# Insigneo Newsletter - July 2021

Welcome to our monthly Insigneo newsletter!

Our monthly e-newsletter keeps you up to date with events, funding, success stories and information. We hope you will find it useful! If you would like to add information and/or events to this newsletter please email: news@insigneo.org (the newsletter will be issued during the 2nd week of the month, excluding January and August). Please ensure that you submit news and events with a minimum of one week's notice.

Expressions of interest invited for Insigneo research board

In conclusion of the Insigneo review process, we are now inviting expressions of interest for research director roles in the themes depicted below, who will sit on the new **Insigneo research board**:
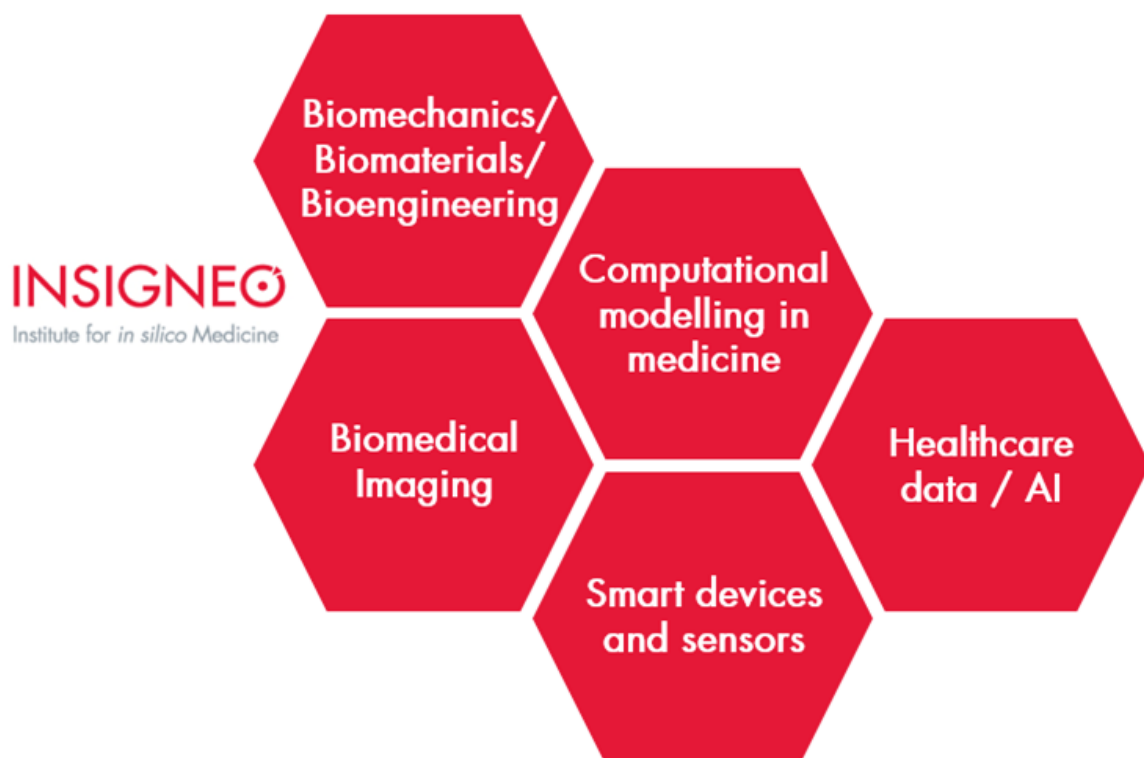
Please send your expression of interest by responding to the email from Jim Wild (sent separately) by 23 July 2021.

Insigneo Commercialisation Manager

Welcome to Alex Wilkinson who joins Insigneo as Commercialisation Manager.

Alex Wilkinson has taken up a part-time 12 month secondment as the Insigneo Commercial Manager and is part of a wider commercialisation community supporting the development of the Institute's intellectual property (IP).

