APRIL 2022 ISSUE N1

E ECE MAIL

The Electrical, Electronics and Computing Engineering Newsletter

What is EECE?

EECE is a department within the School of Engineering and Physical Science (EPS) that focuses on Electrical, Electronics and Computing Engineering.
The undergraduates courses related to EECE are Electrical and Electronics Engineering and Robotics. The Institute of Sensors, Signals and Systems (ISSS) belongs to this department as well.

We thought of creating this newsletter to bring our department together and make our students and staff aware of what is going on. You will find more information about the different students-led groups as well as about our staff and their research.
We hope you find it interesting and if you want to contribute to the next issue, please get in touch at **eece-newsletter@hw.ac.uk**

We are actively looking for volunteers, so come on, join us!

IN THIS ISSUE

THE ROBOTICS SOCIETY

HERIOT-WATT ROBOTICS

With the new National Robotarium opening in September, it feels like Heriot Watt is all about robots lately. Theres no better place the for the HWU Robotics society! Founded three years ago, we've grown and have been keeping ourselves busy! The society aims to bring the fun side of robotics at university by creating a sense of community among our students.

This past year, our committee worked hard to bring interesting and interactive events such as the series of workshops we had during the first semester. The goal? Build your own SumoBot! The objective? Be ready for the competition!

The SumoBot competition has been nominated for “Event of the year” award at the Student Union Volunteers Awards, and guess what? We won!

We offered weekly drop-ins in the GRID for our members to come and work on their robotics projects. A team has worked on a bionic arm, others playing with CAD and designing random 3D models…

SOFT ROBOTICS
SOFT ROBOTS FOR THE PLANET

EDINBURGH ROBOSOFT APRIL 4-8 - 2022

We got great opportunities such as volunteering at the Edinburgh RoboSoft Conference and at the Edinburgh Science Festival with the National Robotarium and the University of Edinburgh. Our volunteers have been highly spoken about from organising teams! Some have even gotten their 5th year project sorted out as they networked with other people from the field and same interests.

What’s next?

We are in the process of getting our own dedicated space that people will be able to access anytime! Isn’t that amazing? We are also working on a few projects with National Robotarium and other academics to bring more opportunities and exposure to our members (labs visits, internships etc.).

Are you interested in getting involved? Our society is looking for volunteers so get in touch! Follow us on social media **@hwurobotics**

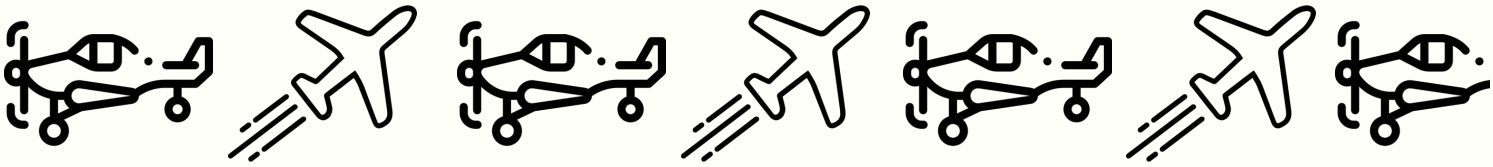
AERO-WATT

So you've probably looked at the pictures first, and don't worry, we're here to answer your immediate question: no, we've not crashed it… yet.

We are Aero-Watt, the Heriot-Watt team working hard towards designing and building (from scratch) a fully autonomous plane for the IMechE Unmanned Aerial System (UAS) Challenge 2022!

This challenge intends to simulate a real-life engineering environment, tasking our team with the mission of dropping a precisely targeted aid package, navigating around waypoints, and performing on-board image recognition, all fully autonomously. This, alongside the fact that the plane airframe should be designed from the ground up (all the way to the sky) provides a significant mountain to fly over.

Our destination however is a huge 3-day competition in England on July 7th, where ourselves and tens of other teams from the UK and further will take flight and aim score as many possible points in the missions mentioned previously. We are really excited to see what other teams have come up with, and the event will be a great opportunity to pick up some obscure engineering knowledge from other teams!



Back to the present though, we have now completed the preliminary design review, design and development specification, and critical design review, so we're feeling confident that our system – in theory – should work well! To test this, we have for the last few weeks been steadily pitching up manufacture of plane, our fairly complicated plane with: vertical take-off and landing capabilities, carbon rod frame, HexCube Orange controller, rear push propellor, and inverted v-tail!

