

# FET Enterprise Projects

2020-2021

# Welcome...

## Welcome...

This publication celebrates the wide range of staff and students' enterprise activities which have been completed across the Faculty of Environment and Technology (FET) during 2020-21 academic year.

Our students involved in these projects earning valuable experience in their field and developing a professional portfolio of work.

Their engagement with external partners and research projects builds professional and personal practice. With the ever-changing landscape of technology, these projects offers students a unique opportunity to collaborate across disciplines, learning new skills and challenging their perceptions of where they see our future.

This enterprise activities completed across the FET have been funded by the faculty and the Higher Education Innovation Funding (HEIF), a funding stream from the Higher Education Funding Council. It aims to develop a broad range of knowledge-based interactions between universities, colleges and the wider world. UWE Bristol channels HEIF to support a broad range of knowledge exchange activities for the region economic and social benefit.

Ramin Amali  
Faculty Director of Enterprise and Partnership  
Faculty of the Environment and Technology  
UWE, Bristol

# Projects....

Project:

## Extending goal programming models for lot-sizing problem with supplier selection

Yaseen Zaidi

Rowan Sutton

### Project Description:

The model-based system engineering (MBSE) is currently the industry favoured design methodology that integrates mission and systems requirements, architecture trade-off studies, verification & validation (V&V), performance analysis, qualification, and certification – all via a digital thread ultimately achieving a digital twin of the aerospace vehicle. The performance analysis of the HL-20 NASA lifting body Simulink-SysML model, utilising the new and innovative MBSE paradigm was focussed on the improvement of the control and stability of the vehicle during the atmospheric re-entry and landing flight modes. Defining the operational dynamics of the HL-20 and then implementing improvements to the flight modes, expanding the capability over multiple domains to display the HL-20's behaviour characteristics under different operational ranges of the flight controllers that control vehicle's actuators interfacing the external surfaces were conducted.

### Outcomes and Benefits

Within two months after graduation, the student was employed by Capgemini as a Jr Systems Engineer specialising in the application of MBSE using co-simulation of SysML, and Simulink, Modelica etc, for aerospace and defence, automotive, oil and gas, which is phenomenal in the present times.

Project:

# Optimization of Labyrinth Seals for Aero-engines

Supervisor:

Budi Chandra

## Project Description:

Sealing technologies have been one of the most crucial parts of turbomachinery due to the operational working principle of gas turbines. There are at least fifty locations in a jet engine that utilises a seal therefore the collective influence of the seals has a massive contribution to the overall efficiency of the engine. There has been a great advancement in other major components within jet engines but labyrinth seal technologies have lagged. Even with the emergence of new types of seals, such as brush seals, labyrinth seals are still preferred at certain positions within the jet engine as the minimum clearance between the stationary and rotational components accommodates the differential thermal expansion while reducing undesired leakages. With the greater push for more efficient aircraft engines and the reduction of carbon emission contribution by the aviation industry, all components within the engines must be optimised to operate at their maximum efficiency.

The work focuses on the geometric design optimisation of a two-dimensional labyrinth seal stepped seal design configuration. A numerical Computational

Intern:

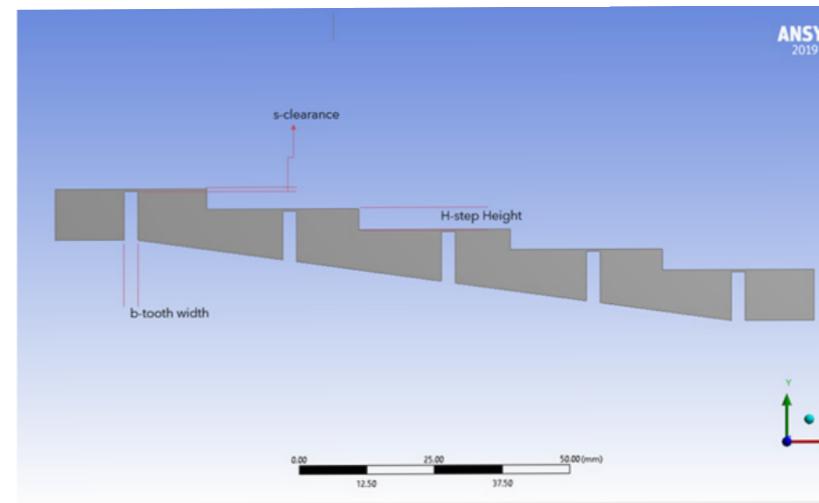
Elvis Tinago

Fluid Dynamics (CFD) study of a two-dimensional axisymmetric labyrinth seal to explore the effects of the geometrical parameters at operational conditions on the leakages in a jet engine was undertaken using ANSYS Design Explorer. A base geometry with associated experimental results was used to perform verification and validation of the simulation results was chosen from previous literature studies. Three geometric parameters namely, clearance, tooth width and step height were set as input parameters and mass-flow rate as the performance measure for the optimisation task. Latin-hypercube sampling Design of Experiments (DOE) was utilised to explore the design space with upper and lower limits set on the input parameters to constrain the size of the optimisation problem. An automated workflow is created to allow automatic generation of geometry using the parameters and using the set CFD boundary conditions to run the numerical calculation on each design. A goal-driven Multi-Objective Genetic Algorithm (MOGA) was used to optimise the DOE without constraints on parameters to avoid over constraining the optimiser.

## Outcomes and Benefits

The work revealed that the input geometric parameters interaction requires a trade-off for the most optimum design in regards to minimum leakages each design allows. The clearance was found to have the greatest influence on the leakage output. The results showed the step height is inversely proportional to the mass flow. Design optimisation techniques that make use of data-driven methods and numerical techniques can allow designers broader design space search at much shorter lead times.

An abstract has been submitted and the student will present the work at the Sixteenth Multiphysics International Conference.



Project:

## Investigating the role of morphing wings for noise reduction at airports

Supervisor:

Budi Chandra

### Project Description:

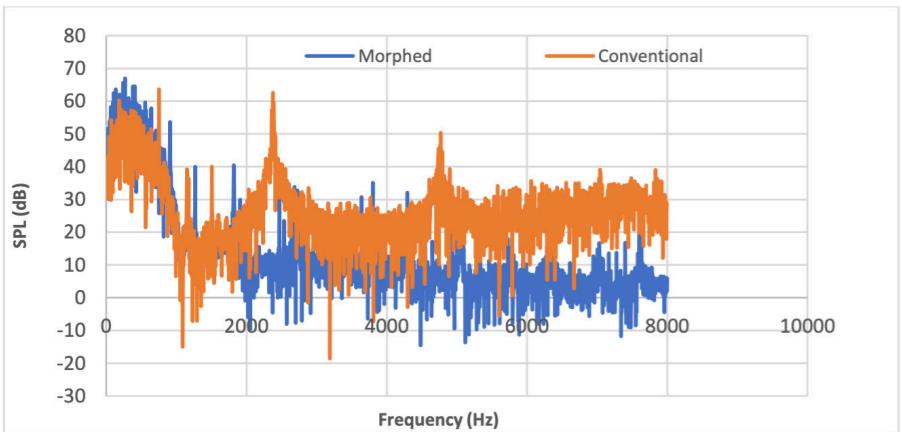
Investigating, using numerical CFD in Ansys Fluent, the noise characteristics of a trailing edge morphing flap at different flight conditions as well as flap deflections.

Intern:

Joseph Watkins

### Outcomes and Benefits

Student was able to extend his MEng dissertation work into a short journal publication. Before this, the student also presented at the Isatech 21 conference and a conference paper will appear in the Proceedings.



Project:

## Assessment of future marine energy generation technologies using RICARDO software and existing literature

Rohitha Weerasinghe

Intern: Upul Kumarasena

### Project Description:

The time was used to perform simulations for benchmarking energy technologies for maritime applications. It was intended to do extra work parallel to the MPhil project 'EMISSION REDUCTION OF SMALL MARINE ENGINES USING HEAT RECOVERY BOTTOMING CYCLE AND ON-BOARD CARBON CAPTURE'

### Outcomes and Benefits

The student was able to generate RICARDO WAVE simulation models that will be used for future publications and additional input to Upul Kumarasena's MPhil research. The PI was able to use the outputs to deliver a keynote speech at ICAEER 2021 conference in Shanghai, China. The results will be published in a research paper. Work in progress. Please see presentation attached. Thank you for this funding. It has been extremely useful.

Presentation by

Rohitha Weerasinghe  
BSc Eng, DIC, PhD,  
SFHAE, FIMechE, CEng



**Low Carbon Energy Generation Technologies for Water Vessels**

**UWE Bristol** University of the West of England

Project:

# Designing an automated larva separating system for Oasis Cardiff

Supervisor: Aghil Jafari

## Project Description:

Aligned with the United Nations development goals to achieve sustainable food production to solve the hunger problem worldwide, part of the responsibilities of food production relies on insects to produce protein and fat as they have desirable traits such as scalability, better FCR, and various possible diets.

Oasis Cardiff is an organisation that is proactive in this sector. Since they would like to have a fish production section in their community farm, we have been asked to design a Black Soldier Fly (BSF) farm to feed their fish.

Black Soldier Fly is a species of insect that is highly efficient in converting organic wastes to protein and fat. It is a suitable candidate to replace fish meals.

To populate colonies of the BSF, a portion of the total BSF larvae needs to be separated for the breeding section. The question is, which portion? This is the question that was investigated by creating an automated separating system that separates BSF larvae with desirable traits to breed.

