4th ANNUAL INNOVATIVE ENGINEERING RESEARCH CONFERENCE (AIERC 2021)

AGENDA OF THE DAY

Time	Main Sessions	Parallel Session
09:00 - 09:05	**Opening and Introduction of Programme** **Dr Raluca Lefticaru,** Programme Chair	
09:05 - 09:15	**Welcome Message** **Professor Martin Priest** Dean of the Faculty of Engineering & Informatics, 50th Anniversary Chair – Professor of Tribology	
09:15 - 10:00	**Keynote talk** - *Robot Skill Learning and Human-Robot Share Control* **Professor Chenguang Yang** Bristol Robotics Laboratory University of the West of England	
10:00 - 10:15	Coffee break	
10:15 - 11:45	**Presentation Session 1**	**3 Minutes Thesis Presentations**
11:45 - 12:30	Lunch break	
12:30 - 13:45	**Poster Session 2**	
13:45 - 14:00	Coffee break	
14:00 - 15:00	**Keynote talk** - *Learning about Language and Action for Robots* **Professor Anthony Cohn** Professor of Automated Reasoning University of Leeds	
15:00 - 16:30	**Presentation Session 3**	
16:30 - 17:00	**Awards Ceremony** **Professor Felician Campean**, Associate Dean of Research & Knowledge Transfer, Faculty of Engineering & Informatics	
17:00 – 17:10	**Closing Remarks** **Dr Dhaval Thakker,** Director of Post Graduate Research	

Annual Innovative Engineering Research Conference

Main Sessions: Zoom Meeting details

https://bradford-ac-uk.zoom.us/s/87980323597

Meeting ID: 879 8032 3597

Passcode: 311457

Parallel Session: 3 Minutes Thesis Presentations

https://bradford-ac-uk.zoom.us/s/88995983317

Meeting ID: 889 9598 3317

Passcode: 888480

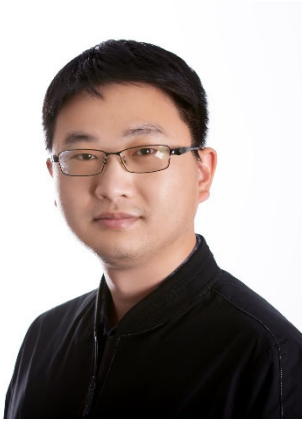
Keynote Talk

Robot Skill Learning and Human Robot Share Control

Professor Charlie Yang

Bristol Robotics Laboratory,

University of the West of England, Bristol, UK



Biography:

Professor Chenguang (Charlie) Yang is the leader of Robot Teleoperation Group of Bristol Robotics Laboratory, a Co-Chair of the Technical Committee on Bio-mechatronics and Bio-robotics Systems (B2S), and of the Technical Committee on Collaborative Automation for Flexible Manufacturing (CAFM), IEEE. He received PhD degree from the National University of Singapore (2010) and performed postdoctoral research at Imperial College London. He is a recipient of the prestigious IEEE Transactions on Robotics Best Paper Award as lead author and over ten Best Paper Awards from top international conferences. He has been awarded EPSRC Innovation Fellowship and EU FP-7 Marie Curie International Incoming Fellowship.

Abstract:

Expressing, learning and reusing skills as modularized ones can strengthen the generalization ability of skills and reusability. Human-Robot shared control combines the advantages of both human and robot. This talk will introduce our advance in the field of robot skill learning and human-robot shared control. We use control theory to model the control mechanism of motor neurons to assist us developing human-like robot controllers so that the robot can realize variable impedance control to adaptively physically-interact with the changing environment. We further propose a multi-task impedance control and impedance learning method used on a human-like manipulator with redundant degrees of freedom to achieve compliant human-robot interaction motor control. Learning from human demonstration methods are generally used to efficiently transfer modularized skills to robots using multi-modal information such as surface electromyography signals and contact forces, enhancing the effectiveness of skill reproduction in different situations. We have also developed an enhanced neural-network shared control system for teleoperation, which uses the redundancy of joint space to avoid collisions automatically. The operator does not need to pay attention to possible collisions during manipulation. Besides, with the help of deep learning, we designed a tool power compensation system for teleoperation surgery, thereby enhancing the performance of the force and motion tracking at both ends of the teleoperation system. Furthermore, this talk will also introduce our research on the topics of human-robot collaboration and skill generalization.

Meeting Link: https://bradford-ac-uk.zoom.us/s/87980323597 (Passcode: 311457)

Keynote Talk

Learning about Language and Action for Robots

Professor Anthony Cohn

Professor of Automated Reasoning

University of Leeds, UK

Biography:

Anthony Cohn is Professor of Automated Reasoning in the School of Computing, University of Leeds. His current research interests range from theoretical work on spatial calculi (receiving a KR test-of-time classic paper award in 2020) and spatial ontologies, to cognitive vision, modelling spatial information in the hippocampus, and Decision Support Systems, particularly for the built environment, as well as robotics. He is Editor-in-Chief of Spatial Cognition and Computation and was previously Editor-in-chief of the AI journal. He is the recipient of Distinguished Service Awards from IJCAI and AAAI. He is a Fellow of the Royal Academy of Engineering, the Alan Turing Institute in the UK, and is also a Fellow of AAAI, AISB, and EurAI. He holds Distinguished Visiting Professor positions at three Chinese Universities.