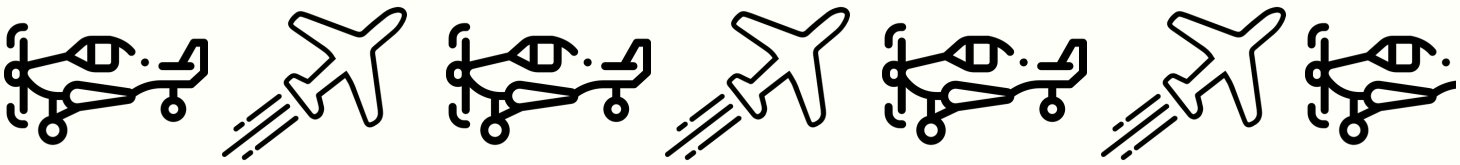
To break that down that long-sentenced explanation into more understandable information about our project, we can hand off some of the explanations to our two sub-teams: Airframe and Aerodynamics (AA), and Software and Electrical Systems (SES).

AERO-WATT

AA

The airframe we have designed is comprised of a wooden fuselage and inner wing sections, with a foam inverted V-tail and outer wings, all reinforced by a carbon fibre frame. These components are currently undergoing manufacturing and testing, giving us physical feedback to know if our design performs as intended. Handling the real parts has provided some inspiration for tweaks and improvements – coming soon to plane!

The plane combines the ease of vertical take-off and landing (VTOL) with the speed and efficiency of horizontal flight by using vertical motors to climb to height of around 20m, before transitioning to the horizontal flight of a conventional plane. However, this transition could be a little risky and will need some calm heads on the sticks to be ready to recover the plane should anything unexpected happen! Our 2.6 metre wingspan should allow us to cruise at around 45mph - if anyone knows how to get an airbag to deploy around a plane please let us know.



SES

SES have been hard at work rewiring everything for the umpteenth time, and continuing to badger AA to give us somewhere to route cables through! In all seriousness though, we have been slowly testing and building up our experience with the Hexcube Orange and mission planner based autonomous control system, alongside working on pre-creating most of the wires created. Alongside this, we have been continually testing our telemetry and RC systems ensuring the work with the range required while staying compliant with the law.

We hope you enjoyed hearing a glimpse into what Team Aero-Watt has been up to this last academic year, and if any of this sounds even remotely interesting to you, or if you think we're doing everything terribly, please do consider applying next year! Keep an eye on our socials @aerowatt for more!