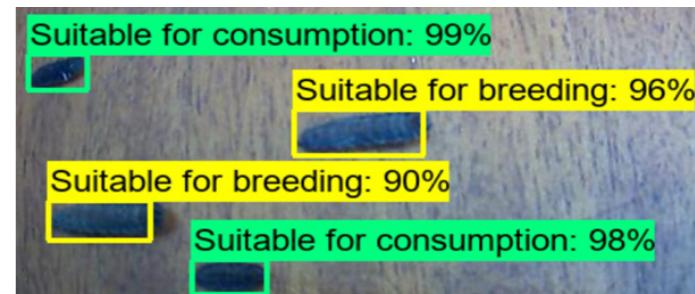
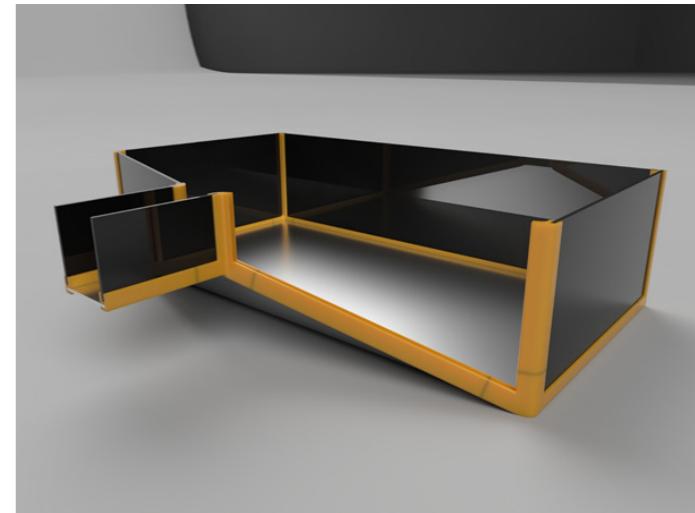
Intern: Amir Karimi

## Outcomes and Benefits

This research project provided critical data such as the first Black Soldier Fly dataset and the initial baseline to apply for the UKRI's New Investigator Award. Moreover, an automated Black Soldier Fly classifying algorithm was developed, which is capable of selecting desirable Black Soldier Flies and sorting them accordingly.

## External organisations or groups that were partners, participants or recipients on this project

Oasis Cardiff asked the research team to perform feasibility studies and provide initial designs for a practical BSF farm. Additionally, companies and organisations such as Beta Bugs based in Edinburgh, and Enviroflight based in the US, were contacted to acquire further validation on the necessity for a solution to the mentioned problems.



# Exploitation of building technologies and constructional systems research: a Living laboratory in action

Supervisor: Louis Rice

## Project Description:

The project examined the use of recycled materials for architecture and building construction projects that contribute to sustainable forms of construction. The student contributed to a number of activities associated with this project. the first phase involved creating a typology of recycled materials for sustainable construction. Secondly, the student participated in building a register of best-practice case studies and collating these into a short, user-friendly format. The student explored a range of different recyclable materials as part of this project and devised methods for their use in architecture and construction processes.

Intern: Joseph Gibbs

## Outcomes and Benefits

The project has generated an easy-to-use guide to recycled materials for architecture and built environments students. The guide also highlights a number of precedent studies to further contribute to understanding the viable exploitation of building technologies and constructional systems. Through practical experiments and academic research, the student intern developed a number of core research skills through their participation with this project. The work benefitted the research of the lead academic through the development of a typology of recycled materials for construction and building a register of best-practice case studies. The input of the student intern was a welcome and helpful contribution to this timely research into sustainable construction materials.

RUBBISH

## Plastic Bottles

### You Will Need

- 8ft Cains
- Water bottles
- Stanley knife
- Pegs
- Hammer

An average of 35.8 million plastic bottles are reported to be used everyday in the UK. On average 16 million of these plastic bottles do not get recycled.



The bottle sail is constructed from a bamboo structure, protected by a nylon sheeting and then clad with tubes of plastic bottles.

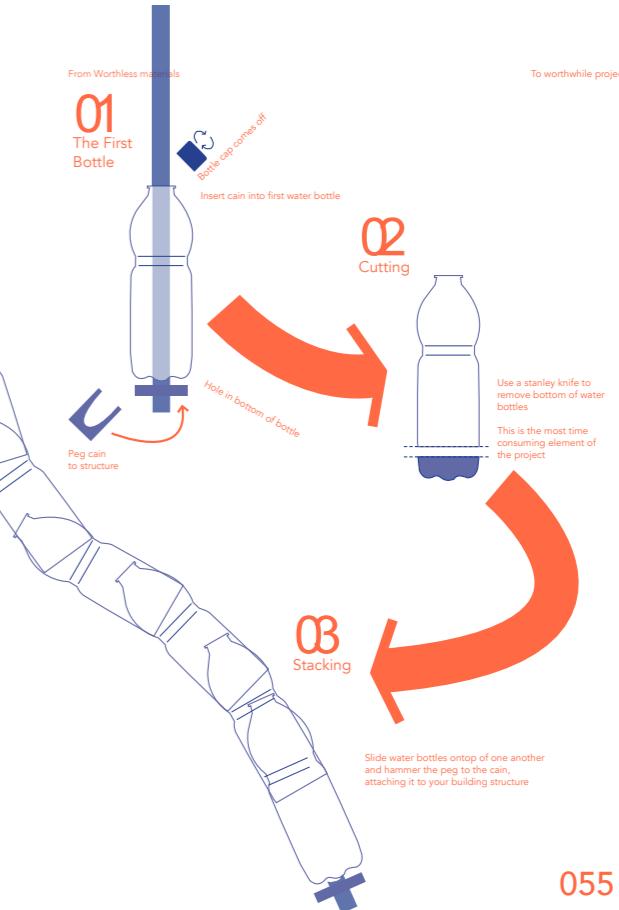
The nylon sheeting is translucent and stops any water getting into the structure. The water bottle tubes act as an additional protection from the elements, how to make these can be shown on the next page.

These bottle tubes could also be used to construct thin greenhouse walls instead of roofing. Its important these tubes are spaced tightly for rainwater to not get through.

The Bottle Sail  
Architects: 1+1>2  
Country: Vietnam  
Year: 2014  
Size: 16sqm



054



055

Project:

# ChatBot integration with Knowledge Graph technology

Supervisor: Steve Battle

## Project Description:

The aim of the project was to create a chatbot that retrieves its questions and answers from an external knowledge base. After investigation a range of technology options, we decided to develop an FAQ chatbot using RASA, a modern open-source chatbot platform. We were able to use a new KB feature, currently in beta-release. The mapping from user input to response is achieved by training a neural network on a ‘bag of words’ in the training data.

## External organisations or groups that were partners, participants or recipients on this project

The project worked with Keynsham Town Council. We are using questions from the Bath HAZ Project where we have been given FAQs – questions and their corresponding answers. Rasa is a leading conversational AI platform, for building conversations at scale. It is an open-source framework for NLU, dialogue and interactions.

Intern: Camilo Pires

## Outcomes and Benefits

The project achieved its objectives of identifying an appropriate chatbot platform and using this to pull data drawn from a knowledge base, rather than being hard-coded within the chatbot. The work complemented our postgraduate research, allowing us to sit down and build a working chatbot for real with an external ‘customer’, looking at their requirements. For example, it was the customer’s need for an FAQ system that pushed us in that direction. The customer also identified a need to capture tabular data, ideally suited to a knowledge base, that is not well supported by existing chatbot systems. Given the short timescale, we only had a limited data-set to work with, but the project has enabled us to build a relationship with the Town Council that will allow us to collect more FAQ data in future. The project also helped to identify next steps in providing a more natural response to KB based questions, that we hope to fully develop in future.

Your input -> What is the high street action zone?  
Keynsham's HS HAZ is a four year partnership programme between Historic England, B&NES and Keynsham Town Council. The aim of this programme is to enhance Keynsham's history and heritage in hope of, alongside enhancing Keynsham's conservation area. With hopes that these enhancements will generate economic growth and improve the quality of life in the town centre.  
Your input -> Who is paying for it?  
Keynsham High Street was awarded £1.1million as part of Historic England's High Street Heritage Action Zone (HS HAZ) Programme. This programme has been match funded by Keynsham Town Council (£40,000) and Bath and North East Somerset (B&NES) who have contributed £100,000 from the Community Infrastructure.  
Your input -> Will the Ashton Way car park stay open?  
'Ashton Way' has the value 'no' for attribute 'affected'.  
Your input ->

Project:

# Determining material properties for advanced composites using machine learning techniques

Supervisors: Xiaodong Xu, Andre Jesus

## Project Description:

The University has prioritised Artificial Intelligence and the Data Revolution in her Strategy 2030. Machine learning, a branch of AI, is the study of computer algorithms that improve automatically through experience and by the use of data. In this project, two students will receive training on machine learning techniques (using Matlab or Python) and an image database. They will then apply such techniques/ database to identify composite material properties such as fibre volume fraction and crack length. These properties are crucial for the optimisation of the process and design of advanced composite components. which is a form of high value design and manufacturing.

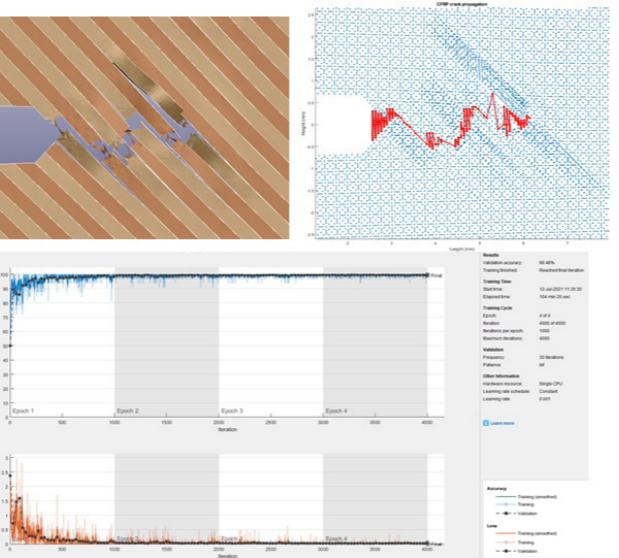
## External organisations or groups that were partners, participants or recipients on this project

Utah State University

Interns: Matthew Dumbrill, Eliska Polkova

## Outcomes and Benefits

Two Matlab codes were created which will be used for future publications.



