BRUNEL CENTRE FOR AI

Thought Leadership Programme Winter/Spring 2024

7 February 2024 / 2pm-3pm
Mixed Reality Heritage Performance: Combining immersive technologies and theatre and as a tool for decolonising heritage sites
Dr Mariza Dima (Brunel University London)

28 February 2024 / 2pm-3pm
AI-Driven Bioinformatics for Fish Biodiversity Preservation
Dr Matloob Khushi (Brunel University London)

20 March 2024 / 2pm-3pm
Artificial Intelligence for Intelligent Sensing and Analysis of Underwater Environments
Dr Valsamis Ntouskos (National Technical University of Athens)

17 April 2024 / 2pm-3pm
AI for Cultural Heritage: what of copyright?
Dr Paula Westenberger (Brunel University London)

8 May 2024 / 2pm-3pm
AI and Physics - An Equal Partnership
Dr Liliana Teodorescu (Brunel University London)

29 May 2024 / 2pm-3pm
When Do Decision Makers Use Visualisation? A Closer Look at the Relationship Between Data and Decision-Making
Dr Mai Elshehaly (City, University of London)

12 June 2024 / 2pm-3pm
Exploring the Synergy of Machine Learning and Healthcare Advancements
Dr Zahraa Abdallah (University of Bristol)

26 June 2024 / 2pm-3pm
Remixing the real world: How to use synthetic images and videos to train more robust deep learning models
Dr. Ivan Nikolov (Aalborg University, Denmark)

3 July 2024 / 2pm-3pm
Law Enforcement Use of Facial Recognition in the UK—A Normative Regulatory Framework?
Dr Asress Gikay (Brunel University London)

ORGANISER
Brunel Centre for AI

SERIES COORDINATORS
Dr Nadine Aburumman | Computer Science
Dr Asress Adimi Gikay | Brunel Law School

Brunel University London

Dear Community,

We are very proud that the Centre for AI's Thought Leadership Series is now in its third year. We are delighted to extend a warm welcome to all members of our community as we launch the 2024 Centre for AI Thought Leadership Series. As Co-Directors of the Brunel Centre for AI: Social and Digital Innovation (Centre for AI), we are excited to host this exciting series, something that we view as being the dynamic heart of our mission to advance and introduce new AI technologies at both theoretical and applied levels.

In the ever-evolving landscape of AI, staying at the forefront of technological knowledge is paramount. Our Thought Leadership Series is the leitmotif of our mission, serving as a nexus for thought-provoking discussions, bringing together experts, researchers, and enthusiasts to explore the multifaceted dimensions of AI. Through this series, the space we seek to provide creates growth for meaningful dialogue, where ideas can flourish, challenges are tackled with rigour and dexterity, and creative solutions and novel approaches are embraced.

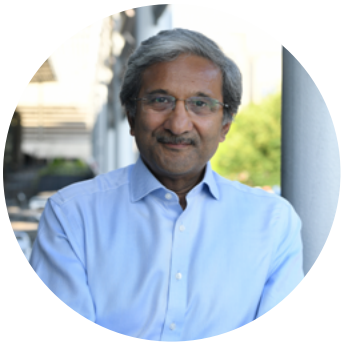
At the Centre for AI, we recognise the transformative power of AI across various sectors, and the essence of interdisciplinary understanding made more necessary in our increased digitally and technologically connected worlds. For this reason, our seminar series transcends traditional boundaries, featuring sessions led by our Centre members alongside respected and renowned experts in particularised subject areas of AI from leading organisations. Our mission drives us to propel not only the theoretical aspects of AI but also to forge formidable journeys by bringing advancements into practical real-world applications. The Thought Leadership Seminar Series reflects this commitment by delving into cutting-edge research, real-world applications, and the myriad implications of AI, providing a holistic perspective on the evolving landscape.

