British Orthopaedic Association

AI in Orthopaedics and MSK

The Third National Conference

December 19th & 20th 2024

The Royal College of Surgeons Lincolns Inn Fields

www.boa.ac.uk/learning-and-events/ai-in-orthopaedics-and-msk-2024.html

WELCOME!

Following the success of last year's AI conference and the first conference at the Royal College of Surgeons, welcome to AI24!

It's great to note that we have been fully booked in spite of the meeting's close proximity to Christmas!

The feedback we have received from last years conference where we ran an instructional course on the afternoon and evening of the first day was very positive. What it also contained, from several participants was a request for break out meetings, during the instructional day, to suit delegates of varying knowledge. We have taken note of this feedback and the facilities at the RCS should be excellent for such an arrangement; with the main lecture room, a large room for posters and refreshment besides 2 break out rooms together with rooms in the BOA section of the college (level 4)

The BOA AI Hub

This year another major attraction has been added that will give the event a long lasting benefit, and it is the establishment of the BOA AI hub. The hub will come online before this meeting. Details about it and the facilities it offers will be made clear at the meeting. We expect the majority of the presentations, posters etc will be added to the hub once the meeting is over.

For the most part the format of the meetings will follow last year's pattern with short presentations, adequate time for questions and a lot of time to network.

During the second day there will be more podium presentations than previously. As you will see from the programme below, there will be keynote speeches on several closely related topics.

There will be prizes for the best Podium Presentations, Essays, etc. These have been sponsored by the Gwen Fish Orthopaedic Trust

We want everyone to visit the posters and on Friday, the Robot demonstration. There will be a prize for the best poster. All attendees will be invited to mark / comment on the posters via the meeting App. Owners of the posters will be at their poster for a chat during the refreshment breaks. Please say hello!

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Access to the programme: *To reduce costs there will not be a printed version of the programme. The programme will be visible on the BOA website and App*

Abstracts
We are delighted that we received 47 abstracts… a record for this event.

Python
Please note the announcement below. If you would like a session with a Python Guru please book it with BOA events. Booking can be made before the meeting or on Thursday. They are going fast!

LATE ADDITION…. GREAT NEWS!
We have secured the services of Python Gurus who will be arranging 1:1 sessions with budding Python enthusiasts on the Friday. For more information go to:
www.boa.ac.uk/learning-and-events/ai-in-orthopaedics-and-msk-2024/python-clinic.html

Essay competition:
We invited anyone who is attending to write up to 1000 words on the following subject:

"The Challenges facing innovators in trying to make use of AI in Health Care"

The closure date for the Essay competition was December 1st 2024 and we have received 10 excellent essays. Anyone could have been the winner and we hope that at least some of them will be published on the Hub. The winner will be announced at the end of the meeting.

Advice to speakers:

- The programme is tight so we can hear from lots of people with different experiences and knowledge therefore please do keep within your allotted time!
- Please bring you presentation with you on a USB unless you have already sent it in (best do both!!)
- Don't spend a lot of time talking about yourself etc. You will have sent it all in with your bio and it will be available on the BOA website and App for all to read
- Make yourself known to the moderator for your session

- Get to the front of the hall and be ready to speak as the previous speaker begins to finish. It is a good idea to familiarize yourself with the podium and the slide control consul during a break
- If you have a poster please stand by it after your talk
- If you put your e mail address at the end of your presentation others will be able to contact you

Moderators: Our moderators are all very experienced and knowledgeable people and their job, besides keeping everyone to time, is to add value to the presentations

Questions: Questions from the floor can only be made using Slido and they will be visible on the srcreen on the podium.

[NB] *The meeting is being recorded but not filmed. Please let the organisers know if this is a problem for anyone*

Thursday 19th December

Fundamentals for AI and ML in Orthopaedics and MSK" …… a workshop

The core presentations will take place in the "View" with the first 2 Instructional sessions / practicals / discussion groups taking place in the break out rooms on the same floor. The last session will take place in the BOA space on level 4.