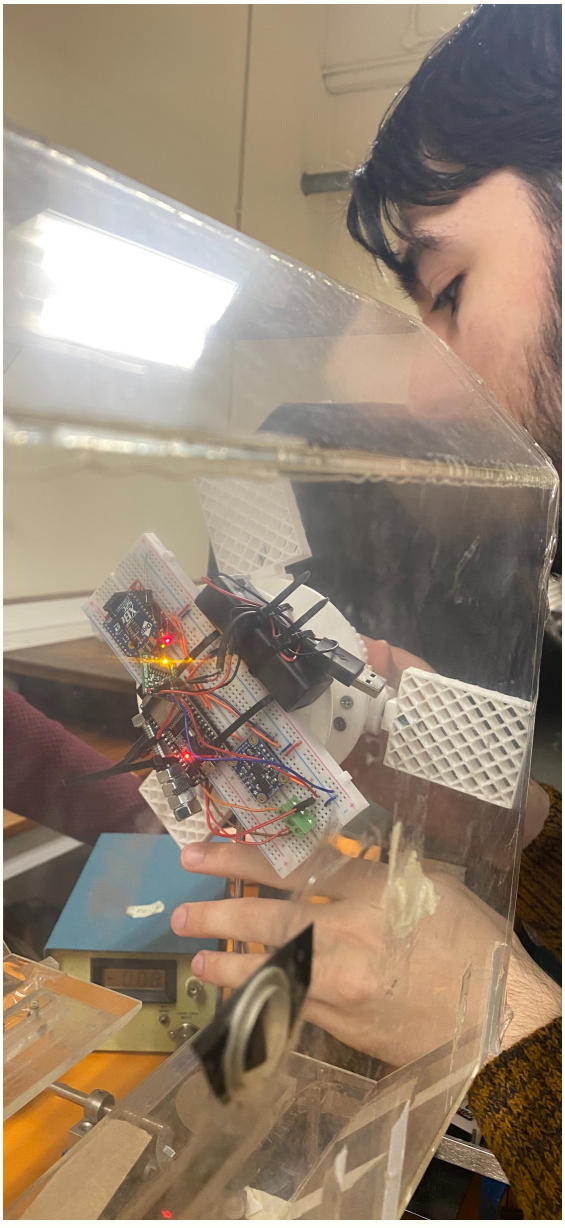
©Photo by Nela Wypijewska

CANSAT TEAM

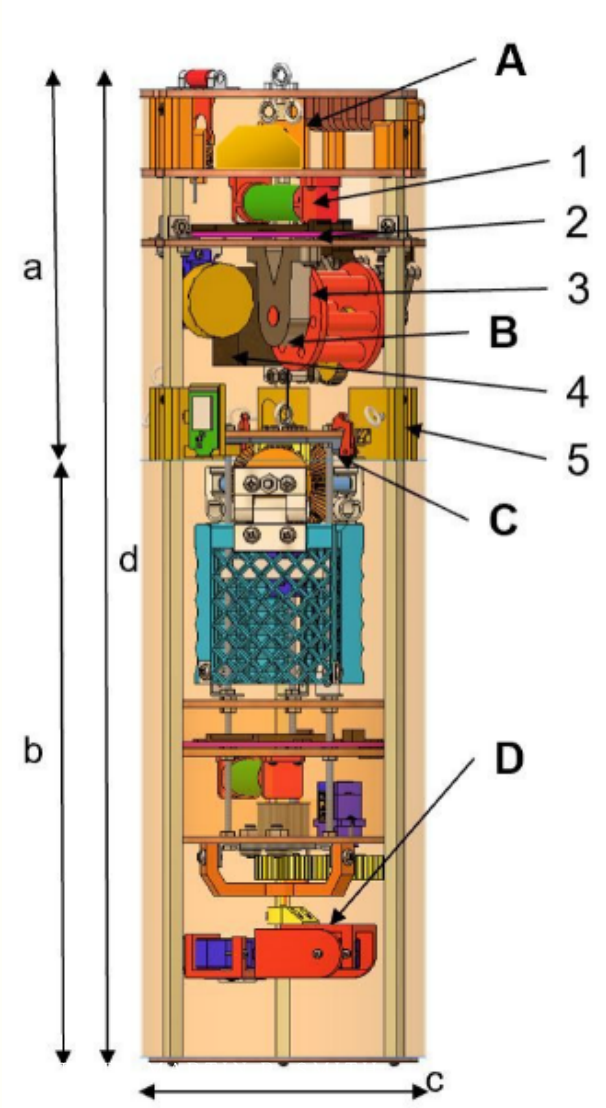
You've heard of NASA, well… we're not NASA, but we are HWU's CanSat team. With brand new members and fresh ambition, we have been dedicating perhaps a little too much of our time to the CanSat Competition this year. However, the sacrifices have all been worth it.

We are currently ranked as the 14th best team worldwide, after scoring 97.04% - yes, we do cherish the .04 - on the Preliminary Design Review.

That all sounds swell, but what is the CanSat competition? The CanSat competition is an international challenge organised by the American Astronautical Society and is sponsored by some of the biggest names in aerospace. The goal of the competition is to design and build a payload (a CanSat) for a suborbital rocket that carries research instruments. This year, the mission requires a secondary payload to be lowered from the descending CanSat, by a tether, which must produce a stabilised video feed and relay constant instrument readings to the team on the ground. However, the real difficulty in the competition comes from smaller details: descent speed, instrument measurements, and size restrictions are all tightly set in the mission guide. Our team's real challenge is to ensure that these are adhered to with the smallest margin of error possible.

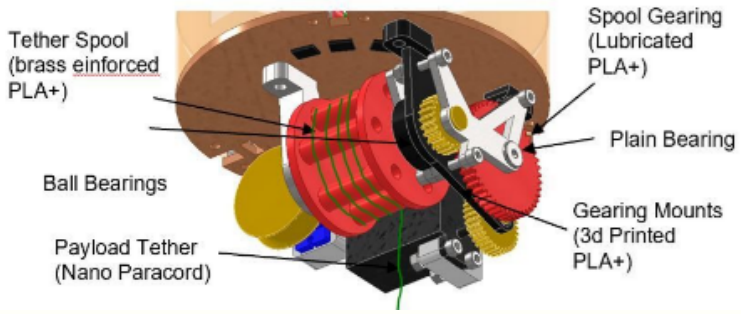


CANSAT TEAM



We have recently submitted our Critical Design Review - outlining what is now the final design of our CanSat. If we score high enough, we will be invited to America to launch our design, but whilst we wait on results, we have been keeping busy. Our mechanical crew has been working from their awesome CADs to manufacture and assemble the CanSat's skeleton and parachutes. The electronics team has been focusing on finalising the PCB layouts for the electronic bays.

