

1. Artificial Intelligence

Research areas

Knowledge representation and reasoning

A long standing interest of the Knowledge Representation and Reasoning (KRR) Group is Qualitative Spatial Representation and Reasoning (QSR), for which the group is well known, in particular for the [Region Connection Calculus \(RCC\)](#). The group collaborates with the [computer vision group](#) on applying QSR as a representation in activity recognition.

Professor Anthony G Cohn	From < https://eps.leeds.ac.uk/staff/76/prof_anthony_cohn_freng_ceng_citp >		
Contact Information	A.G.Cohn@leeds.ac.uk , +44(0)113 343 5482		
Areas of expertise	artificial Intelligence; knowledge representation and reasoning; data and sensor fusion; cognitive vision; spatial representation and reasoning; geographical information science, robotic		
Project	Current EPSRC Support	EP/R031193/1 Humanlike physics understanding for autonomous robots (P)	
		EP/N010523/1 Balancing the impact of City Infrastructure Engineering on Natural systems using Robots (C)	
Previous EPSRC Support	EP/K021699/1	ASSESSING THE UNDERWORLD - AN INTEGRATED PERFORMANCE MODEL OF CITY INFRASTRUCTURES	(C)
	EP/F06585X/1	MAPPING THE UNDERWORLD: MULTI-SENSOR DEVICE CREATION, ASSESSMENT, PROTOCOLS	(P)
	EP/G025177/1	Geometric Abstractions for Scalable Program Analyzers	(P)
	EP/D061334/1	Learning about Activities from Video	(C)
	EP/D002834/1	Foundational Ontology for Geographic Information	(R)
	EP/C014707/1	Mapping the Underworld: Knowledge and Data Integration	(P)
	GR/R53401/01	Escape Analysis of Object-Orientated Languages.	(C)
	GR/N13159/01	SPECIFICATION AND VERIFICATION OF ARM6	(P)
	GR/M56807/01	MANAGING VAGUENESS, UNCERTAINTY AND GRANULARITY IN SPATIAL INFORMATION SYSTEMS	(P)
	GR/M05645/01	SEMANTIC-BASED SOFTWARE SUPPORT FOR CONSTRAINT LOGIC PROGRAMS	(C)
	GR/L19515/01	DECLARATIVE LANGUAGE INTERFACE FOR CONSTRAINT SOLVING	(C)
	GR/K79635/01	DETECTING AND EXPLOITING DETERMINACY IN LOGIC PROGRAMS	(C)
	GR/K65041/01	LOGICAL THEORIES AND DECISION PROCEDURES FOR REASONING ABOUT PHYSICAL SYSTEMS	(P)
	GR/H78955/01	LOGICAL AND COMPUTATIONAL ASPECTS OF SPATIAL REASONING	(P)
	GR/H78962/01	DECLARATIVE EXTENSIONS OF LOGIC PROGRAMMING	(P)
	GR/H78948/01	MANY SORTED EQUATION SOLVING	(P)
	GR/G24231/01	MANY SORTED UNIFICATION	(P)
	GR/G36852/01	REPRESENTATION AND INFERENCE IN A NAIVE PHYSICS THEORYOF SPACE AND TIME.	(P)
	GR/F64388/01	REPRESENTATION AND INFERENCE IN A NAIVE PHYSICS THEORYOF SPACE AND TIME	(P)
	Others		
Research interests	<ul style="list-style-type: none">• He founded a research group working on Knowledge Representation and Reasoning with a particular focus on qualitative spatial/spatio-temporal reasoning, the best known being the well cited Region Connection Calculus (RCC)• His current and recent research interests range from theoretical work on spatial calculi and spatial ontologies, to cognitive vision, grounding language in vision, detection of archaeological residues using remote sensing techniques, modelling spatial information in the hippocampus, integrating utility records and sensor data concerning the location of underground assets and decision support systems for tunnel maintenance and construction.		
Internal contacts	<ul style="list-style-type: none">• Robotics• Artificial Intelligence		
External contacts	He is Editor-in-Chief Spatial Cognition and Computation and has been Chairman/President of the UK AI Society SSAISE , the European Association for Artificial Intelligence (EurAI) , KR inc , the IJCAI Board of Trustees		

Computer vision

Their recent work has focused on activity analysis from video, with fundamental research on categorisation, tracking, segmentation and motion modelling, through to the application of this research in several areas. Part of the work is exploring the integration of vision within a broader cognitive framework that includes audition, language, action, and reasoning.