We cordially invite you to join us on this intellectual journey. Whether you are a seasoned professional, a curious student, or simply someone interested in the possibilities and considerations surrounding AI, our Thought Leadership Series offers something for everyone. Each session

will contribute to fostering a community that shares a common passion for understanding and responsibly utilizing AI. We are happy to have the Thought Leadership Series growing as a buzzing hub for generating ideas that enhance innovation and progress, aligning with the goals of the Centre for AI.

Thank you for your continued support! We look forward to your participation and engagement, and no doubt, the energetic discussions and lively collaborations that will follow.

Sincerely,
The Co-Directors of the Centre for AI



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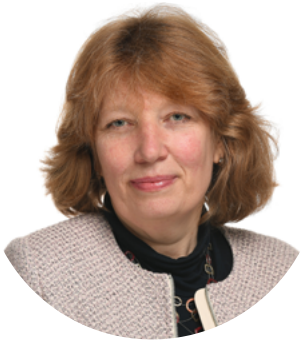

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THOUGHT LEADERSHIP SERIES | BRUNEL CENTRE FOR AI

Mixed Reality Heritage Performance: Combining immersive technologies and theatre and as a tool for decolonising heritage sites

Dr Mariza Dima | **Brunel University London**

7 February 2024 | **an online event**

2 PM-3 PM (UK Time)

Mixed Reality Heritage Performance: Combining immersive technologies and theatre and as a tool for decolonising heritage sites: Dr Mariza Dima, Brunel University London

This talk presents Mariza's latest project discussing the fusion between Mixed Reality (MR) and Immersive Heritage Performance (IHP) in order to reframe troubled and uncomfortable histories that serve to challenge hegemonic power structures and decolonise heritage sites.

Through the presentation of two distinct experiences in UK and US heritage sites, Mariza will describe the creation process, including the orchestration of the virtual components, interaction opportunities, script, acting, archival material, and oral histories. She will also outline methods for prototyping and R&D within the widely interdisciplinary research team and discuss the impact of such projects in the digital design, heritage and theatre sectors moving towards innovative tools and strategies to engage 21st century museum audiences.

Moderator: Dr Pantea Foroudi (Brunel University London)

Dr Mariza Dima is a Reader in Games Design. She specialises in User Experience and User Interface design for developing meaningful and engaging interactions, particularly using mobile, AR and haptic technologies. She has worked between academia and the creative industries as an interaction designer and creative technologist in R&D projects combining engineering and design approaches grounded on theoretical contexts of narrative, affective dramaturgy, and audience/player engagement. Mariza's work has been published and exhibited widely in leading academic conferences such as SIGGRAPH Asia, CHI, HCI International, British HCI, NordiCHI.

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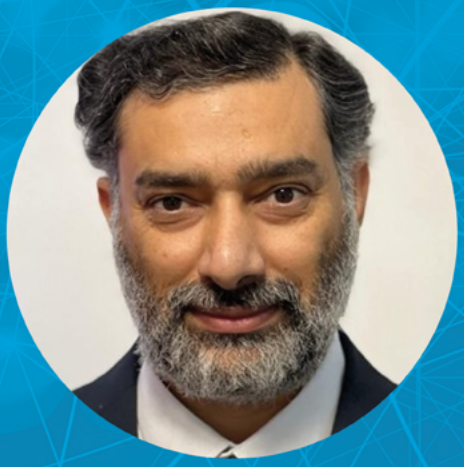
AI-Driven Bioinformatics for Fish Biodiversity Preservation



Dr Matloob Khushi | Brunel University London

28 February 2024 | an online event

2 PM-3 PM (UK Time)

AI-Driven Bioinformatics for Fish Biodiversity Preservation: Dr Matloob Khushi, Brunel University London

We are losing biodiversity at an alarming rate, which is leading to the sixth mass extinction event after the last one 65.5 million years ago which wiped out the dinosaurs from existence. Climate change, habitat loss, and chemical pollution are some of the factors driving this loss of biodiversity.