Project:

# Wind Turbine Sub-Structure Design methodologies

Supervisor: Chris Harrison

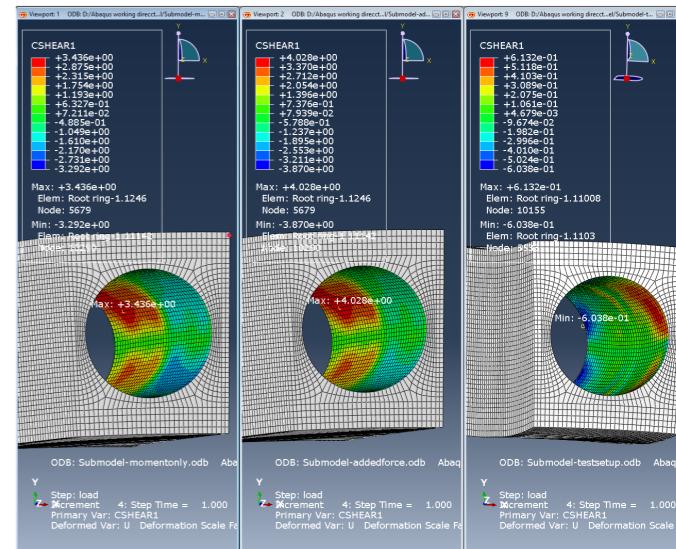
## Project Description:

Finite element investigation of sub-structure tests of a wind turbine blade root, and comparison with an actual blade.

## Outcomes and Benefits

A model of a representative blade root and two different sub-structure tests were prepared by the student. DNV is currently analysing the results and may co-author a paper if they are suitable.

Intern: Leigh Booth



Project:

# Ornithopter Drone

Supervisor: Chris Toomer

## Project Description:

The project looks to develop a biomimetic nanodrone. This part of the project consisted of establishing communication between different parts of the drone; and the User which is a non-standard procedure, and improving the shoulder design of the flapping mechanism. This has enabled the wings to start flapping and for the drone to be automatically controlled by the User as well as having an automated stabilisation. The next part of the project involves improving the lifting and manoeuvering performance of the craft.

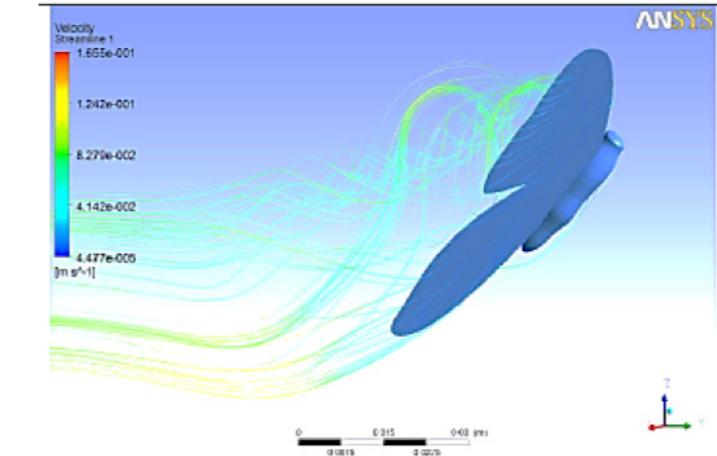
Intern: Victoire Huchet

## Outcomes and Benefits

The submitted report will be turned into a paper as the sequence of connections has not been discussed previously online.

This part of the project has overcome previously problems in the shoulder joint as well as establishing a direct manoeuvring control between User and the aircraft.

The completion of this stage of the project provides evidence to show to potential funders in the future.



Project:

# Design guidelines for Interfacing robots with Pharmaceutical Manufacture and Test equipment at Roche

Supervisor: Farid Dailami

## Project Description:

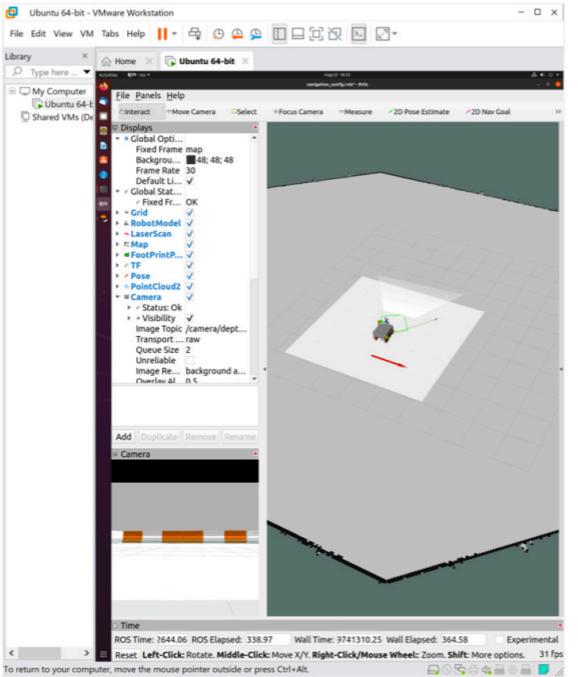
An examination of selecting Autonomous Mobile Robots for servicing of Roche diagnostic machines

## External organisations or groups that were partners, participants or recipients on this project

Roche in Switzerland

## Outcomes and Benefits

The results were well received by Roche and the report from the work will be used for dissemination of and inclusion of findings in the AMR selection making process.



Project:

# Development of a Microbial Fuel Cell Educational Toy

Supervisors: Maryam Lamere, Jonathan Winfield

Intern: Lewis Martin

## Project Description:

Development of a prototype microbial Fuel cell toy for use in STEM teaching.

## Outcomes and Benefits

"Detailed CAD produced and 3D printed model produced.

Unufficient fund to complete the project. Prototype not developed and tested."



Project:

# E-scooters: how are they being used at UWE?

Supervisors: Ian Shergold, William Clayton

## Project Description:

This was a piece of research investigating the impacts of the Voi scooter trial on UWE students and staff travel habits, and their perceptions and experiences of this new mode.

Interns: Anna Speak, Monique Taratula-Lyons

## Outcomes and Benefits

The scooter research collected survey data from 182 participants, including qualitative responses detailing people's "scooter stories". The student researchers also recorded geophotographs and field notes regarding the use of Voi scooters on and around the UWE Bristol campuses. The research generated important insight into people's perceptions of this new mode of transport, which has received relatively little attention so far. The results can help to inform future scooter services like the Voi trial in the West of England, particularly in relation to people's experiences, and issues of road/pedestrian safety. The research initially has generated a project report (authored by the student researchers), and was presented on the Centre for Transport and Society stall at UWE's Zero Carbon Bus Tour day in September. We are currently preparing an abstract for submission to a special e-mobility issue of the Active Travel Studies journal, due October 2021.



Project:

# Festival Of Surveying

Supervisor: Jim Mason

## Project Description:

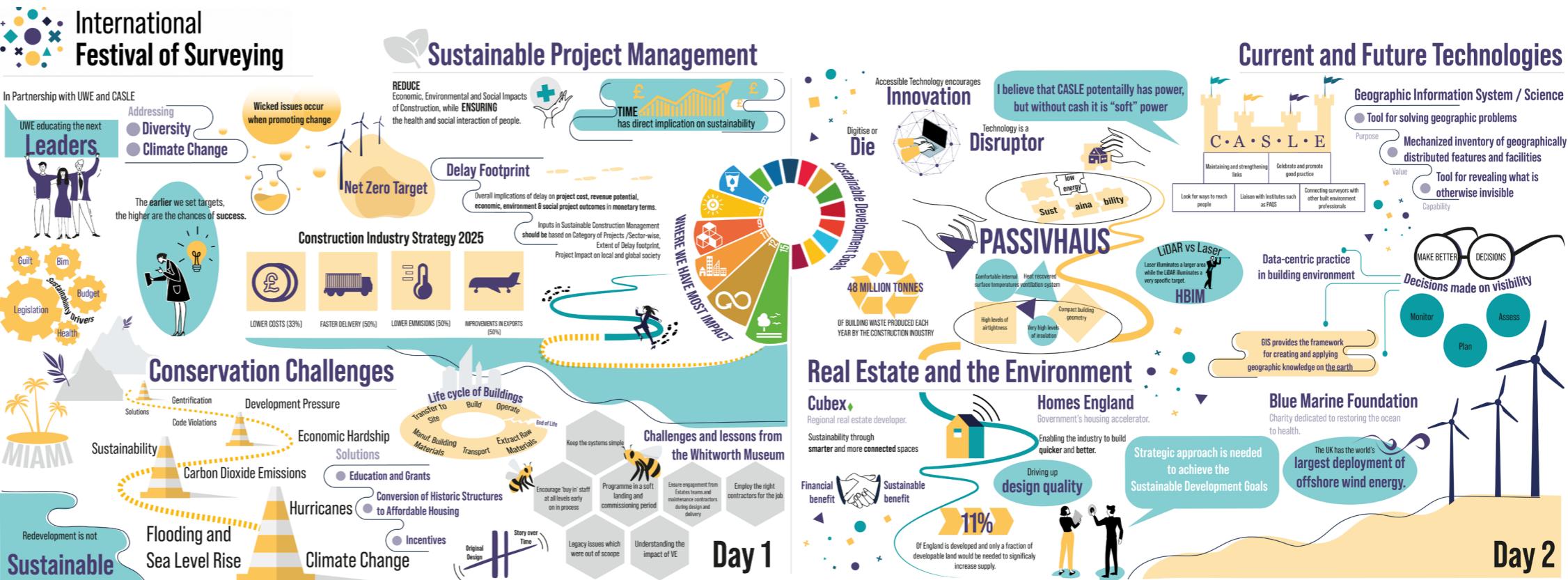
Online festival - preparation and dissemination and recruitment of speakers

## External organisations or groups that were partners, participants or recipients on this project

CASLE Commonwealth Association of Surveying and Land Economy

## Outcomes and Benefits

Great “pebble in the pond” to showcase our research and we are already planning the second year for March 2022.