Abstract:

To operate effectively, and to collaborate with humans, robots need to know much about the world, including the kinds of objects in the world, their properties, the spatial relationships between them and actions that can be performed on them, as well as how language is used to describe these things. I will present a cognitively plausible novel framework capable of /incrementally/ learning a language used to give commands to a robot in a tabletop environment, and the grounding of linguistic concepts to the induced visual semantics of the observed scenes. The system also induces a set of probabilistic grammar rules governing the previously unknown language. I also plan to talk about new work in which we show how robots can improve their manipulation planning in cluttered environments by learning from human demonstrations in virtual worlds.

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Session 1: Paper presentation

Meeting Link: https://bradford-ac-uk.zoom.us/s/87980323597 (Passcode: 311457)

Chairs: Dr Raluca Lefticaru, Dr Kit Qichun Zhang

Time	Presenter	Paper Title
10:15	Vinod Vasudevan	Towards Certification of Machine Learning for Automotive Systems: Opportunities and Challenges
10:30	Jingyu Du	Optimal Maintenance Scheduling by Delay-time Modelling: A Review
10:45	Ahsanullah Mahmoud	Effectiveness Study of Immunotherapy Treatments Using Tree-based Algorithms
11:00	Ibrahim Abobaker	Machine Learning Algorithms for Intrusion Detection and Measuring Network Performance
11:15	Morteza Soleimani	An Application of Engineering System Analysis to Support a Data-driven Fault Analysing Method
11:30	Caroline Duvier	Understanding Sustainability in Social Housing

Parallel Session 3MT: 3 Minutes Thesis Presentations

Meeting Link: https://bradford-ac-uk.zoom.us/s/88995983317 (Passcode: 888480)

Chairs: Dr Amr Rashad Ahmed Abdullatif, Dr Kavian Cooke

Time	Presenter	Thesis Title
10:15	Jingyu Du	Optimal Maintenance Scheduling by Delay-time Modelling
10:20	Morteza Soleimani	Hybrid Framework for Fault Analysis in Complex Engineered Systems
10:25	Ahmed Abdulkhaleq	Investigation and Design of New, Efficient and Compact Load Modulation Amplifiers for 5G Base Stations
10:30	Julius Sechang Mboli	An Internet of Things-Enabled Decision Support System for Circular Economy Business Model
10:35	George Kumi Kyeremeh	Multimodal Biometric Systems

Session 2: Poster presentation

Meeting Link: https://bradford-ac-uk.zoom.us/s/87980323597 (Passcode: 311457)

Chairs: Dr Therese Sheehan, Dr Cuong Dao, Dr Kavian Cooke

Time	Presenter	Poster Title
12:30	Yasir Al-Yasir	New Microwave Imaging Technique for Breast Cancer Detection
12:35	Nima Donyanavard	Development of Digital Health Platforms for processing patient data using Artificial Intelligence and visual computing Technologies
12:40	Kerry Ayrton	The Need for a Framework of Governance for Facial Recognition Software
12:45	Ahsanullah Mahmoud	Effectiveness Study of Immunotherapy Treatments Using Tree-based Algorithms
12:50	Ramsha Ali	HCOME for developing a domain model for IoT based Indoor Air Quality Systems – A Survey
12:55	Sajid Ahmad	Meta-materials to control low frequency sound
13:00	Tony Athur	Processing simulation of the Twin-screw extruder: A review
13:05	Jingyu Du	Optimal Maintenance Scheduling by Delay-time Modelling: A Review
13:10	Morteza Soleimani	Hybrid Methodology for Fault Analysis in Complex Engineered Systems; Case study of Automotive Aftertreatment system
13:15	Sarah Zahid	Instrumented up-on-the-toes test: use of IMUs as a valid alternative to the force platform.
13:20	Ali Abed	Solar Flares Classification with Deep Belief Networks by Using Sunspot Images
13:25	George Kumi Kyeremeh	A Multimodal Biometric System of Face and Fingerprint for Border Control
13:30	Julius Sechang Mboli	Technologies as Enablers for Circular Economy

Session 3: Paper presentation

Meeting Link: https://bradford-ac-uk.zoom.us/s/87980323597 (Passcode: 311457)

Chairs: Dr Dhaval Thakker, Dr Sohag Kabir

Time	Presenter	Paper Title
15:00	George Kumi Kyeremeh	An Overview of Biometric System at Borders
15:15	Ramzi Jaber	Proposing a Three-stage Model to Quantify Bradykinesia on a Symptom Severity Level Using Deep Learning
15:30	Yogesh Gadinaik	A Brief Review of Optimization Problems & Methods for Autonomous Vehicles
15:45	Rameez Raja Kureshi	Low-Cost Sensor Selection and Calibration for Air Quality Monitoring
16:00	Alexey Uglanov	Driver Behaviour Modelling: Smooth PDF-based Travel Predictions
16:15	Kirill Kartashev	Driver Behaviour Clustering using Discrete PDFs and Modified Markov algorithm