



Bath Institute for  
Rheumatic Diseases

## Summer Studentships 2022

BIRD is the local charity working with patients to fund arthritis research and education in Bath and is pleased to announce it is funding another summer student scholarships. The studentships are run in conjunction with the [University of Bath](#) and colleagues at the [Royal National Hospital for Rheumatic Diseases \(RNHRD\)](#).

The University of Bath has a long-standing and internationally recognized reputation for high quality research with an overall aim of improved healthcare outcomes and the RNHRD has a strong record of delivering high quality research into rheumatic disease, with several investigators recognised as international leaders in their field. By generating another interdisciplinary arthritis research programme through integrating knowledge from different areas, including public policy, this will promote and advance medical knowledge and treatments in arthritis.

This will provide educational and research opportunities for undergraduate student in the area of arthritis research, one of the key aims of BIRD. The studentship will provide hands-on experience of data-based research for undergraduate students between the 2<sup>nd</sup> and 3<sup>rd</sup> year of their degree course, prior to applications for postgraduate programmes and graduate employment.

Ultimately, working with colleagues from the University and the local hospital, the RNHRD, we wish to build an internationally recognised, interdisciplinary programme of research that leads to a new Centre of Excellence in Arthritis Research located at Bath.

### **The studentships**

This studentship is for a maximum of £3,000 and will be hosted by the Department of Computer Science at the University of Bath.

This £280 per week living expenses paid directly to the successful applicant, plus £600 consumables for each project paid to the University of Bath.

Studentships will be six to eight weeks long over the summer vacation. Each student would be required to write a lay and scientific summary of the project findings to submit to BIRD for publication on the BIRD website and inclusion in the charity's annual report. There will be an afternoon symposium of research talks delivered by the students at the end of the summer (August-September). Members of the University of Bath, the RNHRD/RUH, and BIRD will be invited to the symposium. Good attendance is anticipated as this will include the supervisors and other group members.

There is one summer studentships available this year 'Automating the BASMI Measurement Using Pose Tracking on a Smartphone', please see below for more information on this study.

## To apply

Please discuss your preferred project with the project supervisor(s) before you apply. This may help you prepare your application and you need the project supervisor to submit your application.

BIRD are financially supporting this summer studentship in the Department of Computer Science at the University of Bath, to engage young scientists considering a future in arthritis research. These studentships will provide hands-on experience of data-based research for undergraduate students between the 2<sup>nd</sup> and 3<sup>rd</sup> year of their degree course, prior to applications for PhDs and graduate employment

Your application should include:

- A 200 word statement of your career intention and how this studentship is important for your career development.
- A CV, maximum two sides of A4.
- An academic reference with predicted degree class.

Please submit your application by email to [BIRD@birdbath.org.uk](mailto:BIRD@birdbath.org.uk).

**The closing date for applications is 31<sup>st</sup> March 2022.**

Shortlisted applicants will be invited for an informal interview with the Project Supervisor(s) and representatives from the BIRD Research Committee. These meetings will be held at the end of April, dates TBC.

## **Study 1: Automating the BASMI Measurement Using Pose Tracking on a Smartphone**

**Lead supervisor:** Dr Christopher Clarke, Human-Computer Interaction, Computer Science, cjc234@bath.ac.uk

**Co-Supervisors:** Dr Dario Cazzola, Sport, Health & Exercise Science, Department for Health, Dr Raj Sengupta, Consultant Rheumatologist and Visiting Senior Lecturer in Dept of Pharmacy and Pharmacology

**Scientific Summary:** Ankylosing Spondylitis (AS) is a form of arthritis affecting the spine which causes pain and stiffness while limiting the patient's movement. The disease progression of AS is monitored using the Bath Ankylosing Spondylitis Metrology Index (BASMI) which consists of five measurements that together provide a single metric representing an individual's spinal mobility. Currently, the BASMI requires expert administration by a trained physiotherapist which is performed less regularly than would be ideal due to their limited availability. This project will investigate how state-of-the-art pose tracking algorithms can be leveraged in a smartphone application to enable non-expert users to measure the BASMI at home. The student will develop a modular smartphone application that leverages markerless pose tracking frameworks (e.g., BlazePose, OpenPose, DensePose) and will consider how to provide appropriate guidance for a non-expert user (e.g., patient's family or friend) to capture the required images for the BASMI measurement. We will take a modular approach so that different state-of-the-art pose tracking frameworks can be used within the application. The precision of current pose tracking frameworks as they relate to the BASMI measurements will be evaluated in comparison against state-of-the-art motion capture systems and BASMI measurements taken from physiotherapists.

**Lay Summary:** Ankylosing Spondylitis (AS) is a form of arthritis affecting the spine. It causes pain and stiffness in the back, as well as limiting spinal mobility. Currently, the progression of the disease is monitored by trained physiotherapists who perform several measurements to assess how well a patient can move their spine. Unfortunately, due to the limited availability of trained physiotherapists, these measurements are taken infrequently, sometimes years apart. In this project, we will develop a smartphone application that would allow non-expert users, such as the patient's family or friends, to capture the measurements at home. This empowers patients to capture data about any change in their mobility and posture on a much more frequent basis which can then help medical experts decide appropriate and personalised treatments. The proposed smartphone application will automate the measurement using state-of-the-art algorithms which can detect the position of a user's joints and their spine from the images taken from the smartphone's camera. The student will also explore how the application can best provide guidance so that a non-expert user can take the measurements accurately. To validate the accuracy of the proposed approach, we will compare the algorithms against the existing method of the BASMI measurement taken by a physiotherapist.

**Summary of the relevance to arthritis research:** The ability for a non-expert to measure the BASMI would allow patients to gather data with a greater frequency than is currently available. This data can better inform medical experts on any changes/ deterioration in spinal mobility and can be used to optimise treatment plans. It may also empower patients to monitor their own disease progression, leading to better engagement and adherence with their treatment plans. A fully automated approach using pose tracking reduces the chance of user error and variability in the measurement process and may lead to the ability of patients themselves taking the measurements without the need for additional support.

**Additional note:** By investigating a fully automated approach for measurement this internship complements a PhD project which is investigating the use of a smartphone application to measure the BASMI. The student will be supported by the same supervisory team and will leverage data and insights from the PhD studentship to assess pose tracking algorithms.