# The Psychology of Buildings: Architecture 'on the Couch'

Supervisors: Jonathan Mosley, Lita Crociani-Windland

Interns: Emily Herridge, Jose Cornejo Bermeo

## Project Description:

"The project is based on inter-disciplinary research between architectural academic/practitioner A/ Prof Jonathan Mosley, psychology academic Dr. Lita Crociani-Windland (UWE-HAS), psychoanalytic therapist Dr. Nigel Williams (UWE-HAS/independent) and conceptual artist Sophie Warren (independent) to explore buildings as psychological subjects. The research considers architecture as an assemblage of built material, systems and people, all with mutually affective relationships, and how that assemblage may have conscious and unconscious dimensions. The research seeks to understand these relationships in different levels of the psyche and how this understanding can enhance our individual and collective wellbeing within architectural space.

We have developed an innovative toolkit of methods that can be applied to pieces of architecture to uncover their psychology and have completed pilot research on case study buildings. We are now developing a funding

bid to the Arts and Humanities Research Council and disseminating the pilot research at conferences and to future collaborating organisations and partners.

The students were asked to do two tasks:

1. Desktop research and, working with the architectural academic, develop small scale digital architectural models of buildings within the 'family tree of a building' of the case study of the pilot research and one bigger 'Deputised Object' digital model for 3D print. The buildings include: French Communist Party HQ, and its relations - Bourse du Travail (Paris), Palace of Dawn, National Congress, Pombal (all Brasilia), Pampulha (Belo Horizonte) - designed by seminal architect Oscar Niemeyer.

2. Working with the above academics/practitioners of the research to design and produce a project website for the overarching research - the Psychology of Architecture - using Squarespace. The website sets out the territory

of the research initiative, its relevance and application, summarise the research completed, future projects, associated network and lead to other relevant sites. The task included website organisation and design, presenting draft work, manipulating images, graphic design, web-software manipulation.

## Outcomes and Benefits

The students gained in the following ways:

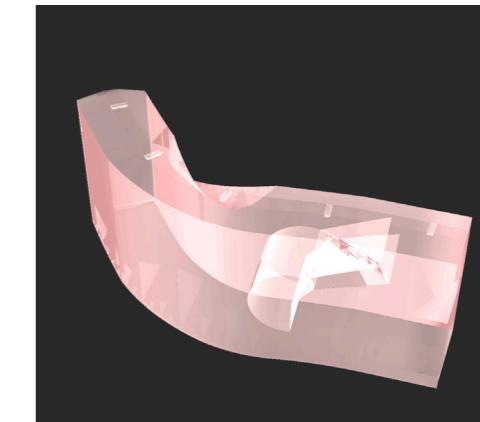
- Introduction to emerging field of architectural psychology and the innovative approaches and tools that the project creates;
- Understanding and first-hand experience of inter-disciplinary collaboration;
- Developing architectural understanding of Oscar Niemeyer buildings;
- Developing digital modelling skills, graphic and website design and production skills;
- Increased awareness of how initiatives can gain traction through networks between research organisations, practitioners, funding organisations and developing platforms for dissemination of ideas;
- Contributing to a dynamic project with a publicly accessible platform that the students can reference when seeking employment.

The academics benefited in the following ways:

- Assistance in completing the 'family tree of a

building' research output that extends from the internally funded pilot research. The output is potentially to be included in the next REF;

- Gaining a project website that can:
- o Provide a platform for the inter-disciplinary research/practice initiative to set out its territory and purpose
- o Develop outreach for the department/faculty
- o Assist in enlisting external funding bid partners and collaborators
- o Develop network around the project
- o Give the research initiative a public profile that will assist in attracting positive peer reviews for papers and grant proposals.



Project:

# Creative Technologies Community Workshops and Showcase in Easton May 2021

Supervisors: Michaela Palmer, Steve Brown, Tom Garne, Maxwell Davies

## Project Description:

Delivery of creative technologies workshops to help launch a new STEM club in Easton, with the aim of fostering the perception of UWE Creative Technologies as a community partner open for dialogue and future collaboration.

Three Creative Technologies student interns helped to prepare and document projection mapping and camera workshops. Students gained valuable work experience in knowledge exchange and co-creative working in the creative technologies. The workshop consisted of engaging activities in audio and video production that allowed participants to explore software tools for content creation.

The workshops were part of a wider initiative by Baggator and Graphic Science. This involved the launch of a new STEM club in Easton, giving disadvantaged children and young adults the opportunity to engage with

Interns: Alessandro Gontay, Andreea Popescu, Maryan Abdirahman

technology and to deepen their learning via science-related activities.

We planned and delivered 2 afternoon/ evening sessions to ~25 young adults aged 3-16. We also successfully engaged with parents and community members on these occasions.

## External organisations or groups that were partners, participants or recipients on this project

Baggator Bristol

## Outcomes and Benefits

Successful connection made between UWE Creative Technologies cluster and a non-profit community organisation in Easton. We plan to strengthen this relationship in the next academic years and continue project work via a Community Grant.

One FET graduate who worked on this project continues to be employed by Baggator as Outreach Officer, now taking the project into the next stage (Growing Easton's Data Garden).

Successful connection made with Graphic Science and the STEM Ambassador Hub West England.

Successful launch of a STEM club in the Easton Community.



Project:

# Extending goal programming models for lot-sizing problem with supplier selection

Supervisor: Xiaodong Li

Intern: Rowan Sutton

## Project Description:

In the project, the hired student extended successfully her final year project by further learning additional knowledge of multi-objective optimisation approaches. The new models have been formulated and solved under supervision. The student improved the modelling and programming skills during the project work.

## Outcomes and Benefits

A manuscript based on this project work has been created and will be finalised in November. It is expect to submit it to International Journal of Production Economics for publication.

	$\alpha_1$	$\alpha_2$	$\alpha_3$	$\alpha_4$	$r_1^P$	$r_2^P$	$r_3^P$	$r_4^P$	$r_5^N$	$r_6^N$	$\sum_{k=1}^4 z_k$	$z_5$	$z_6$
Sol.1	0.25	0.25	0.25	0.25	1	0	0	0	1	1	3,002.70	5,781	6,205
Sol.2	0.925	0.025	0.025	0.025	1	0	0	1	1	1	2,596.88	5,770	6,162
Sol.3	0.025	0.925	0.025	0.025	1	0	0	0	1	1	3,023.90	5,768	6,157
Sol.4	0.025	0.025	0.925	0.025	1	1	1	1	1	1	2,910.09	5,914	6,154
Sol.5	0.025	0.025	0.025	0.925	0	1	1	1	1	1	2,939.78	5,844	6,131
Sol.6	0.625	0.125	0.125	0.125	0	1	1	1	1	1	2,913.78	5,800	6,132
Sol.7	0.125	0.625	0.125	0.125	0	1	1	1	1	1	2,901.71	5,822	6,133
Sol.8	0.125	0.125	0.625	0.125	0	1	1	1	1	1	2,992.34	5,787	6,129
Sol.9	0.125	0.125	0.125	0.625	0	1	1	1	1	1	2,902.32	5,823	6,133
Sol.10	0.475	0.475	0.025	0.025	0	0	1	1	1	1	2,594.83	5,809	6,136
Sol.11	0.475	0.025	0.475	0.025	0	1	1	0	1	1	2,787.84	5,765	6,158
Sol.12	0.475	0.025	0.025	0.475	0	1	1	1	1	1	2,864.65	5,823	6,134
Sol.13	0.025	0.475	0.475	0.025	0	0	0	0	1	1	3,103.60	5,749	6,086
Sol.14	0.025	0.475	0.025	0.475	0	0	0	1	1	1	2,511.26	5,752	6,122
Sol.15	0.025	0.025	0.475	0.475	0	0	0	0	1	1	3,051.87	5,811	6,181
Sol.16	0.312	0.312	0.188	0.188	0	0	0	0	1	1	2,991.24	5,829	6,147
Sol.17	0.312	0.188	0.312	0.188	0	1	1	1	1	1	3,188.52	5,827	6,139
Sol.18	0.312	0.188	0.188	0.312	0	1	1	1	1	1	2,915.69	5,842	6,148
Sol.19	0.188	0.312	0.312	0.188	0	1	1	1	1	1	2,969.32	5,812	6,107
Sol.20	0.188	0.312	0.188	0.312	0	1	1	1	1	1	2,879.94	5,793	6,153
Sol.21	0.188	0.188	0.312	0.312	0	1	1	1	1	1	2,884.17	5,789	6,156

Project:

# Development of novel techniques to enhance the performance of vertical axis wind turbine

Supervisor: Yufeng Yao

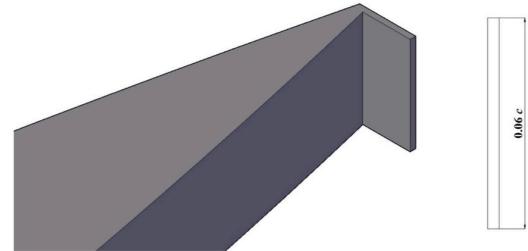
Intern: Rista Syawitri

## Project Description:

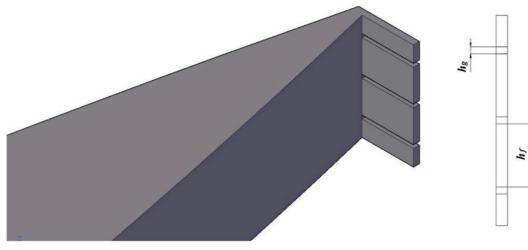
The proposed project has been completed in success with a conference paper accepted and presented at the UK Fluids Conference, 8 to 10 September 2021. Some outcomes from this project will also contribute to a Journal paper under-preparation.

## Outcomes and Benefits

Main outcome is a conference paper (accepted and presented) and another Journal paper is under-preparation. The case study can be used for future tutorial examples for student projects and some M-level modules.



