one Skype link!*

Kerry and Rachael have been extremely helpful in helping to enable Bill's (and Warwick's) role within the Space Academic Network, coming up with ideas for possible funding initiatives, and beginning the process of forming the sort of cross-department Space Strategy Group that we have been looking for. Amazing that we should have made this sort of progress when everything seemed to have stopped during lockdown. More to report on this next time!

Space Academic Network (SPAN)

As part of our effort to capitalise on WUSAT's heritage and enable Warwick's Space Strategy, Bill & Julia have both become members of the Space Academic Network. SPAN provides a voice for space-related research in the UK in the fields of Earth Observation, Space Engineering and Space Science. We are both members of the **Space Engineering and Technology Working Group**, and attended our first online meeting recently.

In addition, **Bill has become a member of the SPAN Board**, where he will hope to represent Warwick's interests and see how we can help to develop the UK Space Research Network generally. With this arrangement, Warwick will join the OU, Leicester, MSSL, Oxford and Birmingham in become a contributing member of SPAN.



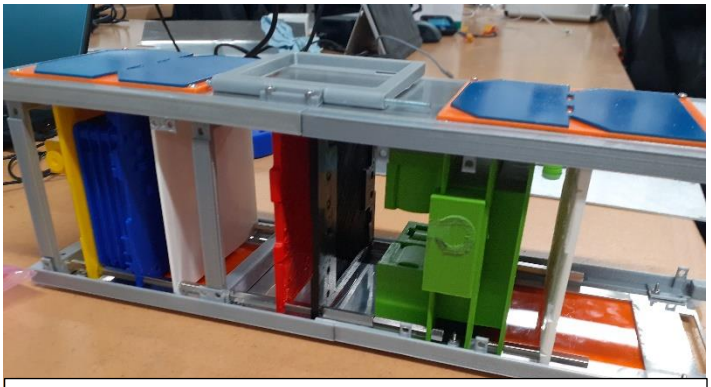
Space Technology Advisory Committee (STAC)

Julia has been nominated to be a member of The Space Technology Advisory Committee. This is a **UK Space Agency** body whose membership acts on behalf of the sector to provide knowledge and experience. It is an industry-led group whose membership includes prime contractors, SMEs and academia. Julia's extensive, high-level industrial experience as a Space Systems Engineer, combined with her four years of working on WUSAT, should make her an ideal member of this influential committee and would give Warwick a close connection to UK Space Agency activities.

Warwick Space Technology Hub?

As part of the UK Space Growth Partnership, there are proposals to fund **five Space Technology Hubs** at £10M/Yr each over four years. Once our Warwick Space Strategy Group is in place and we have had time to evaluate our strengths, we hope to propose – through our membership of SPAN – a Warwick strategy for becoming one of these UK Space Technology Hubs.

WUSAT Team 2019-20



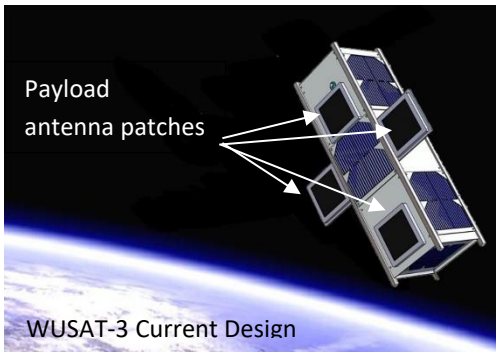
3D Printed version of the WUSAT-3 Configuration Model

To remind you, our current mission, **WUSAT-3**, is a 3U CubeSat designed for launch to the International Space Station where it will be deployed in a Low Earth Orbit to test a novel wildlife monitoring technology.

We asked this year's team to work on the design of a **configuration model** for WUSAT-3.

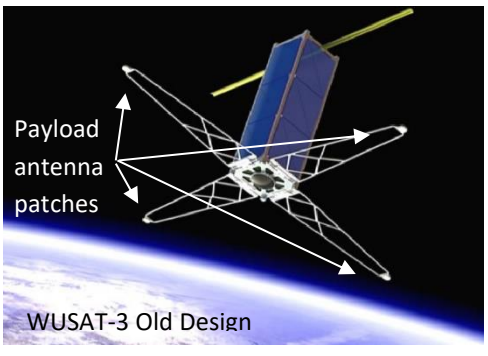
This is a complex task, often referred to as the **structural and thermal model (STM)** of the satellite. It required the team to consider all previous design & analysis work and formulate a final structural model of WUSAT-3 to incorporate each one of the subsystems of the satellite namely electrical power, attitude determination & control, thermal control, communications, command & data handling, and the overall structure in addition to the wildlife tag monitoring equipment itself (i.e. the payload).

Each subsystem group within the team have produced models and working prototypes of their various subsystem designs, and an overall model that illustrates the new configuration of WUSAT-3 has been produced in 3D Printed format as shown above. This has progressed the development of WUSAT-3 considerably and will give the 2020-21 team(s) a springboard to reach the next stage.



WUSAT-3 Current Design

WUSAT-3 in orbit will now look like that shown on the left with the Earth-facing wildlife tag monitoring antenna being on a long-side of WUSAT-3, as opposed to the previous design where the antenna system was on one end of WUSAT-3 pointing towards Earth.



WUSAT-3 Old Design

Dr Bill Crofts & Prof Julia Hunter-Anderson, Co-Directors of the WUSAT Programme, www.warwick.ac.uk/cubesat

WUSAT Teams for 2020-21

Note the plural in **teams** above! For the first time in 15 years, we are planning to run **two** WUSAT teams working concurrently on WUSAT-3. This will give us the manpower we need to push WUSAT-3 on towards achieving flight-ready status. The team split will be:

- **WUSAT-3 Platform**
- **WUSAT-3 Payload**

We propose that both teams will comprise:

1 x Computer Systems Engineering (CS), 2 x Electronic Engineering (E)
2 x Mechanical Engineering (M), 1 x Systems Engineering (S)

Julia and I will run these as one integrated team even though they will have their own aims and objectives. This is in-line with practicing **concurrent engineering** as part of our **systems engineering** approach, and is typical of the way Space engineers work on major projects

WUSAT Team Members Selected for ESA Training Programmes

WUSAT Engineers, **Emma Osbiston** and **Ole Ørke** were recently selected for an **ESA Satellite Communications Training Programme** in February this year. Held at the ESA European Space Security and Education Centre (ESEC) at Redu in Belgium, these programmes provide invaluable experience for our team members and they meet individuals with similar backgrounds in Space engineering from across Europe.

WUSAT Team Day – Sadly, since we first started in 2006, this is the first time we cannot have a Team Day with all of our partners. Nevertheless, we are very grateful to **Ben Green, Harwin Ltd**, who had still generously offered to support it. We may try to arrange something for start of term 2020-21 if things are more normal by then!