



AI4ER Undergraduate Research Experience Placements 2022

The UKRI Centre for Doctoral Training in the Application of Artificial Intelligence to the study of Environmental Risks ([AI4ER](#)) trains researchers to develop and apply leading edge computational approaches to address critical global environmental challenges by exploiting vast, diverse and often currently untapped environmental data sets. Embedded in the outstanding research environments of the University of Cambridge and the British Antarctic Survey (BAS), the AI4ER CDT addresses problems that are relevant to *building resilience to environmental hazards and managing environmental change*. The primary application areas are: Weather, Climate and Air Quality, Natural Hazards, Natural Resources (food, water & resource security and biodiversity).

The *AI4ER CDT Research Experience Placement (REP)* scheme aims to encourage suitably qualified undergraduate students to consider a career in artificial intelligence applied to environmental risk.

We encourage that placements are undertaken in person, however this can be flexible depending on student and supervisor's circumstances.

REP placements will be between 6-8 weeks and each student on a REP placement will be paid £332.5 per week. (Based on 35 hour week.)

A list of available projects is given [here](#).

Eligibility of students

Students must meet all of the following criteria to be eligible for this placement:

- (i) Be studying for an undergraduate degree (or integrated Masters degree) in one of the following subjects: natural sciences (e.g. physics, chemistry, earth sciences, biology), engineering, computer science, mathematics. (The degree course should continue beyond summer 2022, i.e. students should not currently be in their final year. Priority will be given to students who will complete their course in 2023.)
- (ii) Be expected to obtain a first or upper second class UK honours degree.
- (iii) Be eligible for subsequent UKRI PhD funding and have the right to work in the UK.
- (iv) Meet the particular requirements (academic background/skills) associated with the project or projects of interest.

How to apply

Students should submit their application by email to the CDT administrator (ai4er@esc.cam.ac.uk).

- (i) Single sheet giving: (a) Full Name, (b) DOB, (c) email, (d) Home address, (e) Nationality including confirmation of right to work in UK, (f) current academic course and expected graduation date, (g) List of projects for which you wish to apply, in priority order (most preferred first), (h) Name and contact details of referee (we will contact referee but applicants must have informed referee in advance of application).
- (ii) CV (no more than 2 pages).
- (iii) Brief covering letter giving motivation for application – maximum 1 page.

Closing Date: Sunday 1 May 2022

AI4ER Research Experience Placement Project 2022

PROJECT 4

Title	Automated detection of walrus haulouts to assess seasonality
Supervisor	Ellen Bowler and Hannah Cubaynes
Department/Institution	British Antarctic Survey

Brief description of background to project:

As sea ice retreats in the Arctic, the future of walruses (*Odobenus rosmarus*) is uncertain. Understanding the effect of their changing habitat is essential to safeguard their existence. Walrus monitoring needs to be at the pan-Arctic scale to reflect their wide distribution, and preferably annual to match the rapid changes in sea ice conditions. However, monitoring walrus across their distribution range by boat or plane is logically challenging, making current surveys sparse and irregular. Satellite images now offer a non-invasive, potential alternative to conduct these pan-Arctic surveys annually.

During the summer and autumn months, when sea ice retreats, walrus gather on shore (terrestrial haulout). Every year the same haulout locations tend to be used, making it suitable to count walrus at these locations. However, throughout the course of the summer/autumn, numbers of walrus hauled out will vary. Understanding this variance is crucial to estimate walrus abundance.

Background introductory reading:

Fischbach AS, Douglas DC. Evaluation of Satellite Imagery for Monitoring Pacific Walruses at a Large Coastal Haulout. *Remote Sensing*. 2021; 13(21):4266. <https://doi.org/10.3390/rs13214266>
<https://www.mdpi.com/2072-4292/13/21/4266>

Brief description of what the student will do, the skills they will gain and the outcome expected from the project:

Researchers have been able to assess seasonal variability of a large terrestrial haulout in Alaska using free Sentinel-2 Images. We propose for a student to expand this work to other known terrestrial haulouts by using Sentinel-2 Images and Google Earth Engine, as well as making the process more efficient using AI tools. First, AI tools (such as Spectral Angle Mapper) will be tested to assess the feasibility of automatically detecting and delineating haulouts as an alternative to manual outlining. If successful and time permits, the AI methods will then be used to assess how the surface area occupied by walrus changes over the course of the haulout season.

The student will gain skills in analysing satellite images, and using Google Earth Engine.

The outcome will be a better understanding of the automated methods that may work to detect walrus in Sentinel-2 images.

Required academic background/skills of student:

The project would suit a student with a background in remote sensing, computer science, or image analysis. Prior experience of working with satellite or other image datasets would be beneficial, as well as coding in python/java/ use of google earth engine.

Dates within which the project could be carried out and supervision could be offered:

20th June to 31st August

Latest start date: 4th July

Logistic arrangements:

We encourage that the placement is undertaken in person, however this can be flexible.