(a) Clean GF



(b) GF with slits

Project:

## Raspberry Pi Cluster

Supervisors: Xiaodong Xu, Andre Jesus

Interns: George Johnson, James Harvey

### Project Description:

This project aims to build a 21 Raspberry Pi cluster to serve future students' projects.

### Outcomes and Benefits

The mini computer cluster has been built and will be used by the students in the new academic year.



Project:

## Bristol Water History Project

Supervisor: Chad Staddon

Interns: Natalie O'Donoghue, Abigail Bristow

### Project Description:

As part of the celebrations of Bristol Water's 175th anniversary, UWE and BW are launching an oral history project, focusing on capturing the memories of employees, former employees and other stakeholders around key events still in living memory, including the 1995 Drought, the 1976 Drought, Privatisation, and the changing role of women in the company, especially around water engineering and operations.

### External organisations or groups that were partners, participants or recipients on this project

Bristol Water

### Outcomes and Benefits

Collaboration between UWE & Bristol Water with students learning to work with archival material.

Project:

## Research Intern for CCC-CATAPULT: Challenging the Climate Crisis: Young people's Agency to TAckle Policy Underpinned by Learning for Transformation

Supervisor: Sara-Jayne Williams

### Project Description:

To work on the international research project CCC-Catapult and experience first hand the intricacies of developing a new research project, taking part in international project meetings and working with multi interdisciplinary partners. To use research skills to develop a social media strategy, create templates for social media posts and write a Blog about use of social media in research projects with young people.

### External organisations or groups that were partners, participants or recipients on this project

CCC-catapult research project.

Intern: Leah Nudds

### Outcomes and Benefits

Templates created  
social media strategy created - across 4 partner countries  
twice weekly Instagram and twitter posts created and posted to increase following and disseminate early information about the project.  
Blog published in website 'Top Tips for Using Social Media in research projects with young people'

Project:

## Low Cost Environmental Sensors - Arduino-based Platform

Supervisor: Chad Staddon

Interns: Henry Percy, Callum Jones

### Project Description:

The purpose of this project is to advance previous work on low cost environmental sensors for assessing (1) water levels in rainwater harvesting systems, (2) ambient air quality in housing, (3) acoustic monitoring for traffic assessment.

### Outcomes and Benefits

This project will give students cutting edge skills in Arduino-based sensor design and operation and is open to students without any previous experience. For staff this progresses ongoing work in low cost sensors.

Project:

## Flat Holm Augmented Reality (AR) Reporting

Supervisor: Michaela Palmer, Mark Palmer

### Project Description:

After a successful Phase 1 bid for the regeneration of Flat Holm island (see <http://flatholmsociety.org.uk/2018/10/new-lease-of-life-for-flat-holm-as-hlf-funding-is-announced/>), Cardiff City Council has been awarded Heritage Lottery Fund for Phase 2. BRO Cymru, Artstation and UWE academics will be subcontracted to work collaboratively on some aspects of phase 2, which includes the creation of an AR user experience.

For this project, 1-2 students have been working alongside Mic Palmer in the gathering of design requirements for the design of the AR user experience, and the evaluation of an augmented reality pilot. This has culminated in a report for Cardiff City Council containing recommendations for future implementations. Under Mic Palmer's guidance the student(s) liaised with project stakeholders, gathered data remotely and helped to compile the report.

Interns: Lucinda Rigby, Andreea Popescu

### External organisations or groups that were partners, participants or recipients on this project

Cardiff City Council, BRO Cymru, Artstation

### Outcomes and Benefits

"Students have helped to gather research insights and to communicate these via an internal design recommendations report. This document will help artists and professionals involved in the Flat Holm Regeneration project and the AR application project to fulfil the funding criteria and engage members of the public successfully.

This report contributes to the next stages of the Flat Holm regeneration project. With permission of the grant holder, the report will eventually feed into a conference / journal paper on UX design for AR applications in environmental regeneration once the regeneration is successfully underway and accessible to the public (2023). The grant holders have not permitted any visuals of creative work in progress to be released at this point in time."

Project:

## Art of Healing / Kalakar Qasbah

Supervisor: Michael Burser

### Project Description:

This is an arts project with children in Kashmir. Students are working with artists to work through issues associated with conflict in Kashmir. We have 30 surveys which have been completed (they are hard copy and scanned). The surveys are 4 pages long and have a number of tick box questions and some text responses. The student can help set up an excell form to transfer the data and will then input the data. all the work can be done and on computer with excell. We are likely to have a second round of surveys (another 30 surveys) in April. The student could help with data transfer and input at this point as well. the work requires a bit of computer skills (Excell) and the ability to input data. It should help the student understand formal surveys and data management.

Interns: Kotryna Kuskyte, Pauline Hahnemann

### Outcomes and Benefits

The research is contributing to wellbeing of children. The specific activity here will help researchers analyse data being collected. The Students will gain expertise in using excel, data management, survey techniques, and quantitative methods.

Project:

## Investigating hydrogen fuel cells for green aviation

Supervisor: Abdessalem Bouferrouk

### Project Description:

Investigating the feasibility of using hydrogen fuel cells on a General Aviation aircraft, the Cessna 172. Also, looking into possibility of powering the aircraft using batteries. Finally, a comparison between the two technologies in regards to aircraft's performance.

Intern: Jonathan Charman



### Outcomes and Benefits

Conference paper was presented at the Isatech 2021. A follow-up of this work will be written as a short journal paper in an aerospace journal.

Project:

# Interpreting Scoping Reports for Offshore Wind Projects in UK & Ireland

Supervisor: John Morton

## Project Description:

The United Nations have declared 2020-30 The Decade of Ocean Science for Sustainable Development. The initiative strives to reverse the cycle of decline in ocean health by creating sustainable development of the World's Oceans. One such aim is the sustainable use of offshore wind which is quickly gaining traction in UK and Irish waters. Most planned offshore wind projects focus on shallow sandbanks dotted around UK and Ireland. The initial part of each of these large-scale operations is a scoping study which are made available to the public online. These studies contain large amounts of information on the coastal processes and geotechnical properties of the seabed at each site. This 150 hour project is to analyse the geoscience data within a number of recent scoping reports published in the last 2 years. This analysis will allow us to better understand typical seabed conditions at various offshore wind sites and allow us to propose novel and more sustainable site investigation methods tailored to UK and Irish waters. Current site investigation methods rely on techniques

used by the oil and gas sector such as in the North Sea and the North West Shelf. However, these are not always best suited to shallow sand bank sites and novel site investigation methods are required.

## Outcomes and Benefits

The students will build on their geotechnical knowledge learned at UWE and gain key knowledge of offshore engineering. The students will be introduced to the standard testing methods used in offshore site investigation and learn important skills on interpreting geophysical maps from side scan sonar. Offshore engineering is a growing sector and will provide strong employment opportunities for the students. The academics are benefitted by identifying where automated field testing processes can be used to replace existing outdated methods. This is a key area for offshore renewable engineering highlighted by a recent EPSRC Statement of Needs call for an autonomous robotics facility for underwater environments. Once the scoping analysis is complete the academics will be in better position to plan to automate the field testing process by working closely with the UWE Robotics Laboratory.

Project:

# Creating interactive walking maps

Supervisor: Miriam Ricci

## Project Description:

"This proposed student project builds on a concluded project led by Dr Miriam Ricci in 2019. The project, named "Accessible walks from local rail stations" and funded by GWR, audited 3 accessible walks from local train stations with the help of disabled rail users. Outputs from this project include participants' feedback, photos, videos and field observations. .

The student can work a pattern that suits their studies, starting preferably after their exams in May. Work must be completed by 31st July.

The student will be tasked with creating interactive maps for the walks, in an accessible format, using and further enhancing the available outputs from the "Accessible walks" project (photos, videos, text and narrated descriptions).

Ability to work independently to produce well-designed interactive maps, using UWE approved software. Excellent organisation, time-management, and verbal and written communication skills.  
"

Intern: Jack Fry

## Outcomes and Benefits

It is important that we understand and nurture the views and aspirations of planners of the future whose responsibility it will be to implement and challenge the planning system to ensure the benefits of good planning are realised (their voices are under-represented in both professional and academic literature). The findings are a significant contribution to furthering our understanding of young planners and are of relevance, therefore, not just to educators (both in schools and universities) but to professional bodies, employers and politicians alike. The headline findings from the first year of the survey (2019-2020) have been well received by planning schools across the UK and professional bodies who are keen to continue to engage as the study expands to take in data from further years. This project is an opportunity to get some hands on data analysis experience and also provides the excellent opportunity to present the findings in a professional setting.

Project:

# The impact of spring weather conditions on yield of cereals in UK

Supervisor: Sarah Ayling

## Project Description:

The climate change predictions for UK suggest that winters will become warmer and wetter and summers hotter and drier. Cereal crops are generally considered drought tolerant but if dry conditions occur during flower formation, flowering or seed set yields can be reduced. Better understanding of the impact of regional weather conditions at different times of year on yield will help growers and consumers of cereals predict more accurately if yields are likely to be reduced. The students will extract information about cereal yields for different regions of the UK from the Defra database and correlate these with information about weather conditions at different times of year available from MetOffice website. The students looked at rainfall and growing degree days separately and together. The students compared different cereals and winter and spring-sown crops.

Interns: Sayda Shejuti, Louis Gray

## Outcomes and Benefits

"The students gained experience in downloading and handling large data sets. The students learnt how to apply concepts described in academic publications to the data they had downloaded. They learnt how to use logical statements to extract the data that they needed for further calculations, and how to combine logical statements to carry out conditional calculations. The students learnt the importance of plotting data in multiple ways to look to trends and patterns. These data handling and analytical techniques will help them during their dissertation projects and in their professional life after graduation. Surprisingly the students found no clear strong link between rainfall amounts or growing degree days and yield. One of the students is interested in looking at the data in more detail if they have an opportunity to do so, One of the students was interested in learning about different fields in which this type of analytical work might be used, and spend some time speaking with me about possible careers and employers."