Our software guys have been setting up the radio communication network and integrating the sensor subsystem into the software. Meanwhile, management has been scrambling to keep the team on schedule and find funding for the next part of the project (turns out a group trip to America is expensive). Here's hoping all goes well.



Want to see what our project looks like at the moment? Head over our Instagram and watch this video!

Interested? Keep your eye out for the news on Instagram **@hwucansat**.

Soon we will be looking for a new team for 2023 competition!

THE PHD CORNER

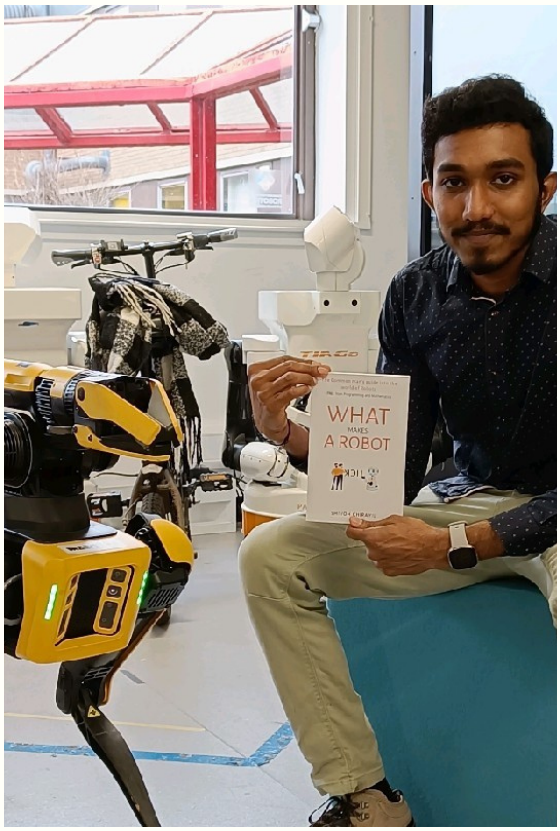
Institute of Sensors, Signals and Systems (ISSS) Postgraduate Researchers' representative - Elisa Ramil

As postgraduate researchers' representative, I am working towards increasing the sense of a community within our institutes and across the School of Engineering and Physical Sciences (EPS). This year, our research institute (support provided by the Head of Institute Prof George Goussetis) provides free coffee, tea to the PhD students, and access to a microwave (in front of EM2.40).

In addition, the School of Engineering and Physical Sciences has funded a walking tour and pizza event in March for all PhD students across the school.

We started organizing monthly seminars (ISSS/ EECE events) and weekly coffee (Tuesdays@1pm) catchup meetings. If you have suggestions on topics or ideas of events, please get in touch. We have also further plans in the works, so keep an eye out on your email and the PhD WhatsApp group!

If anyone would like to participate in the organization of events, have any feedback, or questions feel free to contact me at esr1@hw.ac.uk.



A short robotics book for curious minds.

As an experienced Teacher and a Roboticist who plays with robots every day, I have gained a good understanding of the Robotics field. I have seen that people often fear and avoid robotics books because they think the concepts are hard to grasp. But I believe I can teach in a way that even a child can understand. Through my short book named "What makes a Robot tick", I hope to shed light on the fundamental ideas of robotics without making you scratch your head pondering about mathematics or the programming of a robot. I hope to take you on a brief journey to expand your understanding of robots and clear any misconceptions you have regarding the robotics field.

Who is the Author?

Shivoh Chirayil is a first-year PhD student in Robotics at EPS, Edinburgh Campus. More details of his Academic achievements and book details can be viewed on his profile via scanning the following QR code.

THE STAFF CORNER

Athena Swan Bursary and Institute of Sensors, Signals and Systems (ISSS)

Congratulations to Christy Cameron Ritchie and Jiayu Hou for getting an Athena Swan Bursary and an ISSS Bursary to work over the summer in our Institutes.

Christy is interested in renewable energy and her project is in the field of Photovoltaics focusing on measuring different combinations of solar cells, from different technologies, including crystalline silicon and CdTe. The cells will be then tested with different infrared photon management devices, mostly photonic crystals that have been already fabricated by Neil Ross at the clean room of HWU. The project objective is to demonstrate the preliminary results which proved that the temperature of the cell decreases and the efficiency increases.