Delegates will need to assign themselves to the appropriate break out rooms depending on their experience, in advance of the meeting.

Delegates with projects, particularly embryonic projects are welcome to bring them along for discussion with an expert.

All involved will need to have access to a laptop computer which they will use in the practical session. A limited number of power points will be available. Mobiles will be required for asking questions.

The SLIDO app (www.slido.com) will be used to facilitate questions, the chat and other activities during the events. We would advise you to download it from App-store on your phone.

You may find the glossary of terms that we have up loaded on to the website helpful!

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8am registration, Coffee and meet the faculty.

Invited faculty: Vipin Asopa, Peter Harris , Justin Green, Dr. Eddy Zhu, Mustafa Alnaib , Philip Breedon, Amit Sagi, Ross Coomber, Tacey Kobayashi, Irrum Afzal, Cheukting- Ho, Andrew Coppola, Richie Gill, Hassan Nemati, Luke Farrow, Feroz Dinah, Anisa Haashi, Daniele De Massari.

Assemble in the Conference Suite, "The View"

Agenda
Thursday 19th December 2024

08:00 - 08:25	**Registration, Coffee and Meet the Faculty.** **Invited faculty**: Vipin Asopa, Peter Harris , Justin Green, Dr. Eddy Zhu, Mustafa Alnaib , Philip Breedon, Amit Sagi, Ross Coomber, Tacey Kobayashi, Irrum Afzal, Cheukting- Ho, Andrew Coppola, Richie Gill, Hassan Nemati, Luke Farrow, Feroz Dinah, Anisa Haashi, Daniele De Massari.
08:25 - 08:30	**Welcome** Vipin Asopa
Session 1 **Moderators:** Feroz Dinah, Richie Gill	
08:30 - 08:45	**Introduction and History of AI, our glossary** Vipin Asopa
08:45 - 09:00	**What is in the black box?** Peter Harris
09:00 - 09:15	**Principles of AI** Justin Green
09:15 - 09:30	**Considerations in AI…. Basic background hardware, data, consent etc** Irrum Afzal
09:30 - 09:45	**The different types of AI: Vison, predictive and LLM** Ross Coomber
09:45 - 09:55	Discussion
09:55 - 10:15	**Python its uses and limitations** Moderator: Vipin Asopa Speaker: Cheuk Ting Ho, Python Software Foundation
10:15 - 10:30	**Refreshments / Networking Break**
Session 2 **Principles in AI** Moderators: Prof. Deiary Kader, Job Doornberg	
10:30 - 10:37	**Ethics** Tacey Kobayashi
10:37 – 10:45	**Safety** Justin Green
10:45 – 10:53	**Bias: PROBAST & CHARMS… what do we mean?** Luke Farrow
10:53 – 11:03	**Model Selection …. What do we mean?**

	Peter Harris
11:03 - 11:11	**Hardware, Virtualization, Deployment and Monitoring** Chris Tromans
11:11 - 11:19	**Where Data Engineers fit in** Cheuk Ting Ho
11:19 – 11:29	**Data security and federated technology- what do we mean?** Luke Farrow
11:29 – 11:39	**Digital technology deployment – one size does not fit all!** Philip Breedon
11:39 – 11:47	**Maximising the success of your innovation!** James Naylor
11:47 – 12:05	Discussion
Podium Presentations **Moderators:** Eddy Zhu , Chris Tromans	
12:05 – 12:12	**Assessing the Efficacy and Efficiency of AI in Clinical Documentation: A Comparative Study Using Simulated Patient Notes** Phani Kondur
12:12 – 12:19	**Multi-View Cross-Fusion Mamba for Musculoskeletal Condition Classification** Zheng Xiaoyu
12:19 – 12:26	**Transforming healthcare documentation: harnessing the potential of AI to generate discharge summaries** Reece Clough
12:26 – 12:35	Q&A
Session 3 **Using Imaging Data for Machine Learning** Moderators: Vipin Asopa, Will Briggs	
12:35 -13:05	**How this might work including technical aspects** Hassan Nemati
13:05 -13:15	**Comfort Break & Pick up lunch boxes**
13:10-13:30	**Guest Presentation from Corin - "Big Data"** Moderator: Keith Tucker, Richie Gill Jim Pierrepont
13:30 -13:35	**Comfort Break**
13:35 - 13:50	**Guest Presentation from Stryker - The Hackathon** **Moderators:** Vipin Asopa, Peter Harris Daniele De Massari The Hackathon is a competition in which people are asked to solve a problem over a short period of time, either individually or in teams. This event has been organised by Stryker, with an emphasis on using coding to solve and AI related musculoskeletal problem. 19 teams have entered this very first exciting national competition, and the results will be announced at this point in the meeting. We are sure that there will be considerable discussion!