Alex's role is to aid Insigneo to achieve wider reach and rapid clinical translation of technologies through developing members' research into commercially attractive products.

Alex joined the University of Sheffield in 2015 having spent the previous decade in Contract Research Organisations managing delivery of drug and medical device trials for industry working on Phases I-III.

Within Sheffield Alex supported the development and delivery of translational grants as project manager and has been part of the NIHR Research Design Services providing advice on the development of medical devices and *in vitro* diagnostics.

New member

Welcome also to new member Professor Ashley Cadby from the University of Sheffield's Department of Physics and Astronomy and the Imagine Life consortium.

Professor Ashley Cadby
Department of Physics and Astronomy
Professor of Soft Matter Physics

Ashley Cadby is a Professor of Biophysics and founding member of the Imagine Life consortium at the University of Sheffield.

Ashley's research interests include optical microscopy, single molecule biophysics, super resolution microscopy and the development of novel optical imaging.

The Cadby Lab sits at the core of the Bio Imaging centre, hosted within the physics department and is part of the Biophysics Research Group at the University of Sheffield, UK.

The group is known for the development of optical systems for biological imaging focusing on their application to real world problems. This may be repurposing existing technology, or the development of a completely novel system.

Their current research focuses on the study of cancer (funded by CRUK), Antimicrobial resistance (funded by the MRC), reproduction biology, photosynthesis (funded by the BBRSC), neuroscience (industry funded), host pathogen interactions (SHIELD) and the development novel camera technologies. Most of these projects are focused on the development of novel imaging systems, and as such they work very closely with several companies, such as Hamamatsu, Andor Technologies, Cairn Research, Nikon, Proctor&Gamble, Photometrics, and IBM.

Ashley is also the course director for the exciting NEW MSc Programme in Biological Imaging!

Full profile

ESPRC New Investigator Award for Dr Artur Gower

Congratulations to Insigneo Member Dr Artur Gower, Lecturer in Dynamics at the University of Sheffield's Department of Mechanical Engineering, on his £232k EPSRC New Investigator Award.

Dr Gower's research on 'Sensing Dense Particulate Materials' will aim to develop new sensing methods using ultrasound. To achieve this, the first step will be to understand how a sound wave reflects from these materials. A team of engineers and mathematicians will work together to develop new sensing methods by looking at the maths of sound waves, considering how these sensors will be installed in industry, and will use machine learning to deal with the complex microstructure of particulate materials.

When using a powder for a chemical reaction, or producing an emulsion, the particles will constantly change size and properties. To automate these processes, we need to monitor the particle properties. In many cases the particle properties are simply unknown. For example, the pores (which are a type of particle) in bones. Measuring these pores would help diagnose and treat osteoporosis.