Project:

# Analysis of the 2020 National Planning Student Expectations and Motivations Survey

Supervisors: Hannah Hickman, Katie McClymont

## Project Description:

Funding was provided through the FET Research and Enterprise Scheme to enable the casual employment of Aidan Clarke, a current UWE masters students in Urban Planning. This employment was to support the analysis of the 2020 national planning student survey, exploring the expectations and motivations of planning students across the UK and Ireland. This survey is part of a longitudinal study initiated by UWE in 2019 to explore whether student's initial motivations and expectations are matched by their early practice experiences.

## External organisations or groups that were partners, participants or recipients on this project

Students from 14 Planning Schools across UK and Ireland participated in this year's survey. The project also has the support of the Royal Town Planning Institute

Intern: Aidan Clarke

## Outcomes and Benefits

"Aidan's work was invaluable to the analysis of the second year of data that forms the foundations of our longitudinal study of planning students nationally. Without Aidan's important contribution, we would not have been able to present the findings to this year's UK/Ireland Planning Research Conference, which we did on the 9th September 2021. The findings were extremely well received and prompted good debate, including amongst international participants. "

Project:

# Smart place re-making – Retailidential reviving of city centres

Supervisor: Grażyna Wiejak-Roy

## Project Description:

This research responds to retail digitalisation by contributing to a vision for vibrant city centres. It builds on my externally funded research on changes in the real estate sector and my nascent work on retail market transformation. Both call for improved decisions regarding surplus retail properties. At the same time the residential sector is in low-supply disequilibrium. This research investigates what could be the expected changes and opportunities and produces a tool linking the retail and residential sectors in order to bring balance in both markets by conversion of surplus retail into residential uses.

Interns: Maryam Hussain, Thomas Melvin

## Outcomes and Benefits

- “1. Review of existing academic literature - near completion
- 2. Review of existing business publications and news - near completion
- 3. Data collection - identification of case studies of retail to residential conversions - in progress

### Benefits:

- for my research: started paper drafting
- for students working on data collection: learning how to efficiently collect data, searching professional and academic databases, data validation / triangulation”



Project:

# Bridgwater Station Room Development- Stakeholder & Community Engagement

Supervisor: Miriam Ricci

## Project Description:

The Severnside Community Rail Partnership (<https://www.severnside-rail.org.uk/>) is a Community Interest (not for profit) Company, providing a link between local communities and the rail industry. An opportunity has arisen to initiate the processes involved with converting two redundant rooms at Bridgwater station for community use. The first (formerly a model shop) has potential as a 'community hub' which could be accessed by a range of groups. The second room (previously used for storage) would ideally become the venue for a café or similar social enterprise. The Partnership would like to commission a student to undertake a short research study to better understand the aspirations of the communities and of the key stakeholder groups surrounding Bridgwater station and how these rooms might be brought back in to use to the maximum benefit of the communities served by the local rail network. Work pattern and start time can be flexible to suit the student's academic commitments, but the project needs to be completed by 30th June 2021.

William Lucas

### Tasks:

- Introduction to the community rail, agreeing exact brief, methods and processes. 1.5 days.
- Designing and distributing community survey: 3 days.
- Analysing survey data: 4 days.
- Identifying and contacting key stakeholder organisations: 1 day.
- Undertaking interviews with key stakeholders: 3 days.
- Writing up key findings from interviews: 3 days.
- Preparing final report: 4 days.
- Presenting final report to key stakeholders: 0.5 days.

The ideal candidate should have the following skills:  
An interest in local communities and their future development. An interest in rail is helpful but not essential.

Establish and develop working relationships with representatives from public, private and voluntary organisations.

Work as a member of a team but be self-motivated and able to use own initiative.

## External organisations or groups that were partners, participants or recipients on this project

The Severnside Community Rail Partnership

## Outcomes and Benefits

"This is a great opportunity for a student to apply their research and enterprise skills in the community rail sector, whose mission and values are aligned with UWE GEM department's focus on sustainability and community engagement. The student can expect to • develop their network by engaging with a wide range of stakeholders stakeholders, such as GWR, Network Rail, Bridgwater Town Council Sedgemoor District Council, Somerset County Council. • receive feedback on their work from several rail industry professionals • be able to reference the experience in applications for future study or employment. This project also benefits the academic member of staff involved and her team, who have an existing collaboration with community rail partners, built over recent successful research projects."

Project:

# E-bike futures

Supervisor: Ian Shergold, Steve Melia

## Project Description:

Undertaking a third wave of online research with electrically assisted, or e-bike users (and aspiring users) in the UK. Two earlier waves have generated responses from over two thousand five hundred members of the public, pre-pandemic and during the pandemic. The two surveys conducted so far were undertaken in the Replicate Project, an EU-funded multi-city study into citizen perspectives on energy use and climate change action in inner-urban areas of European cities. Provision of shared-use e-bikes was one intervention tried in Bristol during the project, and the surveys provided background information on how e-bikes were being used, and were likely to be used more widely. The third wave survey will happen after Replicate finishes, but will continue the longitudinal data as we begin to emerge from the pandemic. Results from the analysis of the data will be of value to Replicate project partners such as Bristol City Council (in respect of bike-share schemes), and commercial partners such as Co-Wheels who delivered the Bristol e-bikes. The first two waves of data have already led to one academic journal article

Intern: Chloe Woodruff

(with another in development), and a submission to an international cycling conference

## Outcomes and Benefits

Students will gain real-life experience of designing and deploying an online survey aimed at the whole UK population of e-bike users (and aspiring users). They will learn how to set up such a survey in Qualtrics, and manage the resultant data. They will get an opportunity to set this data up in SPSS and NVivo, and carry out both quantitative and qualitative analysis. The data from the first two waves of the survey is currently under more advanced statistical analysis, and if the students involved wish to look at the data in more advanced ways this will be possible as well. We would like the students at minimum to write up a short descriptive report from the data, and think about how that might be taken a step further, and developed into an academic paper. Academics will benefit from additional data to complement the first two waves of survey data, offering views of people as we emerge from the lockdown (hopefully the survey can be deployed in April / May 2021). UWE researchers would be in a privileged position of being able to report

Project:

# CAR Project

Supervisor: Jason Matthews

## Project Description:

The project was set up to investigate the requirements for a student experience project retrofitting a classic British ICE powered vehicle to an electric power train.

Intern: Robert Eilbeck

## Outcomes and Benefits

"The outputs from the project were:

1. An assessment that the project could be safely and successfully undertaken by students (with academic supervision)
2. Identification of appropriate and affordable classic cars that could be used in the project.
3. Investigation, costing and selection of appropriate kit for the conversion process.
4. Identification of pre-tension battery units to power vehicle.
5. Risk assessment for undertaking this activity within the faculty.
6. Identification of appropriate resources and personal for the manufacture of brackets, fixtures and on vehicle modification beyond student capabilities.
7. Identification of safety training providers for the high voltage element of the project, including costing."

# Partnership in a Pandemic: Researching the Student Experience During COVID-19

Supervisors: Harry West, Aida Abzharova, Jennifer Hill

## Project Description:

The learning and teaching experience of our students in the last year has changed dramatically under COVID-19, in particular the evolution to online and blending learning. It is increasingly likely that we will carry through many of these changes into our future practice, and so it is important that we understand what it is like for students to work in these novel, and what have been termed virtual and disconnected, ways. We are seeking to undertake a pedagogic research and development project that adopts a 'students as partners' ethos. Our aim is to explore and understand the student experience with online and blended learning, with a focus on examining the skills/attributes needed by students to study successfully in these environments, how we can effectively integrate the necessary skills/attributes into our curricula across all years of undergraduate study, and how we can encourage students to understand and articulate the relevance of these skills/attributes to their future careers. In the spirit of true student partnership, we will co-create this project with students, working

Interns: Anoushka Alexander, Will Cox

through each step together from research design, through data collection and interpretation, to co-authorship of a publication about our findings

## Outcomes and Benefits

There is a large body of literature that explores the benefits to students from participating in 'live' research projects with staff. In this project we would like to broaden their disciplinary horizons by taking them into the realm of higher education pedagogy. This will diversify and complement their existing research skills set. We cannot be too prescriptive at this stage about the research process as we would like to co-design this with the student partners. Two possible data collection methods might include an online cohort survey and/or focus groups stratified across year groups conducted over the BSc and BA Geography programmes. Data analysis would be co-designed to align with the data collected. The project will achieve three key outcomes: 1. The student researchers will learn about the challenges and positive steps the Department has taken to support our

diverse student body with their studies during the pandemic. Their involvement in the project will demonstrate to them that there are career prospects in HE that are much broader than an 'academic'. For example, working in professional services at universities, and a variety of roles in organisations such as the Office for Students and the Quality Assurance Agency. Geographers, with their multidisciplinary skills and attributes, are well qualified for these roles, and this project will open up new opportunities for the students in these areas. 2. The data will inform the Department about the skills students are lacking and/or developing through online/blended learning. This will help us to develop an action plan around how we welcome students into such environments and embed new learning skills. The understanding gained from the project will allow the Department to plan a course of action to articulate the development of new twenty-first century (Generation Z) skills to students, linking with a wider set of graduate attributes. Embedding such a programme will prepare students to complete the Graduate Outcomes Survey, with greater certainty about the skills/attributes they possess and how these can help them to secure a purposeful career trajectory. In short, we will gain an evidence-informed understanding of the challenges and opportunities our students face working in online and blended learning spaces. We will use this new learning environment as a spring board to enhance graduate skills and opportunities. The findings will contribute to the planning and delivery of staff development across

the department, helping us to plan effective and resilient delivery in future years, in order to secure positive outcomes coming from a healthy blended learning environment 3. The students will travel with us to the very end of the research process – publication in peer-reviewed journals. We envision two articles coming out of this project, co-authored between the student and staff partners. We will target the Journal of Geography in Higher Education and International Journal for Students as Partners as suitable outlets for this work. As well as publication in journals we will seek to co-present work with the students at conferences such as the Royal Geographical Society and the British Conference of Undergraduate Research (in online or face-to-face form depending upon COVID-19 social distancing restrictions). The students will play a key role in helping us to shape these outputs for publication and will be encouraged to work with us to determine how to best showcase this work. These outputs will be a valuable co-curricular addition to students' CVs, and will continue to build the pedagogic research profile in the Department.