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13:50 – 14:15	Hackathon presentations (3 best, 5 minutes each) plus up to 10 minutes Q&A We are indepted to Daniele and Stryker for the immense amount of time and effort they have put into this event. stryker

Workshops

There will be 3 separate sessions, each devoted to one of the 3 main pillars of AI that impact on MSK. Delegates to each session will need to have assigned themselves to either the basic, intermediate or advance group for each of the 3 sessions most importantly the first session
The separate rooms will be marked for each of the basic, intermediate and advanced groups. The purpose of this is that the subject matter for each group will be covered in an appropriate way. Delegates do not have to stay in the same room throughout the afternoon. Some may want to be in the basic room for one topic or may wish to move to a room where a more advanced session is being held
Delegates will be very welcome to bring along some of their own work/ ideas / solutions for discussion in the session they are attending.

Each session will last approximately 55 minutes

	Basic	**Intermediate**	**Advanced**
	What is it? How it works? How can it help clinicians Whats in the literature?	How AI has been used to create tools. The problem. Proposed solution. How was the solution was coded? Implementation of solution.	Coding: how to do it!

Workshop 1

	Room: Main Auditorium	**Room: Linder Boardroom**	**Room: Newman Suite**
14:15 – 15:10	**Predictive Analytics** Feroz Dinah Justin Green Luqman Hamed Moderators: Tom Harte, Keith Tucker	**Predictive Analytics** Corin Stryker Moderators: Mustafa, Ross Coomber	**Predictive Analytics** Python software foundation Richie Gill Moderators: Luke Farrow, Peter Harris

Workshop 2

	Room: Main Auditorium	**Room: Linder Boardroom**	**Room: Newman Suite**
15:15 – 16:10	**Computer vision** Dr Eddy Zhu	**Computer vision** Stryker	**Computer vision**

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	Anisa Haashi Moderator: Keith Tucker	Smith & Nephew Moderator: Philip Breedon	Python software foundation Richie Gill Moderators: Justin Green, Peter Harris
16:15 – 16:25	**Refreshments / Networking Break**		
16:25 – 16:30	**Relocate to Level 4**		
Workshop 3			
	Room: Meeting Rm 1, 2 & 3	**Room: Alan Lettin**	**Room: Philip Leverhulme**
16:30 – 17:30	**Large language models** Philip Breedon Shazmeena Shams Roshana Mehdian Moderator: Keith Tucker	**Large language models** Ross Coomber Mustafa Alnaib Moderator: Tom Harte	**Large language models** Python software foundation Richie Gill Moderators: Luke Farrow, Peter Harris
17:30 – 17:40	**Summary (Online)** Vipin Asopa		
18:15 - 18:30	**The BOA AI Hub and closing questions and remarks (Online)** Justin Green		
18:00 – 18:30	**Soft drinks and nibbles in the Level 4 workshop rooms**		
18:30	**Close**		