Read more

First prize for Will Henson's Mechanical Engineering PhD student presentation
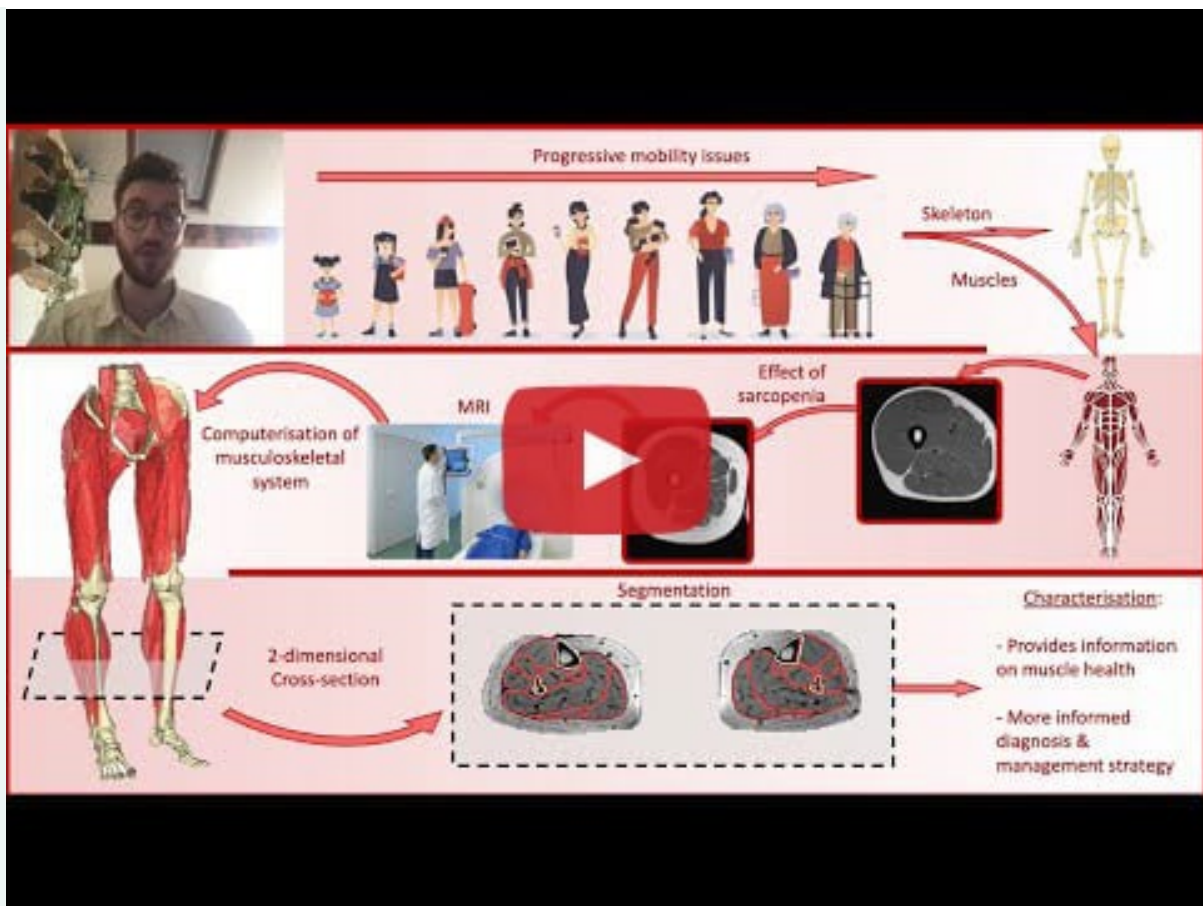
Congratulations to Insigneo Associate member Will Henson whose student presentation received first prize in the University of Sheffield's Department of Mechanical Engineering PhD student presentations. The aim of Will's research is to automate the process of segmentation (the isolation and characterisation of individual muscles within the human body from medical imaging data). Automation will allow fast, operator-independent quantification and characterisation of muscles. This research will contribute to the clinical understanding of age related muscle disorders such as sarcopenia which affect mobility.

Watch

Insigneo Summer Research Programme 2021 fully subscribed

Summer Research Programme

We are pleased to announce that the Insigneo Summer Research Programme 2021, is fully subscribed with 60 applications received from undergraduate students in the Faculties of Engineering, Science, and Medicine, Dentistry, and Health.

The Insigneo Institute will host 12 summer placements for University of Sheffield undergraduates to undertake a research project on a topic related to *in silico* medicine.

Read more

Invitation to collaborate: Horizon Europe Health Work Programme

We would like to alert you to these Horizon Europe Health Work Programme calls that are highly relevant to Insigneo research:

- **Computational models for new patient stratification strategies**
- **Trustworthy artificial intelligence (AI) tools to predict the risk of chronic non-communicable diseases and/or their progression**

We would be keen to hear from Insigneo members who are already thinking of coordinating applications and building consortia with EU academic and industry partners, so that Insigneo can best help support, join up and coordinate efforts wherever possible.