However, chemical pollution is often overlooked in discussions on measures to restore biodiversity, despite its impact on sensitive species. In a bid to protect the remaining wildlife, Southampton and Brunel University researchers are seeking to understand the factors that determine individual species' sensitivity to pollutants. Dr. Khushi in collaboration with researchers from Southampton University developing AI-based bioinformatics in-silico tools to predict receptor phenotype and species' sensitivity and confirm these predictions by conducting functional analysis.

Moderator: Dr Asress Gikay (Brunel University London)

Dr Matloob Khushi is a Senior Lecturer in computer science. His areas of expertise include image processing, computer vision, machine learning, and natural language processing (NLP). Dr Khushi has earned various awards for his research achievements and has authored more than 75 research papers. During his postdoc (2014-2017) at the Children's Medical Research Institute, Australia, he developed automated AI-based algorithms for expediting the drug discovery process.

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Artificial Intelligence for Intelligent Sensing and Analysis of Underwater Environments

Dr Valsamis Ntouskos | **National Technical University of Athens**

20 March 2024 | **an online event**

2 PM-3 PM (UK Time)

Artificial Intelligence for Intelligent Sensing and Analysis of Underwater Environments: Dr Valsamis Ntouskos, National Technical University of Athens

Artificial intelligence has evolved immensely within the last few years enabling, among other tasks, the continuous and unattended sensing of various environmental parameters, improving the awareness regarding the state of important ecosystems.

Nevertheless, underwater ecosystems continue to be vastly understudied due to the significant challenges they pose to the development, deployment, operation and communication of the sensors required to perform direct measurements or to collect data via remote sensing. In this talk, Dr Ntouskos will present a series of AI-based solutions based on underwater robotic technology, multispectral cameras and non-conventional imaging sensors, as well as radioactivity detectors and imagers, for the intelligent sensing and mapping of underwater environments.

Moderator: Dr Mingfeng Wang (Brunel University London)

Dr Valsamis Ntouskos received the engineering diploma from NTUA, Athens, the B.Sc. degree in electronics engineering, the M.S.E. degree in artificial intelligence and robotics and the Ph.D. degree in computer engineering with honors from the Sapienza University of Rome, working on “Inverse Problems Theory in Shape and Action Modeling. Until 2020 he was Researcher with the Department of Computer, Control, and Management Engineering, Sapienza University of Rome. As of 2020, he is a Research Fellow with the Remote Sensing Lab, NTUA. Dr Ntouskos is renowned for his contributions in machine learning and computer vision, with numerous publications and a focus on autonomous perception and imaging systems. He serves as a Program Committee Member and reviewer for key international conferences, and is actively involved in several EU-funded robotics and ICT projects.

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AI for Cultural Heritage: what of copyright?

Dr Paula Westenberger | **Brunel University London**

17 April 2024 | **an online event**

2 PM-3 PM (UK Time)

AI for Cultural Heritage: what of copyright? Dr Paula Westenberger, Brunel University London

Artificial intelligence ("AI") is revolutionising our relationship with cultural heritage, enhancing access to, engagement with and preservation of collections and heritage sites. AI is also being used as a valuable research tool in the context of heritage collections.

However, copyright law and practices may become an obstacle to such important AI deployments in the heritage sector. As AI may use copyright-protected materials in the process of algorithm training, there are concerns from creators on how their works may be misappropriated or misused. This talk will therefore address the current challenges in achieving an appropriate balance between allowing important AI uses in the heritage sector while preserving legitimate interests of creators.

Moderator: Dr Asieh Hosseini (Brunel University London)

Dr Paula Westenberger is a Senior Lecturer at Brunel University London, specializes in Intellectual Property Law and intersects AI in her research. She holds a PhD (with Scholarship awarded by the Centre for Commercial Law Studies) and an LLM in Intellectual Property Law from Queen Mary University of London (QMUL), and an LLB from the Pontifícia Universidade Católica of Rio de Janeiro (PUC-Rio). Her research interests cover the intersection between copyright law, human rights and culture, with particular focus on topics including limitations and exceptions to copyright, the use of digital technology by cultural heritage institutions, and the relationship between artistic freedom and copyright law. Currently on Athena Swan Award research leave, she also contributes as Deputy Editor for ECDR and is a member of BLACA and SLS, alongside being a qualified Brazilian lawyer
with experience in intellectual property law.

