UNIVERSITY OF LIVERPOOL SUMMER RESEARCH PROJECTS

2019

WELCOME

The University of Liverpool Summer Research Projects are a fantastic opportunity to gain valuable research experience at a leading UK research institution. Over 80% of our research is ranked as 'world leading'; these projects are a chance for you to work under academic supervision while enjoying the summer in the UK's **best city for student life!** (WhatUni? 2018)

Included in this document are the projects available that you could work on. When choosing which to apply to, you should **read the decription carefully** and research the project supervisor and department by **clicking on the supervisor's name to see their profile.**

Each summer research project is worth **15 University of Liverpool credits** (equivalent to 7.5 ECTS). Students completing a project will receive a transcript with their grade.

If you wish to apply to a summer research project you should **contact your home Study Abroad Team** to express your interest in being nominated to Liverpool for a summer research project.

Once nominated you will be asked to apply via the University of Liverpool application portal, opening in early 2019. You will be asked to list your project of interest and supply an academic transcript and a short expression of interest. Our Study Abroad Team guide students through the application process, at the end of which you will receive an **official offer** to join a summer research project.

Contents

If after reading this document you have further questions about a particular project please contact the academic supervisor.

If you have a question about the application process or life in Liverpool, please contact **erasmus@liv.ac.uk**

COMPUTER SCIENCE

Project:Matchings in Regular Networks

Description: Networks are structures formed by nodes, some of which share pairwise connections (mobile phone networks are formed by phone, connected to a backbone of communication masts; social networks are collections of people, connected by various types of acquaintances).

A matching in a network is a collection of independent connections, and an important computational problem is that of looking for large matchings in networks.

This project aims at comparing empirically some of the best known heuristics for this problem.

Project: The Algorithmic of Domestic Energy Management Systems
**Description:**

Modern dwellings might receive energy from multiple sources (different providers, micro-generation plants, etc)
The availability of modern technologies enables home-owners to control the way in which such energy is used to optimize various criteria (including comfort, spending, and usage).

The project will look at a specific scenario in this context, design a solution and evaluate its effectiveness.

Dr Michele Zito
Michele@liverpool.ac.uk
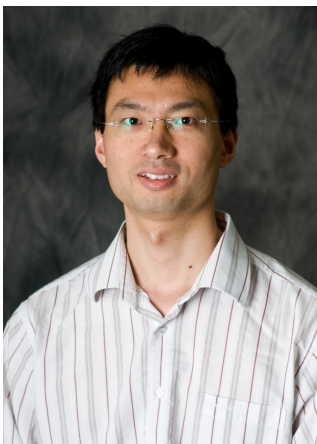
Dr Xiaowei Huang
Xiaowei.Huang@liverpool.ac.uk

Projects with Dr Xiaowei Huang
Dr Huang's research areas can be viewed at https://cgi.csc.liv.ac.uk/~xiaowei/

Students interested in these areas can submit a proposal of their research interests for consideration.

Previous available projects in Artifical Intelligence have included:

• Deep learning to study the safety of Artificial Intelligence
• Multi agent systems

ELECTRICAL ENGINEERING & ELECTRONICS

Subject area: Instrumentation, Sensors, Signal processing

Project title: Low-cost monitoring system for healthcare applications

Project description: This project fits in a wider inter-disciplinary research activity, aimed at improving the accuracy of low-cost systems to measure bioelectrical signals from humans and/or animals. Such signals may include ECG (heart activity), EMG (muscle activity), EEG (brain activity), skin conductance, etc. The project may involve both hardware development (sensors and signal conditioning circuits) and software implementation (signal acquisition, processing and data analysis). Due to its inter-disciplinary nature, the project is also likely to involve a collaboration with colleagues from the Faculty of Health and Life Sciences, and/or with clinicians from Alder Hey children's hospital. Collaborations with industry are also possible.
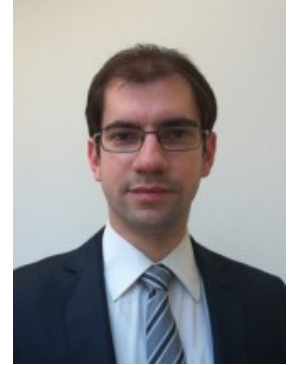
Dr Roberto Ferrero
Roberto.Ferrero@liverpool.ac.uk

Project: Wireless Power Transfer for Portable Devices

Description: Power can be transferred from one location to another wirelessly using radio waves. The technology can be used to charge mobile phones, watches, drones, and implantable devices etc. This project will investigate how to realize highly efficient wireless power transfer systems using coils or radio frequency circuits.

Dr Jiafeng Zhou
Jiafeng.Zhou@liverpool.ac.uk

ENGINEERING

Projects in Engineering

The School of Engineering is open to hosting students on summer research projects in any of the research areas within the school, led by our 70 academic staff members.

Students with an interest in a particular area of Engineering can see the activities of the University's 3 research centres here (click on the following):

• **Centre for Engineering Dynamics**
• **Centre for Engineering Sustainability**
• **Centre for Materials and Structures**

Students should pick 3 possible research areas of interest or staff members they would like to work with and list them on their application.