Please send your response to: sarah.black@sheffield.ac.uk

Working with Krakow's New Sano Institute

Old Krakow

New Krakow

Insigneo's connections with Cyfronet in Krakow, Poland go back many years, and have involved multiple well-funded ventures, typically supported by the EC. Most recently we were jointly successful in a proposal to secure €30M of Horizon 2020 and Polish funding, to establish **Sano**, a new translation-focused Centre for Computational Medicine in Krakow, and Dr Andrew Narracott is leading Insigneo's contribution to the establishment of infrastructure, systems and support mechanisms.

In addition to providing best-practice support, Insigneo is also beginning to forge closer technical connections with Sano, already co-developing research strands in cardiovascular applications, with cooperative activities underway and funding proposals being submitted to UK and European funders. Regular discussion of research developments takes place as part of the **Sano seminar programme**.

An Invitation: If you would like to help improve our understanding of the developing needs in the world of *in silico* medicine, and perhaps get to know Sano a little better, please visit Sano's website and, especially, **please consider completing a short online questionnaire** to help identify the support we need to be providing to equip students with optimised academic training. Click the link below to complete the questionnaire and, if you provide your email address, you'll receive a summary of the findings. Thanks for helping us with this.

[Sano Questionnaire]

The role of the loading condition in predictions of bone adaptation in a mouse tibial loading model
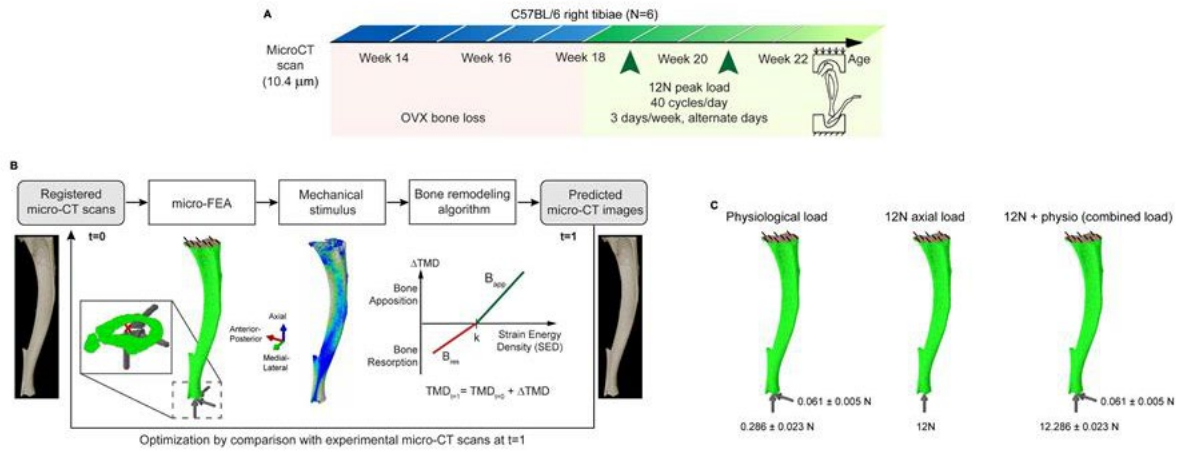
Our MultiSim project researchers Vee San Cheong, Visakan Kadirkamanathan and Enrico Dall'Ara have had a paper on 'role of loading condition in predictions of bone adaptation in a mouse tibial loading model' published in Frontiers in Bioengineering and Biotechnology.

The *in vivo* tibial loading model in mice is increasingly used to study bone adaptation but the interaction between external loading and physiological loading in engendering bone changes have not been determined. Hence the aim of this work was to determine the effect of different applied loads on finite element predictions of bone adaptation.

Longitudinal micro-computed tomography (micro-CT) imaging and in vivo loading were performed once every 2 weeks from weeks 18 to 22 of age, to quantify the shape change, remodelling, and changes in densitometric properties. Predictions of bone adaptation were performed under physiological loads, nominal 12N axial load and combined nominal 12N axial load superimposed to the physiological load, and compared to the experimental results.