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AI and Physics - An Equal Partnership

Dr Liliana Teodorescu | **Brunel University London**

8 May 2024 | **an online event**

2 PM-3 PM (UK Time)

AI and Physics - An Equal Partnership: Dr Liliana Teodorescu

Applying AI to physics problems is a common approach by now. Challenging problems in particle and nuclear physics, astronomy, condense matter and other branches of physics are tackled with AI. Physics-informed machine learning which incorporates physics knowledge and constraints into the design of the machine learning algorithms brings further benefits in solving physics problems.

The benefits of the relationship between AI and Physics are bidirectional, though. Physics concepts and phenomena are used as inspiration for novel AI algorithms which aim to harvest the predictive power of the physics laws. Physics-inspired machine learning is an exciting and fast developing subfield. This interplay between the two fields is explored in this talk. Examples of applications of AI to physics problems as well as Physics-inspired AI algorithms will be discussed probing the mutual benefits for the two fields.

Dr Liliana Teodorescu is a physicist with diverse research experience acquired participating in large-scale international particle and nuclear physics projects in Europe and United States. She combines physics with computer science and engineering both in her research and teaching. She has a particular interest in the development of machine learning algorithms for particle and nuclear physics experiments, and their extensions to solving real-world problems. She has started in this field well before the current machine learning revolution, when she has pioneered the application of Gene Expression Programming (a variant of Evolutionary Computation) as a machine learning algorithm to particle physics. She is also interested in combining physics with computer science in other innovative ways, investigating physics-inspired computer algorithms.

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When Do Decision Makers Use Visualisation? A Closer Look at the Relationship Between Data and Decision-Making

Dr Mai Elshehaly | **City, University of London**

29 May 2024 | **an online event**

2 PM-3 PM (UK Time)

When Do Decision Makers Use Visualisation? A Closer Look at the Relationship Between Data and Decision-Making: Dr Mai Elshehaly, City, University of London

Visualisation is the graphical representation of data that offers audiences a qualitative understanding of information. It enables humans to make sense of large amounts of data and generate new insights about the past, present and future. However, there remains a well-documented gap between this insight generation process and the real-world practice of making decisions.

In this talk, I will highlight some of the gaps in our data-centric view of visualisation. I will explain how narrative-focused visualisation can create new opportunities, not just to entertain and inform, but to direct the attention of decision makers to situations that are otherwise hidden or reduced to abstractions that poorly reflect the lived experiences of those represented in data.

Moderator: Dr Federico Colecchia (Brunel University London)

Dr Mai Elshehaly, is a Lecturer in Visualisation at City, University of London's giCentre, she specializes in visual analytics for decision-making. An Honorary Research Fellow at the Wolfson Centre, she leads visualisation research at Yorkshire and Humber Patient Safety Research Centre and contributes to data literacy programs in Bradford. Mai holds a PhD in Computer Science from Virginia Tech, focusing on scientific data visualisation, and has postdoctoral experience from the University of Maryland, Baltimore County and University of Leeds.

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Exploring the Synergy of Machine Learning and Healthcare Advancements

Dr Zahraa Abdallah | University of Bristol

12 June 2024 | an online event

2 PM-3 PM (UK Time)

Exploring the Synergy of Machine Learning and Healthcare Advancements: Dr Zahraa Abdallah, University of Bristol

In an era marked by the rapid evolution of Artificial Intelligence (AI) and significant strides in complex and large-scale models, this talk explores the dynamic intersection of state-of-the-art algorithms and intricate healthcare challenges. It delves into the substantive role of machine learning techniques in propelling the field forward, with a primary focus on ongoing projects dedicated to the early detection of cancer, Alzheimer's, and Diabetes.

The presentation will highlight success stories while addressing challenges and ethical considerations integral to the seamless integration of machine learning in healthcare. This includes considerations of robustness, explainability, and trustworthiness. Furthermore, it delves into the pivotal role of collaboration between data scientists, healthcare professionals, and policymakers, illuminating their collective impact on shaping the future landscape of healthcare delivery.