Professor David Hogg	From < https://eps.leeds.ac.uk/staff/84/Professor_David_Hogg >		
Contact Information	D.C.Hogg@leeds.ac.uk , +44(0)113 343 5765		
Areas of expertise	computer vision; machine learning		
Project	Current EPSRC Support	EP/T022205/1 JADE: Joint Academic Data science Endeavour - 2 (C)	
		EP/S024336/1 UKRI Centre for Doctoral Training in Artificial Intelligence for Medical Diagnosis and Care (P)	
Previous EPSRC Support	EP/S016406/1	Assuring the quality of design descriptions through the use of design configuration spaces	(C)
	EP/P001556/1	Multifunctional Scanning Microscopy	(C)
	EP/P001394/1	Ti:Sapphire Regenerative Amplified Laser System for ultrafast, high-field terahertz photonics	(C)
	EP/P00122X/1	3D Volume Microscopy and TEM Sample Preparation of Complex Hybrid Nanostructures	(C)
	EP/J021156/1	University of Leeds-Equipment Account	(P)
	EP/S01540X/1	Analysing the Motion of Biological Swimmers	(P)
	EP/R008833/1	Multi-Disciplinary Pedestrian-in-the-Loop Simulator	(C)
	EP/P511341/1	Institutional Sponsorship 2016- University of Leeds	(P)
	EP/P51097X/1	EPSRC Global Challenges Research Fund Institutional Sponsorship Award 2016 - University of Leeds	(P)
	EP/N005694/1	Embedding design structures in engineering information	(C)
	EP/N508809/1	Institutional Sponsorship 2015- University of Leeds	(P)
	EP/M02010X/1	A Network for Regional e-Infrastructure Centres	(C)
	EP/M028143/1	Experimental Equipment Call - University of Leeds	(P)
	EP/K503836/1	Impact Acceleration Account - University of Leeds 2012	(P)
	EP/K503526/1	Institutional Sponsorship 2012- University of Leeds	(P)
	EP/K000209/1	E-Infrastructure Connectivity	(C)
	EP/K000225/1	E-Infrastructure Interconnectivity EPSRC - Chris Taylor	(C)
	EP/I01229X/1	Learning to Recognise Dynamic Visual Content from Broadcast Footage	(C)
	EP/E010164/1	Cognitive Systems Foresight: Human Attention and Machine Learning	(P)

		EP/D061334/1 Learning about Activities from Video (P)
		GR/M33730/01 COMPUTATIONAL SIMULATIONS MORPHOGENETIC PROCESSES TO EVOLVE REALISTIC LIFE-FORMS USING ADAPTIVE 3D MESHES (C)
		GR/K45814/01 MODEL-BASED VISUAL SURVEILLANCE (P)
		GR/J48887/01 INTELLIGENT DEFORMABLE MODELS FOR 2D AND 3D MEDICAL IMAGE SEGMENTATION (C)
		GR/D58260/01 A HIGH PERFORMANCE VERSION OF THE POPLOG VIRTUAL MACHINE (P)
	Others	
Research interests	<ul style="list-style-type: none"> the use of three-dimensional geometric models for tracking flexible structures (e.g. the human body) in natural scenes, and contributed to establishing statistical approaches to learning of shape and motion as one of the pre-eminent paradigms in the field. Current research is on representation and learning of activities from video, specifically models of interaction, and applications of machine learning in science and engineering 	
Internal contacts	<ul style="list-style-type: none"> Artificial Intelligence 	
External contacts	<ul style="list-style-type: none"> IEEE Computer Society British Machine Vision Association (BMVA) The Society for the Study of Artificial Intelligence and the Simulation of Behaviour (AISB) International Association of Pattern Recognition (IAPR) 	

• [Augmenting human intelligenc](#)

Their aim is building intelligent systems that help people make sense of data, take decisions in complex settings, expand their knowledge, learn from experience, and develop self-regulation skills. We develop computational models of people' s conceptual structures by combining ontology engineering and machine learning methods; devise knowledge-driven approaches for modelling individuals, groups, and communities; and develop intelligent interactive interventions to provide personalised user-adapted support.