James Watt and Doctorate Training Partnerships (DTP) Scholarships

In March, the selection for PhD scholarships have taken place. Congratulations to Reka Hegedus, Zebin Huang and Shan Han for obtaining a James Watt Scholarship and to Samuel Mayo, Melanie Calder and Armanc Karakoyun for securing a DTP Scholarship. Welcome to the Institute of Sensors, Signals and Systems.

THE STAFF CORNER

On Friday 8th April, EECE/ISSS staff had their first social gathering since 2020. This event is an initial step to help build a stronger community and sense of belonging within EECE/ISSS. We welcomed two new staff members Dr. Fernando Auat and Dr. Carlos Mastalli.

THE NATIONAL ROBOTARIUM
PEOPLE CENTRED :: INTELLIGENCE DRIVEN

Coming Soon...The National Robotarium!

The National Robotarium uses AI and robotics to make society safer, healthier and more productive. By forming close industry partnerships within sectors including healthcare, energy, agriculture and construction, it will utilise robotics and AI to develop solutions to global challenges.

The multi-million pound, purpose-built facility – opening later this year – will advance robotics and AI research and foster world-leading talent within its three distinct research and development areas; Robotics and Autonomous Systems (RAS), Human & Robotics Interaction (HRI) and High-Precision Manufacturing. Students interested in developing their skills will have the opportunity to work with industry partners, participate in placements and internships, and design and test robotics and AI solutions in its world-class specialist labs.

To find out more about the National Robotarium visit: https://www.hw.ac.uk/uk/research/the-national-robotarium.htm or sign-up for their monthly newsletter at: nationalrobotarium@hw.ac.uk.

THE STUDENT CORNER

POV: Undertaking an Academic Research Placement

Kieran Twaddle, Meng Electrical and Electronic Engineering

The academic research placements which can be undertaken by students in fifth year offers a unique opportunity to experience exposure to academic research. There are limited occasions when an insight into academic research such as this may be given. These placements can range from three to six months inclusive of your first semester of fifth year and can help better inform graduate career decisions. I undertook a 4-month placement conducting research as part of a globally inclusive Natural Environment Research Council (NERC) grant into acousto-fluidic applications to sort marine microplastic particles. This is an opportunity to see first-hand the inner workings of university research and gain an understanding of funding procedures. Select research projects offer unique exposure to interdisciplinary work and is unlike previous undergraduate experiences. Work with all levels of faculty can be undertaken, with some research involving multiple universities and academics from all over the world. During my research, I focused on acoustic manipulation of large plastic particles (>100 μm) and their materialistic influences. Throughout the placement I was given the opportunity to receive training for a variety of lab-based applications and simulations, which allowed me to complete a large array of self-led experiments. This training gave me the skills to experimentally acquire data to inform the design, fabrication, and testing of a new acousto-fluidic microplastic sorting device. This placement, like others, concluded with an oral presentation of my final research to peers and academic faculty in addition to the collation of this research in my final thesis. I personally pursued the opportunity for an academic research placement and found it to be a valuable experience that helped refine my academic presentation skills throughout the process. However, despite the pursuit of industry placements remaining the norm, their attainment is not guaranteed. In such instances, academic placements offer a road less travelled and exposure to unrivalled opportunities and experiences. As with industrial placements, academic placements can present graduates with opportunities to continue work with the university in the form of PhD research. I thoroughly enjoyed my time on the academic placement in so far that I have a new career perspective and will be pursuing a career in the field of research.

OPPORTUNITIES!

Engineering and Physical Sciences Research Council Summer Internship

Engineering and Physical Sciences Research Council (EPSRC)summer internship allows to employ an undergraduate student for 10 weeks starting from June. The aim is to give a taste of research to our undergraduate students in order to raise their awareness/ interest for PhD applications after graduation.
The deadline for the application is on the 20th May 2022 midnight.
If you are interested in the scheme, please contact Dr Souheil Ben Smida: **S.Ben_Smida@hw.ac.uk** for more info and the list of proposed research projects.

THANKYOU

Thank you everyone who contributed to this newsletter:
- Aero Watt Team
- CanSat Team
- Robotics Society
- Elisa Ramil Brick
- Anne Bernassau
- Hebatallah Shoukry
- Kieran Twaddle
- Shivoh Chirayil
- Souheil Ben Smida
- National Robotarium

This project is led by Liza Masson and her Robotics Society under the support from Anne Bernassau and Hebatallah Shoukry as well as the department.

HERIOT WATT UNIVERSITY

You have something interesting to share?
Your group project result must be seen?
You want to be in the newsletter or just help us out?
Email at
eece-newsletter@hw.ac.uk