Predictions of densitometric properties were most similar to the experimental data for combined loading, followed closely by physiological loading conditions. All predicted densitometric properties were significantly different for the 12N and the combined loading conditions. Spatial prediction of locations of bone remodelling were not significantly different from all three loading conditions. The results suggest the adaptive response of bone are in response to both passive mechanical loading and daily physiological load.

Read more

Insigneo seminar series recordings

Insigneo Seminar: A multi-scale modelling approach to gastrointestinal electrophysiology and motility

Dr Peng Du
The University of Auckland
Friday 11 June 2021, 09:00 - 10:00

We have made the following Insigneo Seminars available to watch on the Insigneo YouTube channel:

- **Computational modeling of fracture healing – from intracellular signaling to in silico clinical trials - Aurélie Carlier**
- **Base-pair resolution analysis of the effect of supercoiling on DNA structure and flexibility - Dr Alice Pyne**
- **Mathematical modelling of the distribution of ventilation in the lungs in health and disease - Dr Carl Whitfield**
- **A multi-scale modelling approach to gastrointestinal electrophysiology and motility - Dr Peng Du**

Watch

Guest Lectures, Conferences & Seminars

Insigneo events

16 July 2021
Insigneo Seminar: Mechanical wear in native and crosslinked cartilage tissue

8 September 2021
Joint IICD/Insigneo Seminar: Digital biomarker discovery

Other events

16 July
IICD Department Research in Progress Meeting
Speakers: Dynamic imaging of DNA-Protein interactions using AFM' - Vinny Verma, Md Miraj Kobad Chowdhury (title TBC). **Insigneo members contact sarah.black@sheffield.ac.uk to arrange access.**

20 July
Materialise: Mimics Enlight Structural Heart Planner Workshop: Gain Firsthand 3D-CT Planning Experience: LAOO planning

25 - 29 July
ISB2021, Stockholm

19 - 23 August
[International Symposium on Artificial Intelligence for Medical Applications (AI4MED)](#)

6 - 7 September
[BioMedEng21](#), Sheffield

6 - 10 September
[Bone Cell & Tissue Mechanics Advanced Courses, CISM (International Centre for Mechanical Sciences)](#)

6 - 10 September
[VPH Institute: 2nd International School on In Silico Trials](#)

7 - 9 September
[CMBBE 2021 Symposium 17th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and the 5th Conference on Imaging and Visualization](#)

8 - 10 September
[AMMM – Additive Manufacturing Meets Medicine 2021](#)

15 - 17 September
[CompBioMed Conference 2021: Building the Virtual Human](#)

21 - 23 September 2021
[KKIO 2021 - prime software engineering conference](#)

22 - 25 November
[Klaster LifeScience Kraków (KLSK) Life Science Open Space 2021](#)

For a full list of upcoming events visit: http://insigneo.org/events/

Vacancies

[PhD Opportunity: Detection and analysis of metastatic and primary oral cancers and stromal features with advanced deep learning](#) (closing date: 16/07/21)

Publications

Research output affiliated to Insigneo in Scopus (please ensure papers are affiliated to the Insigneo Institute by including the words "Insigneo Institute for *in silico* Medicine"):

Stochastic PCA-Based Bone Models from Inverse Transform Sampling: Proof of Concept for Mandibles and Proximal Femurs (Applied Sciences (Switzerland)) G. Pascoletti, A. Aldieri, M.Terzini, P. Bhattacharya, M. Calì, E. M. Zanetti

Comparison of stenosis models for usage in the estimation of pressure gradient across aortic coarctation (Journal of Biological Physics) Y. Shi, I. Valverde, P. V. Lawford, H. B. Grotenhuis, P. Beerbaum, D. R. Hose

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