Project:

# Local museums in building Community Resilience to the Climate Crisis?: the case of The John Moore Museum, in the 'Flood Town' of Tewkesbury

Supervisor: Lindsey McEwen

## Project Description:

"The project was focused on researching the present and future role of museums in local climate resilience.

Lauren Baillie (intern) has been involved in the following stages:

- carried out a rapid literature review/ web search on the role of museums in the climate crisis in the UK and internationally. What role do they have? What role could they have?
- input intellectually/ creatively to the research design of the work; carried out narrative interviews with the curator and outreach officers of JMM; interviewed 8 people ((teachers, young people; other museums/ cultural organisations) plus 1 focus group of community volunteers that have been involved in learning/ outreach activities set up by the Museum.
- co-wrote collaboratively a short synthesis report

Intern: Lauren Baillie

on the research that is to be shared with The John Moore Museum (Tewkesbury) and other interested stakeholders.

I am currently editing that report. We have a meeting with The John Moore Museum on 8th October to discuss the project.

The work has potential to inform a future research bid to UKRI.

## External organisations or groups that were partners, participants or recipients on this project

The Museum sector in Tewkesbury, Gloucestershire and other cultural organisations; wider resilience sector - including local government and education

## Outcomes and Benefits

"Piloted a research theme  
Partnership work with The John Moores Museum  
Student learning through the internship at the research interfaces between changingrisk, local resilience and the opportunities of the cultural sector to play a part.

Lauren's reflection for CWCR website:

Working with Lindsey McEwen on a research internship, I have been investigating the role museums can have in building local climate resilience. For this project, we have partnered with The John Moore Museum in Tewkesbury who run flood resilience sessions to assess the impact on participants, as well as the potential impact for museums themselves, in dealing with adversity like flooding and the pandemic. Through interviews, focus groups and surveys, I have been collecting qualitative data around museums' perspectives, as well as their users. Being part of an internship has meant support, encouragement and access to contacts, as well as enabling me to follow a structured approach to a research project. I have felt empowered to take control of the research and have understood the process of findings feeding back into shaping the research questions. I

hope that this experience will help me build a network of contacts, as well as challenge my critical analysis and writing skills by working with an academic on real world research.

I will share a photograph of the report cover, once I have completed this.



Project:

# Using Virtual Reality to understand the visual impact of buildings on users

Supervisor: Louis Rice

## Project Description:

The project examined the impact of the design of architecture and the built environment (ABE) on visual mental health (VMH). VMH conditions like migraines, epilepsy and headaches (MEH) can be triggered by features of ABE. Environmental and visual factors are one of the most significant triggers for migraines and headaches. The project used Virtual Reality in combination with advanced Computer Aided Design (CAD) software to examine the effects of different construction materials and finishes on visual health. The project was based on UWE campus and utilized existing CAD/BIM models of the campus (UWE now has CAD models of over 90% of the campus and is keen to exploit his asset for research and educational purposes). The student established digital models and photogrammetry-based computer models of X block to evaluate the impact of VMH using virtual reality headsets. Pilot testing of the system was also undertaken by the intern to beta-test the technologies.

Intern: Zineb Saadi El Hassani

## Outcomes and Benefits

The student established digital models and photogrammetry-based computer models of X-block to evaluate the impact of VMH using virtual reality headsets. Pilot testing of the system was undertaken by the intern to beta-test the technologies. The student benefitted through their participation in a real-world research project with engagement with innovative technologies and emerging digital devices. The Department has invested heavily in a number of digital devices and software (namely 3D scanners, a Leica BLK 360 camera, Noculars devices, Enscape and BIM360) and the student had an opportunity to become familiar with these state-of-the-art technologies. The project allowed beta-testing of these technologies and should further assist us in disseminating their use and exploitation for teaching and learning for students. The student will also benefit in developing their knowledge and research skills in these technologies in an applied research context. The work carried out by the student produced comprehensive mapping and advanced scanning of 3D computer models of X-block buildings to be used in future research.

Project:

# Supporting the Development of an Online Training Course on Remote Sensing & Water Resources Management for UNESCO

Supervisors: Nevil Quinn, Michael Horswell, Harry West

## Project Description:

Over several years we have been building up a suite of activities aimed at training and supporting water/environmental professionals across the world in the use of remote sensing technologies. In partnership with UNESCO-IHP (Integrated Hydrological Programme) we have developed an online introductory remote sensing training course. To date we have designed several introductory units which will be the building blocks for more specialist learning later on. We are seeking student partners to work with us in testing out the learning materials to help ensure that they are suitable for learners/beginners, are comprehensive, and give an exciting overview of different remote sensing technologies.

## External organisations or groups that were partners, participants or recipients on this project

UNESCO-IHP

Interns: Ashley Cocco, Erika Peklanska

## Outcomes and Benefits

The student partners will be able to continue to expand their GIS skills and knowledge base, especially in relation to remote sensing and water resources management. The student will also gain experience using QGIS, as well as ArcGIS, which will be a useful addition to their CV/GIS skill set. Further we will be prompting the student to reflect on their experience working through the learning resources, giving them an insight into introductory course/learning material development. Having a student onboard to help with the testing and refinement of our UNESCO online course materials will be a great help to the remote sensing team, as it will allow for materials to be thoroughly tested and refined before passing to UNESCO for upload onto the training web site and released globally.

Project:

# Public Communication of Transport & Society research

Supervisor: Miriam Ricci

## Project Description:

The project involved a call for ideas to produce public communication material focusing on research carried out at the Centre for Transport & Society. CTS researchers identified a series of research topics and projects that we would like to make more accessible to the public, on our website or other channels (e.g. individual project websites). The call was publicised through internal communications at UWE and via direct communication to lecturers in ACE, FET and HAS. A few students sent their ideas and CVs and we selected Alexandra Wagstaff, an MSc student at the Science Communication Unit (SCU), as our winning project intern. Alexandra created two videos for dissemination and public engagement, based on two separate lines of research at CTS: 1. freight decarbonisation and 2. electric bikes (e-bikes) for urban transport.

Alexandra liaised with the CTS researchers working on these two topics, Dr Daniela Paddeu and Prof Graham Parkhurst on freight decarbonisation, and Dr Caroline Bartle on e-bikes. Alexandra created a short educational

Intern: Alexandra Wagstaff

video about the harmful effects of online shopping and the challenges this poses to decarbonisation of the freight transport sector. A prop-based or pictogram-style was used to create the video. Alexandra worked creatively on pictograms and props, and also built a filming set with a birds-eye-view homemade camera stand and make-shift lighting. The other short video aims at publicising the research that CTS researchers are doing on e-bike use in the urban landscape, and is interview-based. Alexandra travelled to Bristol to conduct the interviews and rented an e-bike for filming. This video enabled her to improve and enhance her camera skills, and getting to grips with editing software such as Audacity and Adobe Premiere Elements. The two videos are now ready to be uploaded on a UWE-approved website and used for dissemination, further research, public engagement and teaching.

## Outcomes and Benefits

These are Alexandra's own words:

“I greatly enjoyed this project as a creative outlet and I feel it has given me some invaluable insight into what it might feel like to work professionally as a science communicator. Having the responsibility to complete this project independently was quite daunting, and I sometimes felt out of my depth when interviewing and editing. But having the internship as an incentive to progress my learning really motivated me to expand my skills and pushed me out of my comfort zone. I am now less daunted by the prospect of interviewing, filming in public and video editing, and really hope that I can incorporate this kind of work into my future career.”

This project has enabled CTS researchers to understand how film making and science communication can be used very successfully to communicate complex research in an accessible way to the public. We are very pleased with Alexandra's work and this highlights the excellent teaching at the SCU. This project is an exemplar of how research centres can offer invaluable opportunities to students interested in honing and applying their skills in public communication (through multiple media), and at the same time learn and benefit from students.

Project:

## Promoting community outdoor nature-based learning through a themed walk (with panels) within Tewkesbury Community Nature Reserve

Supervisor: Lindsey McEwen

### Project Description:

Co-production of an outdoor learning trail on Tewkesbury Community Nature Reserve. 20 panels on varied themes were produced. Hannah (Intern) gathered the information and designed them, with my iterative feedback.

### External organisations or groups that were partners, participants or recipients on this project

Tewkesbury Nature Reserve (a charity)

### Outcomes and Benefits

"There were multiple benefits - for local communities (a new informative walking trail that promotes green recovery); for TNR who had been planning a trail for a while (the set of 20 panels was described by the Chairman as 'Outstanding').

Interns: Hannah Barnikel

Hannah (the intern) provided this reflection for the CWCR website:

I carried out an internship with the Centre for Water, Communities and Resilience and Tewkesbury Nature Reserve from March-August 2021. This involved collaborating with professionals, volunteers, and trustees to create 20x A5 educational panels, including information surrounding local flora, fauna, and environmental management techniques to engage the local community with the nature found at the reserve. This internship was perfect for me, as I want to pursue a career in environmental education. I feel as though I have developed and improved many skills including communication, presentation skills, graphic design and research skills, and have also improved my understanding of wildlife and environmental management. I received a lot of support throughout my internship from my supervisor, who responded quickly to emails and regularly checked in on me. As well as the personal benefits, this internship has contributed to my degree, providing me with a sound project for my work-based learning module.