Agenda
Friday 20th December 2024

08:30 – 08:55	**Registration, Coffee and Meet the Faculty.** **Invited faculty**: Vipin Asopa, Peter Harris , Justin Green, Dr. Eddy Zhu, Mustafa Alnaib , Philip Breedon, Amit Sagi, Ross Coomber, Tacey Kobayashi, Irrum Afzal, Cheukting- Ho, Andrew Coppola, Richie Gill, Hassan Nemati, Luke Farrow, Feroz Dinah, Anisa Haashi, Daniele De Massari.
08:55 – 09:05	**Welcome and Aims of the Meeting** Keith Tucker
Session 1 **AI and how it worked for me (or did not work!)** Moderators: Richie Gill & Peter Harris	
09:05 – 09:13	**Beyond the Metrics: Ensuring Meaningful Machine Learning Results** Peter Harris
09:13 – 09:21	**Machine Learning-Based Detection of Aseptic Loosening in Hip Implants Using Radiographs and Scikit-Learn Models** Julius Lenaerts

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09:21 – 09:29	**Evaluating the Impact of AI in Orthopaedics: A Systematic Scoping Review of Current Evidence and Research Gaps in the Knee Joint** Nadia Aghili
09:29 – 09:37	**Application of Artificial Intelligence in Quantifying the Degree of Fatty Infiltration of Rotator Cuff Muscle - A Feasibility Study** Yee Lam Louie
09:37 – 09:45	**Automated Evaluation of Post-Operative Knee X-rays Using a Deep Learning Computer Vision Model** Nimra Akram
09:45 – 09:55	Q&A
Session 2 **AI and how it worked for me (or did not work!)** Moderators: Professor Philip Breedon & Richard Field	
09:55 – 10:03	**Automated Identification, Classification and Analysis of Orthopaedic Implants using AI** Vineet Bata
10:03 – 10:11	**Evaluation of the Quality of Information Provided by ChatGPT on Pelvic and Acetabular Surgery** Conor Kilkenny
10:11 – 10:19	**How have generic large language models progressed in their ability to write clinical letters and manage patients in the virtual fracture clinic?** Amy Smith
10:19 – 10:27	**Cumulative patient risk profiling for lower limb arthroplasty. A machine learning model.** Frank Davis
10:27 – 10:35	**Forecasting Knee Replacement Surgery with Deep Learning: an Integrated Approach using Routine Clinical Data and Radiographs** Omar Musbahi
10:35 – 10:45	Q&A
10:45 – 11:05	Refreshments & Poster Viewing
Session 3 **The Robot Journey & AI** Chair: Professor John Skinner	
11:05 – 11:15	**The Robot Journey & AI** John Skinner
11:15 – 11:35	**Round Table discussion** With representatives from Corin, DePuy, Microport, Smith and Nephew, Zimmer Biomet
Session 4 **AI and how it worked for me (or did not work!)** Moderators : Will Briggs & Dieary Kader	
11:35 – 11:43	**Using Artificial Intelligence to predict outcomes of operatively managed neck of femur fractures** Geeth Silva
11:43 – 11:51	**A Fully Automated AI-System for Knee Alignment Assessment in Standard AP Radiographs** Dominic Cullen

