

# SEPnet Summer Placement Opportunities

## Example Projects

## LIST OF PROJECTS

	<b>Project Title</b>	<b>Location</b>
1	<b>X-ray Imaging Software Internship</b>	Oxfordshire
2	<b>Research Software Engineer</b>	Hertfordshire/Remote working possible
3	<b>Assistant Acoustic Consultant</b>	Bristol
4	<b>Assistant Editor</b>	London
5	<b>Student Engagement co-ordinator</b>	Surrey
6	<b>Technology Intern</b>	Oxfordshire/Some office attendance
7	<b>Algorithm Developer</b>	Oxfordshire
8	<b>Adaptive optics for enhancement of laser focusing routines</b>	Oxfordshire
9	<b>Optical properties of chiral nanostructures - Modelling and Experiment</b>	Portsmouth
10	<b>Product Development Intern</b>	Oxfordshire
11	<b>Computational Engineer: Creating 3D environments from 2D images</b>	Oxfordshire
12	<b>Software Development</b>	Surrey/Some office attendance
13	<b>Building a strategic data platform</b>	Oxfordshire

## Project 1

### Placement title

X-ray Imaging Software Internship

### Dates of placement

11 July – 16 September (fixed)

### Placement description

We are looking for science or maths students with strong programming skills to work on a number of projects to enhance our products:

- Creating tools to automatically analyse images from our systems currently installed at veterinary practices to derive useful metadata
- Using Monte Carlo simulation software (MolFlow) to assess the molecular flow within different potential designs for the ultra-high vacuum chambers of our novel X-ray sources.
- Developing methods for noise reduction to improve image quality and reduce radiation dose for our systems for detecting fractures in human hands and feet.
- Adding more automated analysis of electrical components for non-destructive testing imaging.

The structure of your internship may vary depending on your particular technical strengths and interests. During the summer, the direction may be adjusted depending on how the research and development goes. In all cases, you have an opportunity to make a significant real-world contribution and work with a bright and creative team.

### Student specification

Undergraduate or Masters student for a technical degree subject

- Strong analytical and problem-solving skills
- Solid experience in software programming, especially Python, and in running scientific software programs.
- Experience of thinking through image analysis problems eg use of advanced software like ImageJ, MATLAB, Scikit-image or OpenCV.
- Enjoy working as part of team
- Interested in engineering applications in the medical imaging industry.

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## Project 2

### Placement title

Research Software Engineer

### Dates of placement

1 July – 1 September (flexible)

### Placement description

The project involves assisting a Research Software Engineer developing the Power Reactor Optimisation Code for Environmental and Safety Studies (PROCESS) systems code. This code attempts to find a feasible design for an entire fusion power plant and the group consists mainly of modellers using the code to investigate ideas and improve aspects of its design.

The candidate will modify and create Jupyter notebooks to define, run and analyse various types of design study using PROCESS. The project may also involve the writing of tests in Python to improve the test coverage, improving confidence in the results of

the models and minimising risk when making future changes to the code. This will involve understanding some of the models used with the help of members of the group.

The candidate will learn about version control with Git and writing software in teams, as well as being introduced to software best practices and Continuous Integration (CI). This project provides an opportunity for the candidate to learn software development skills in a research setting whilst contributing to a nuclear fusion systems code.

### Student specification

An interest in learning about nuclear fusion, research software development and mathematical modelling is helpful.

## Project 3

### Placement title

Assistant acoustic consultant

### Dates of placement

June – September (flexible)

### Placement description

Placement students will assist consultants as well as having the opportunity to work independently undertaking a range of acoustic measurements and surveys, equipment maintenance, technical report writing and acoustic design work. Your time will be split between office and site work, roughly 50/50. You will have the opportunity to work on some of London's most prestigious developments.

### Student specification

Apply if you...

- Are interested in learning more about the science of sound within the built environment
- Want to work as part of a friendly and sociable team
- Want to learn more about architecture and the construction industry
- Like meeting people and liaising with clients
- Are good at technical report writing
- Want to work in a thriving, busy company

Don't apply if you...

- Hate technical work
- Don't like 'getting your hands dirty'
- Don't have a driver's licence (company pool cars are provided for site work).