Previous projects have been available in the following research areas:

• Engineering Sustainability
• Materials and Structure
• Engineering Dynamics
• Renewable Energy
• Risk and Uncertainty
• Virtual Engineering
• Aerospace Engineering & Avionics
• Mechanical & Manufacturing Engineering
• Industrial Design
• Civil Engineering
• Architectural Engineering
• Biomedical Engineering
• Flight Science
• Additive Manufacturing
• Nuclear Engineering

Lead contact for Engineering:
Dr Matt Murphy
murphym@liv.ac.uk

PSYCHOLOGY

Subject area: Language Acquisition
Project Title: Corpus Linguistics
Description: I am looking for a student who is interested in psycholinguistics/children's language acquisition, and who also has a strong background in math and/or computer programming. The aim of this project will be to build a simple mathematical model (based on the Rescorla-Wagner learning algorithm) of children's and adults' performance on a language acquisition study which will shortly be completed (details of this study are available at: https://osf.io/69ehu/). Experience with programming in the R environment would be beneficial; though experience with programming in a similar language would suffice.
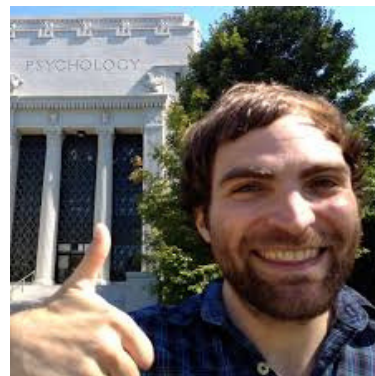
Dr Ben Ambridge
Ben.Ambridge@liverpool.ac.uk

Dr Charlotte Hardman
Charlotte.Hardman@liverpool.ac.uk

Project Title: Investigating the effect of different environments on eating behaviour
The aim of this project is to examine the influence of portion size and context on eating behaviour. It will test the following hypotheses; Energy intake will be higher (i.) in a large-portion condition relative to a small-portion condition, and (ii.) in a real-world context relative to a laboratory context; (iii.) Portion size will have a larger effect on energy intake in a real-world context relative to a laboratory context. This project will provide the student with a unique opportunity to conduct a novel and timely study in a "hot topic" area of health behaviour research.

LIFE SCIENCES

Subject area: Zoology, Genetics
Project Title: Fertility, climate change and selfish genes in fruit flies
Description: I am an evolutionary biologist investigating the feedback between genes, individual behaviour, and population level effects. I am particularly interested in sex chromosome meiotic drive, which I study in a variety of species of fruit fly, and in the interplay between selfish genes, the environment, and fertility.

Maintaining fertility of sperm in the face of increasing global temperatures is a major problem for many organisms. This project will investigate how Drosophila species are affected by rising temperatures, and how this interacts with selfish genetic elements such as meiotic drive.
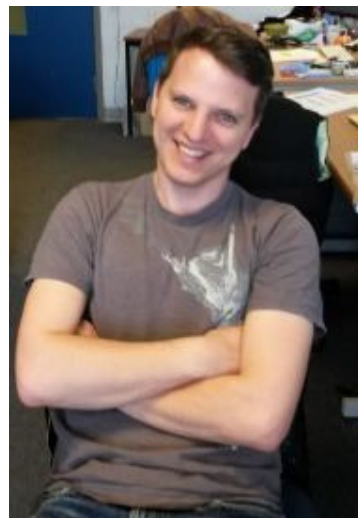
Dr Tom Price
T.Price@liverpool.ac.uk

FREQUENTLY ASKED QUESTIONS

How much does it cost to participate?

You do **not pay tuition fees** to the University of Liverpol for summer research projects. For information on your home tuition costs, please contact your Study Abroad Team.

Do the projects carry transferrable credit?

The research projects are worth 15 University of Liverpool credits (equivalent to 7.5 ECTS). You are awarded a grade at the end of the project based on your contribution and a poster presentation and will receive a transcript mailed to your home institution. The projects are worth 15 credits regardless of the length of project.

How long are the projects?

You can agree the length of your project with the project supervisor - you must be in Liverpool for a minimum of 4 weeks and a maximum of 12 weeks.

When do the projects start?

All projects can start from the 17th June 2019.

What are accommodation options for summer research students?

Students can enter university halls of residence either on or off campus depending on preference and availability. You can apply to accommodation once you have received your offer to study with us. More information on university accommodation can be found here.

What is the application process?

IYou must first apply to a summer research project via our online form by **Friday 29 March**. You will be notified of the status of your application in the weeks following**.** If successful you will be invited to first set your project dates with your supervisor and then start an application on Mobility Online, at the end of which you will receive an offer letter and be able to book travel and accommodation.

What are the core requirements to join a summer research projects?

All applicants need to fulfil the core requirements of a 3.0 GPA or above and will need to meet the University's English Language requirements.

Where can I find out more about Liverpool as a city?

Our website has a useful overview of the fantastic city of Liverpool, as does www.visitliverpool.com which features the many summer music and arts festivals in the city.

Who can I contact with further questions?

If your question relates to the project itself please contact the academic supervisor using the contact details provided. If your question relates to the programme, application processes or life in Liverpool please contact **erasmus@liv.ac.uk**

MEET THE STUDENTS

Previous participants share their experiences...

I loved was how close the university campus was to the downtown core, and how easy it was to integrate experiencing the city into my daily life. There is so much art and history to explore in Liverpool, which nicely balanced the numerical engineering work I was doing.

I was able to participate in world-class research in my field while also having time to feel like I was on vacation and learn about all that the city of Liverpool had to offer.

Minh Tam Nguyen, Engineering Summer Research student 2018, University of Toronto

"I had the opportunity to work towards publishing a research paper, and am hopefully going to continue my research when I'm back home! The project has been way more publishing oriented at the undergraduate level than I was expecting. Liverpool is also a fantastic spot for weekend travel in Europe or UK!"

- Summer research student, 2018

Summer Research students and supervisors, 2018