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11:51 – 11:59	**Analysing the vascular marks loss in th MRI scans in the knee osteoarthritis using AI** Hina Ajmal
11:59 – 12:05	Q&A
Session 5 **How I managed to get going!** Moderators: Tom Harte & Ross Coomber	
12:05 – 12:17	**My Way!** Will Briggs
12:17 – 12:30	**My Way!** Manoj Ramachandran
12:30 – 12:40	Q&A
12:40 – 12:55	**The Zimmer Biomet Canary** Bill Hunter
12:55 – 13:35	Lunch & Poster Viewing
Session 6 **Governance** Moderators: Richard Field & Sashin Ahuja	
13:35 – 13:55	**Ethics and Consent, Case Studies** Stuart Keyden, Benjamin Newall (DAC Beachcroft)
13:55 – 14:05	**How about a patent for your innovation?** Mark Suddaby (Novagraaf UK)
Session 7 **Experiences from another discipline.** Moderators: Salah Hammouche	
14:05 – 14:20	**The Gwen Fish Lecture 2024 - AI in Radiology and Oncology** Dr Katharine Halliday (Introduced by Keith Tucker)
14:20 – 14:30	**The Microport Lecture - How to Leverage Registries to Apply AI for TJR Safety Surveillance?** Jing Xie
14:30 – 14:38	**Experiences from another country: USA** Tom Harte Moderator: Cat Kelly
Session 8 **AI and how it worked for me (or did not work!)** Moderators: Ross Coomber Andrew Coppola	
14:38 – 14:45	**Prospective Evaluation of a Commercially Available Machine Learning Algorithm to Detect Adverse Reactions to Metal Debris (ARMD) Post Arthroplasty.** David Langton
14:45 – 14:52	**Comparative Effectiveness of TNF-α and IL-6 Inhibitors on Bone Health Outcomes in Rheumatoid Arthritis Patients: A Retrospective Cohort Study Utilizing AI-Driven Data Analysis** **I-Han (Iressa) Cheng**
14:52 – 14:59	**Accuracy of Artificial Intelligence Models for Classifying Total Hip and Total Knee Arthroplasty Implants Through X-ray Imaging: A Systematic Review and Meta-Analysis**

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	Amir-Mohammad Asgari
14:59 – 15:06	**Development and Validation of Machine Learning Algorithms for Predicting Length of Stay after Total Knee and Total Hip Arthroplasty** Aditya Vijay
15:06 – 15:13	**Patient Watch AI - Engage Patients while Saving Clinician Time** Guy Solan
15:13 – 15:20	**Ambient Voice AI for Operating Theatre Safety** Callum Craig
15:20 – 15:32	**Q&A**
15:32 – 15:42	**BORS and AI** Ines Reichert Moderators: Luke Farrow & Mustafa Alnaib
15:42 – 16:05	Refreshments and poster viewing
Session 9 **Moderators: Justin Green, Peter Harris & Yunpeng Li**	
16:05 – 16:17	**Computer Vision and pin less navigation** Darren Wilson, Smith and Nephew
16:17 – 16:29	**Computer Vision and AWS** Prabhu Arumugam, AWS
Session 10 **Funding** **Moderators: Will Briggs & Keith Tucker**	
16:29 -16:39	**Non commercial: NIHR "What makes a good application?"** Helen Compton
16:39 – 16:49	**How Can we Help?** James Naylor, Johnson & Johnson
Session 11 **Now and the Future** **Moderators: John Skinner & Fares Haddad**	
16:49 – 17:05	**Now** John Skinner
17:05 – 17:20	**The Future** C Voyant! Four 3 minute presentations on "What's the next generation of AI going to look like?" from 3 of the distinguished speakers from the day (Introduced by Peter Harris)
17:20 – 17:30	**Prizes** 1. The Gwen Fish prizes for the best Podium Presentation 2. The Gwen Fish prize for the Best Poster 3. The Gwen Fish prize for the for the best Podium Presentation by a medical student 4. The Hackathon Prize winner 5. Presentation by the Winner of the Essay Competition
17:30 – 17:35	**The BOA AI Hub** Justin Green
17:35 – 17:40	**Closing Remarks** Vipin Asopa & Keith Tucker

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	+ Date and location for next year's meeting….. we are already planning! Everyone's input is welcome! Should we have a joint meeting with another group?
17:40	Close

Acknowledgements:

We are most grateful to the companies and other bodies who have sponsored the event, including:
The Gwen Fish Orthopaedic Trust
NEC
Microport
HOPCo & Myrecovery
A large number of people have and are working very hard to make this meeting a success. We are indebted to them all, particularly the team at the BOA