## Project 4

**Placement title** Assistant Editor

### Placement description

This role is within the academic journal team in the academic publishing department. We publish 44 journals covering a wide area of engineering and associated technologies. The role supports the journal development team and some of the main tasks include running reports using abstract and indexing databases and online peer-review systems, desk research to support journal development, research on relevant subject conferences and assistance with social media posting. Full training will be provided and support throughout the internship. There will be an opportunity to learn about scholarly journal publishing.

### Student specification

Good analytical and Excel skills. Interest in engineering and academic publishing is a plus.

## Project 5

### Placement title

Student Engagement Coordinator

### Placement description

The Student Engagement Coordinator will support coordination of the Student Engagement programme to implement the agreed review outcomes in preparation for the 2022-23 academic year. To include the following:

- Development of the Campus Ambassador (CA) programme
- Recruitment of Campus Ambassadors
- Develop website content
- Support and coordinate other student volunteer activity teams
- Improve reach of ambassador network
- Training of new ambassadors
- Support coordination of autumn induction talks to universities
- Support development of the student community network
- Support relevant departments eg public engagement or campaign team on appropriate projects.

### Student specification

- Interested in public engagement, outreach, volunteering
- Enjoys communication and supporting the physics community
- Outlook skills and some project coordination skills (preferred) ie through involvement in student society event organising
- Dedicated to making physics an inclusive welcoming space for everyone
- Involved in student engagement activities already and aware of the ecosystem (preferred)

## Project 6

### Placement title

Technology Intern

### Placement description

A unique role in a dynamic environment, the opportunity to work in a strong research and development setup aiming to establish a data-led AI company, under the guidance of a dedicated mentor. Due to the nature of the role there is also scope for significant learning around new and emerging areas of technical innovation and exploring work performed within the various service lines.

### Student specification

Required experience and skills

- Strong academic record
- A good level of technical knowledge with an in-depth understanding of at least one programming language. Preferred language is Python, although experience with other languages will also be considered.
- Understanding of databases, computer architecture, system design, cloud technologies etc. is an add-on

Basic understanding of software development methodologies like Scrum, Kanban etc. •  
 Good numerical and reasoning skills.

**Preferred skills and additional knowledge**

- Excellent communication skills (including presentation and business writing) • A logical approach to problem solving and willingness to take responsibility and have a pragmatic, goal-orientated approach • Self-starting and can work pro-actively within a larger team • Strong interest in learning and developing with emerging technologies demonstrated through self-initiated projects.

**Project 7**

**Placement title** Algorithm Developer

**Placement description**

The successful applicant will work on developing algorithms for the companies' automated candidate shortlisting and bias detection software. This will include the use of techniques from exciting disciplines such as machine learning, natural language processing, data mining and information retrieval in order to solve some of the toughest problems in the recruitment sector and enable us to continue to explore how data-driven space applications can be of use when applied to different sectors. This provides the opportunity to work with techniques and technology at the forefront of modern computing.

There are a range of different tasks that can be undertaken as part of this project, including developing intelligent data collection tools, designing new methods for understanding and modelling natural language, improving large scale learning components of the software, modelling and predicting trends in the job market or in statistically analysing similarities between different jobs, skills or types of education. Each of these areas requires research, problem solving and creativity to solve and this project combines both a task-based and exploratory approach to finding solutions.

**Student specification**

We are looking for a go-getter, all-star intern to join the strong team for the summer working independently and jointly in a vibrant and dynamic start-up atmosphere. The new intern will be part of an intimate and vibrant team. Applicants should have a sound knowledge, interest and background in statistics or mathematics, or Big Data analysis. Programming skills in one or more language C#/C/C++/Java/Python is a must

**Project 8**

**Placement title**

Adaptive optics for enhancement of laser focusing routines

**Placement description**

This project aims to enhance the focusing algorithms to improve their speed and precision. Holograms will be generated and displayed on an adaptive optic element to modify the shape of the focused laser spot in 3 dimensions. Images of the modified laser spot will be captured through focus and analysed to assess how best to modify the laser spot to be able to find focus quickly, precisely and over the largest range of distances. Work on the project may include generation of holograms for the adaptive optic element, operation of the laser system to assess hologram performance and analysis of images captured on the system. The project will span multiple domains, including optics, image

analysis, electronics and machine learning and a motivated student will have the opportunity to direct the project to suit their interests.

### Student specification

A physical sciences student with an interest in applying their knowledge to practical applications. Experience in Python or scripting languages and some exposure to optical systems would be advantageous.