Professor Vania Dimitrova	From < https://eps.leeds.ac.uk/staff/184/vania_dimitrova >	
Contact Information	V.G.Dimitrova@leeds.ac.uk , +44(0)113 343 1674	
Areas of expertise	knowledge capture; ontological modelling; information exploration; user/group modelling; user-adapted interactive systems; decision support systems; intelligent learning environments	
Project	Current EPSRC Support	EP/S024336/1 UKRI Centre for Doctoral Training in Artificial Intelligence for Medical Diagnosis and Care (C) EP/S012206/1 Northern Power: Making Engineering and Physical Sciences Research a Domain for All in the North of England (C)
	Previous EPSRC Support	EP/K021699/1 ASSESSING THE UNDERWORLD - AN INTEGRATED PERFORMANCE MODEL OF CITY INFRASTRUCTURES (C)
	Others	Immersive reflective experience-based adaptive learning (ImREAL) from < https://business.leeds.ac.uk/research-aimtech/dir-record/research-projects/1182/immersive-reflective-experience-based-adaptive-learning-imreal >
Research interests	Her research is on user-aware intelligent systems which augment human intellect by assisting humans to perform complex tasks (focus on decision making and sensemaking) or to learn new skills (focus on soft skills and reflexive learning). This crosses several fields - personalisation and user-adaptive systems, intelligent decision support systems, and intelligent learning environments. <ul style="list-style-type: none"> Knowledge capture User and group/community modelling Interactive information exploration 	
Internal contacts	<ul style="list-style-type: none"> Artificial Intelligence 	
External contacts	<ul style="list-style-type: none"> User Modelling Inc International Artificial Intelligence in Education Society ECTEL steering committee 	

• [Sensible robots](#)

Their research focuses on decision making and machine learning for autonomous robots, centred on planning and reinforcement learning.

Dr Matteo Leonetti	From < https://eps.leeds.ac.uk/staff/771/dr_matteo_leonetti >	
Contact Information	M.Leonetti@leeds.ac.uk , +44(0)113 343 5792	
Areas of expertise	reinforcement learning, planning, autonomous robots, machine learning	
Project	Current EPSRC Support	EP/S005056/1 COMMOTIONS: Computational Models of Traffic Interactions for Testing of Automated Vehicles (C) EP/R031193/1 Humanlike physics understanding for autonomous robots (C)
	Previous EPSRC Support	
	Others	
Research interests	His research revolves around robots that do things. He designs systems and algorithms to bring useful autonomous robots in our everyday life, capable of long-term, rational, and adaptive behaviour. His work usually has to do with automated reasoning, planning, or reinforcement learning, one way or another.	
Internal contacts	<ul style="list-style-type: none"> Robotics Artificial Intelligence 	
External contacts		

• [Robot manipulation](#)

Dr Mehmet Dogar	From < https://eps.leeds.ac.uk/staff/743/dr_mehmet_dogar >	
Contact Information	M.R.Dogar@leeds.ac.uk , +44(0)113 343 5777	
Areas of expertise	robotics; manipulation planning; motion planning; grasping	
Project	Current EPSRC Support	EP/R031193/1 Humanlike physics understanding for autonomous robots (C)
	Previous EPSRC Support	EP/P019560/1 Multi-Robot Manipulation Planning for Forceful Manufacturing Tasks (P)
	Others	
Research interests	<ul style="list-style-type: none"> His research focuses on autonomous robotic manipulation. I envision a future where robots autonomously perform complex manipulation tasks in human environments; such as grasping an object from the back of a cluttered shelf, or manufacturing and assembling a complex piece of furniture. My manipulation planners use <i>physics-based</i> predictive models. This challenges the existing paradigm which is based on a geometric representation of the world and is limited to pick-and-place actions. The physics-based approach, on the other hand, enables a robot to interact with the environment with a rich set of actions such as pushing, tumbling, and throwing, as well as pick-and-place. I am also interested in <i>collaborative manipulation planning</i>, where the task is performed through the collaboration of human-robot or robot-robot teams. 	
Internal contacts	<ul style="list-style-type: none"> Artificial Intelligence 	

- Natural language processing