Moderator: Dr Asress Gikay (Brunel University London)

Dr Zahraa Abdalla a Machine Learning lecturer at the University of Bristol, specializes in time series, adaptive models, and multi-modalities in her research. She focuses on time series analysis, ML applications in healthcare, and works on multidisciplinary projects including early detection of Alzheimer's, Cancer, and Parkinson's disease analysis, as well as diabetes insulin pattern research. Before joining Bristol, Zahraa received her PhD from Monash University, Melbourne, Australia. Her thesis was awarded the Mollie Holman award for the best dissertation in the School of Information Technology.

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Remixing the real world: How to use synthetic images and videos to train more robust deep learning models

Dr Ivan Nikolov | **Aalborg University, Denmark**

26 June 2024 | **an online event**

2 PM-3 PM (UK Time)

Remixing the real world: How to use synthetic images and videos to train more robust deep learning models: Dr Ivan Nikolov, Aalborg University, Denmark

As more and more data is needed for training robust and highly performant computer vision models, researchers are hit with problems around data gathering, analysis, and annotation. These problems can balloon the monetary and time budgets of projects and make the introduction of deep learning models for different tasks harder.

This is where synthetic data can become extremely useful, as developers can directly create all the needed scenarios and gather all the required annotations even before the real scenarios have been finalized. This talk aims to show how game engines like Unity can be used to create digital twins or augment synthetic elements in existing datasets. Contrary to other popular ways of generating synthetic data through 3D modelling programs, using game engines helps lower the knowledge barrier for creating data and scenarios, as well as the time it takes to generate them. We will discuss examples of synthetic data solutions, useful tools for digitizing real-world objects for the creation of digital twins, and open-source applications for easily finding additional assets for synthetic environments.

Moderator: Dr Nadine Aburumman (Brunel University London)

Dr Ivan Nikolov is an assistant professor at Aalborg University, Denmark, integrates computer graphics, human-computer interaction, VR/AR, deep learning, and computer vision in his work. His research includes synthetic data generation for deep learning models used in surveillance, animal habitat observation, surface inspection, and data visualization, emphasizing the use of game engines and AI's privacy implications in various sectors. He is currently authoring a book titled "Artificial Intelligence, Legal Transparency and Accountability," set for publication by Routledge.

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Law Enforcement Use of Facial Recognition in the UK—A Normative Regulatory Framework?

Dr Asress Gikay | Brunel University London

3 July 2024 | an online event

4:15 PM-5:15 PM (UK Time)

Law Enforcement Use of Facial Recognition in the UK—A Normative Regulatory Framework? Dr Asress Gikay, Brunel University London

The law enforcement use of automated live facial recognition has caused great concern in Europe. UK law enforcement authorities have deployed the technology in publicly accessible spaces in multiple instances. Today, there is an increasing call for more robust regulation and governance. Some scholars and advocacy groups also call for an outright ban on the technology's use by law enforcement authorities.

However, the UK should take a more balanced regulatory approach to reap the technology's benefits in improving public safety while addressing its risk. Based on an in-depth study of laws, policies and practices, I argue that the UK's legal regime requires changes to effectively manage the risks posed by the technology, focusing both on the development and deployment stages.

Moderator: Dr Pin Lean Lau (Brunel University London)

Asress Gikay is a Senior Lecturer in AI, Disruptive Innovation, and Law at Brunel University London. He is a member of Brunel University Centre for Artificial Intelligence where he co-coordinates the Centre's Thought Leadership Series. He obtained his PhD (with honour) in Individual Person and Legal Protections from Sant'Anna School of Advanced Studies (Pisa, Italy) with thesis focusing on the Regulation of Automated Consumer Credit Assessment in the EU and the US. His current research interest is in law, policy and governance of AI, with particular focus on fundamental rights including the privacy implications of AI technologies applied in private and public sectors.

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