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## Project 9

### Placement title

Optical properties of chiral nanostructures - Modelling and Experiment

### Placement description

The aim of the project is to create an optical model of periodic chiral structures; and to compare predictions with experimental data. A working model would be powerful in identifying new optical filter profiles for a diverse range of applications.

### Student specification

This could suit a theoretically minded student with some programming ability (eg Python).

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## Project 10

**Placement Title** Product Development Intern

### Placement description

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- Creating tools to automatically analyse images from our systems currently installed at veterinary practices to derive useful metadata
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### Student specification

Undergraduate or Masters student for a technical degree subject

- Strong analytical and problem-solving skills
- Solid experience in software programming, especially Python, and in running scientific software programs.
- Experience of thinking through image analysis problems eg use of advanced software like ImageJ, MATLAB, Scikit-image or OpenCV.
- Enjoy working as part of team
- Interested in engineering applications in the medical imaging industry.

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## Project 11

**Placement Title** Software Tool Development



### Placement description

To provide sustained coverage of the Earth, satellites fly in groups called constellations. As the manufacture, test and launch of every satellite is expensive the traditional goal of constellation design is to minimise the number of satellites required. Minimum satellite solutions for the provision of global, uniform coverage is relatively simple. However, optimisation of constellation design to provide coverage over specific regions of the Earth at specific times is a complex problem. Genetic algorithms are a form of optimisation routines that have been implemented for regional coverage constellation design in the past. The goal of this project will be to review the open-source research that has been performed in this domain to date and then to develop a software tool that uses these generic algorithms to deduce optimal constellation parameters for a set of input region and time-based conditions.

### Student specification

The student will be expected to have a strong mathematical and computing background, with an understanding of orbits and interest in the space sector.

Required skills:

- Python and/or MATLAB
- Strong mathematical background

Desired:

- Understanding of orbits and orbital mechanics
- Interest in space and satellite development
- Creative problem solving.

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## Project 12

### Placement Title: Computational Engineer: Creating 3D environments from 2D images

#### Placement description

The aim of this project is to use a technique call Neural Radiance Fields for representing complex scenes which generates novel views by optimising an underlying continuous volumetric scene function using a sparse set of input views such as a static set of images. In other words, our objective is to reconstruct 3D environments by using multiple images as input. As well as understanding some fundamental concepts of computer vision, this work will also require the use of machine learning techniques.

This project will include the following activities:

1. Familiarity with the Neural Radiance Fields algorithm
2. Familiarity with the type of machine learning techniques required
3. Implementing the approach using Python
4. Running some tests on specific examples and benchmarking the application in terms of:
  - a. Performance (speed and memory requirement)
  - b. Accuracy or ability to generate accurate new views
5. Generating a poster and material for internal dissemination.

#### Student specification

Some knowledge of Python will be preferable.



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## Project 13

### Placement Title: Building a strategic data platform

#### Placement description

The transformation that we help to effect is, wherever possible, underpinned by operational data. This project would be focused on helping us to see how best to capitalise upon the data that we generate from multiple sources and more particularly how we might combine disparate data streams to create valuable new insights.

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## Project 13

### Placement title Technical Engineer

#### Placement description

As part of xx commitment to continuously improve our business, we have a number of projects that will address real needs within the company, giving the successful candidate(s) an opportunity to have a practical impact on one or more of our product groups. Consequently, several projects are available to the successful candidate(s):

1. Investigate the capability of advanced test equipment for improved efficiency during manufacturing testing,
2. Optimise a key manufacturing process to standardise across different products, reduce waste time and empower engineering when creating new products
3. Characterise a range of products through detailed hands-on measurements using existing test systems to improve product data
4. Analyse the data from a manufacturing process and facility monitoring using IoT sensors (developing and enhancing an existing prototype system).

Subject to the capability and interest of the suitable candidate(s), they will be asked to undertake one of above-mentioned projects. Furthermore, for each project the candidate will be given the opportunity to work with the Test Department to get hands-on understanding of the products and how they work.

#### Student specification

- Students with experience of detection, sensors or radiation would be preferred.
  - A practical or experimental background would be beneficial for the projects but is not required.
  - Knowledge of handling and displaying data would assist the role.
  - Students with a curious mind and an appetite for hands-on problem solving would thrive in the role.
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