Project:

## Juvenile/sub-adult Palmate Newt morphology

Supervisor: Todd Lewis

### Project Description:

Palmate newts are a species very common in UK and Europe. Data collection is complete. Data needs contrast with adults using Standardised Major Axis Testing (SMA). This is achievable and short code in R that can help a student improve their analysis skills. The student would then write-up, publish the works in a small article, then send data to Trochet database contributing to open access data availability.

Intern: Isabella Considine

### Outcomes and Benefits

Student gets to; use project for third year dissertation, joint publish with academic lead, learn publishing framework, improve analysis and writing skills, collaborate with external co-authors, represent UWE, gain project leadership skills, present published work on CV, improve employment prospects. Academic gets to; propel an dormant dataset to publication, develop a students skills, retain communication and project development with external collaborators, improve on student communication in an online framework.

# Transport for thriving young people

Supervisors: Sarah Collings, Kiron Chatterjee

## Project Description:

The Centre for Transport and Society alongside Sustrans, a charity making it easier for people to walk and cycle, are delivering a three-year research project. We will be carrying out primary research with young people (12-24 years) aiming to understand what they need from a transport system to access opportunities pivotal to their life chances. We will be using this and other relevant evidence to engage and influence policy makers to act. The project forms part of the Young People's Future Health Inquiry led and funded by the Health Foundation. // We are seeking a student to provide meaningful input to this project by delivering high quality background research, as well as providing their expert guidance to the project as a young representative. // The student's primary responsibility will be to identify and bring together secondary data and evidence relevant to five locations identified for primary research in the UK. This will include data on transport provision, transport trends (e.g. DfT datasets), young people (e.g. ONS data, other local datasets identified by the post-holder), youth

Interns: Jessica Leete, Anna Speak

services, and a synthesis of the wider policy context. This will culminate in the final production of a report with recommendations for primary research. Dependent on time-frames, there will likely be scope for the student to support the set up and delivery of primary research.

## External organisations or groups that were partners, participants or recipients on this project

Sustrans

## Outcomes and Benefits

The student will gain valuable experience contributing to a high profile, impact-focused project being undertaken by CTS. It will be an opportunity for them to build their research skills, understand more about the mechanisms of research leading to impact, build links with Sustrans our industry partner, and deepen their knowledge on a politically relevant issue (social impacts of transport). Given that the focus of the project is on young people, the project has the potential to be highly relevant and engaging to the selected student. // In turn, the three-year project will benefit from student input in several ways. First, our research will be strengthened as the student's time will allow for a deeper understanding of the local context in the areas we will be carrying out primary research. Second, their contribution will be used to guide which stakeholders we engage, which groups of young people we talk to, and the topics we pursue in primary research. Finally (and assuming the selected candidate are themselves a young person), our research and communications will benefit from the candidate's expertise and lived experience of being a young person. Student input also aligns well with our wider project ambition to work with young-people throughout project activity, by affording an additional mechanism to do this.

Project:

# Morphology and ecology of two chameleon species from secondary forests of Madagascar

Supervisor: Todd Lewis

Intern: Anya Newlands

## Project Description:

This project investigates eco-morphology and habitat use by two species of chameleon in Madagascar. The data is collected. The data seeks to expand current known ecology for both species concerned. Academic will supervise analysis. Student will co-produce useful mapping graphics in R, ArcGIS, QGIS or similar. Student will engage with analysis and assist in writing paper as a co-author. Can also qualify as a dissertation.

## Outcomes and Benefits

Academic benefits from cross collegiate publication being pushed forward. Student benefits from working with unusual species, gaining supervised writing skills, producing professional mapping, learning new analytical skills, applies and trials the publication process, and gains co-authorship on a paper.

# Machine Learning for subject and condition classification during robot-assisted motion

Supervisors: Virginia Ruiz Garate, Praminda Caleb-Solly

Intern: Katherine Welbourne

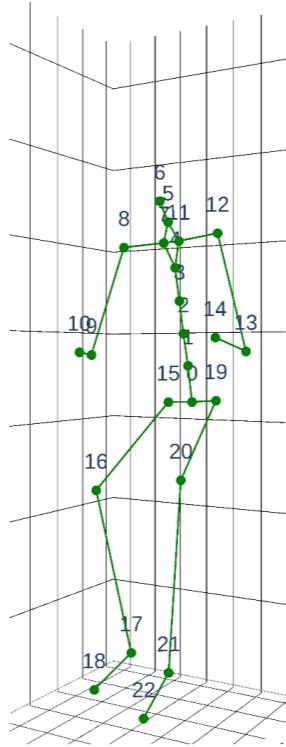
## Project Description:

Assistive robots have the potential to provide support for a range of care-related tasks such as physical and social assistance, physiotherapy and rehabilitation. As part of an Innovate UK funded project Assistive Robotics in Healthcare Demonstrator project within the Assuring Autonomy International Programme (AAIP), CHIRON, the project team have developed a prototype modular overhead/ceiling robotic system that can provide physical and cognitive assistance to frail older adults. A series of experiments designed to validate a range of practical use-cases had generated a data set comprising sit-to-stand and stand-to-sit maneuvers under different conditions: normal motion, simulated stroke, and falls. These data were recorded within the BRL, in the Anchor Robotics Personalised Assisted Living Studio. Based on the recorded data, the student was asked to develop a machine learning algorithm able to differentiate between users and conditions. This aimed to serve as the first step towards adaptation and personalization of assistance.

The selected intern had the opportunity to work with real recorded data in a realistic home environment and to have an insight into the process of data analysis, research procedures, and synthetization of results into a publication.

## Outcomes and Benefits

The student was able to handle the provided data and analyse it giving useful insight into the feasibility of using machine learning algorithms to distinguish between different conditions and users of the robot. This can have direct implications into the envisaged development of the robot controller, which aims to be flexible and adaptive for each different user. “



# Biomechanics of robot-assisted human motion

Supervisors: Virginia Ruiz Garate, Praminda Caleb-Solly

## Project Description:

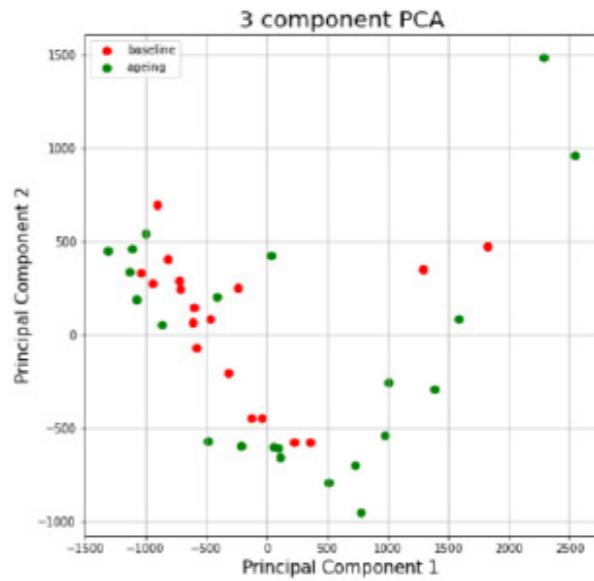
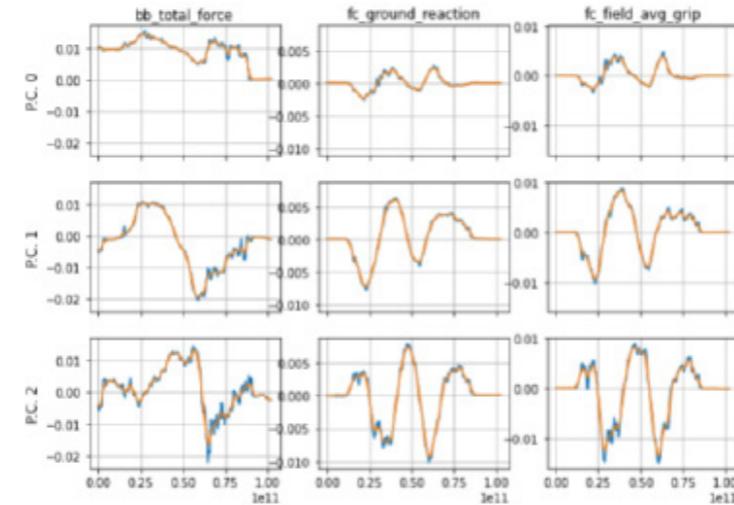
The student was following up on the Assistive Robotics in Healthcare Demonstrator project within the Assuring Autonomy International Programme (AAIP). In this project, CHIRON, a ceiling robotic system prototype that can provide physical and cognitive assistance to frail and older adults is being investigated and evaluated in terms of safety, regulatory and requirements of close proximate human-robot interaction (HRI) in unstructured domestic environments. A series of experiments designed to validate a range of practical use-cases generated a data set comprising sit-to-stand and stand-to-sit maneuvers under different conditions.

The student was asked to analyze the datasets from a biomechanical point of view trying to find patterns by comparing the data from different experimental conditions. The student needed to investigate statistical data analysis methods and study indexes of motion such as the symmetry index. Special attention was to be put into a motor primitive analysis of the movement by means of Principal Component Analysis (PCA).

Intern: Emanuel Nunez Sardinha

## Outcomes and Benefits

The intern was able to achieve and go beyond the desired objectives. He provided algorithms for the fast processing of the data as well as being able to analyse the different sensors and their influence in the PCA-based classification. He also explored the time component of the classification, studying the time span from the beginning of the movements until a successful classification was possible. This can have direct implications into the envisaged development of the robot controller, which aims to be flexible and adaptive for each different user.



## Thank You...

I Hope you have enjoyed seeing what FET students have been up to over the summer 2020 with regards to enterprise activities.

I would like to thank George Richardson for putting together this celebration of work.

George graduated from UWE Bristol in 2020 with a 2:1 in Graphic Design. In his current role as the Graphic Designer and Enterprise Coordinator for FET he is doing design work and helping hire future casual workers.

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# Thank you.

**FET Enterprise Projects** 2020-2021