Research Week 2020 Ceremony

Sharif University of Technology, International Campus
Kish Island

https://vc.sharif.edu/ch/sutic-webinar

Date	Time	Speaker	Subject
Sunday, **December 13th 2020** (23/9/1399)	**18:30 PM**	**Dr. Manos Papagelis** Electrical Engineering and Computer Science, York University, Canada	Large-scale Mining of Dynamic Networks
Tuesday, **December 15th 2020** (25/9/1399)	**15:30 PM**	**Dr. Aydin Azizi** School of Engineering, Computing and Mathematics, Oxford Brookes University, UK	Knowledge Networks & Knowledge Transfer
Tuesday, **December 15th 2020** (25/9/1399)	**17:00 PM**	**Dr. Morteza Amjadi** Institute of Mechanical, Process & Energy Engineering, Heriot-Watt University, UK	Functional Nanomaterial Composites for Soft Sensing and Actuation
Thursday, **December 17th 2020** (27/9/1399)	**17:00 PM**	**Dr. Edoardo Artioli** Department of Civil Engineering and Computer Science, University of Rome, Italy	Recent developments of the Virtual Element Method for nonlinear solid mechanics applications
Saturday, **December 19th 2020** (29/9/1399)	**17:00 PM**	**Dr. Masoud Latifi Navid** Mechatronics Engineering Dept, University of Turkish Aeronautical Association, Ankara, Turkey	Application of Robotics in Development of Novel Composite Materials
Monday, **December 21st 2020** (1/10/1399)	**16:30 PM**	**Dr. Robert West** School of Computer and Communication Sciences, EPFL, Switzerland	Crosslingual Document Embedding as Reduced-Rank Ridge Regression
Tuesday, **December 22nd 2020** (2/10/1399)	**17:00 PM**	**Dr. Fadi Aldakheel** Institute of Continuum Mechanics, Leibniz Universität Hannover, Hannover, Germany	Simulation of Fracture Processes using the Global-Local Approach

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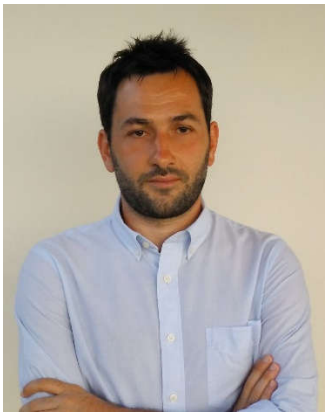

Dr. Manos Papagelis
Assistant Professor
Electrical Engineering and Computer Science (EECS)
York University
Toronto, Canada

Sunday, December 13th 2020 (23/9/1399)
@ 18:30 PM Tehran Time (10:00 AM Toronto Time)
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Large-scale Mining of Dynamic Networks

Abstract.

In this research, recent achievements on mining specific types of large-scale dynamic networks will be presented. In the first part of the talk, I will present our research on mining and analysis of trajectory networks - networks where the nodes are moving objects (cars, pedestrians, etc.) and the edges represent contacts between objects defined by a proximity threshold. In particular, I will motivate the problem of evaluating the importance of moving objects (node importance) in a trajectory network. Then, I will present SLOT, a fast and exact method that can simultaneously evaluate the importance of all moving objects (nodes) according to metrics of node degree, triangle membership and connected component, over time. In the second part of the talk, I will discuss our recent work on network representation learning. Lately, these methods have been shown to perform very well on static networks. However, in real-world, networks are continuously evolving. I will present EvoNRL, a random-walk based method for effectively learning low-dimensional continuous representations of evolving networks.

Biography.

Dr. Manos Papagelis is an Assistant Professor of Electrical Engineering and Computer Science (EECS) at York University, Toronto, Canada. His research interests include data mining, graph mining, NLP, machine learning, big data analytics, knowledge discovery and city science. He holds a Ph.D. in Computer Science from the University of Toronto, Canada, and a M.Sc. and a B.Sc. in Computer Science from the University of Crete, Greece. Prior to joining York University, he was a postdoctoral research scholar at the University of California, Berkeley. In the past, he has worked twice as a research intern at Yahoo! Labs, Barcelona and as a research fellow at the Institute of Computer Science, FORTH, Greece. His research has appeared in the ACM Trans. on Knowledge Discovery from Data (ACM TKDD) and the IEEE Trans. on Knowledge and Data Engineering (IEEE TKDE). He is the recipient of two best paper awards at the 19th and 21st IEEE International Conference on Mobile Data Management (IEEE MDM 2018; IEEE MDM 2020), and the outstanding reviewer award at the 26th ACM International Conference on Information and Knowledge Management (ACM CIKM 2017). He has taught at the University of Toronto, the University of California, Berkeley and York University.

Dr. Aydin Azizi
Senior Lecturer
School of Engineering, Computing and Mathematics
Oxford Brookes University
Oxford, United Kingdom

Tuesday, December 15th 2020 (25/9/1399)
@ 15:30 PM Tehran Time (12:00 PM Oxford Time)
https://vc.sharif.edu/ch/sutic-webinar

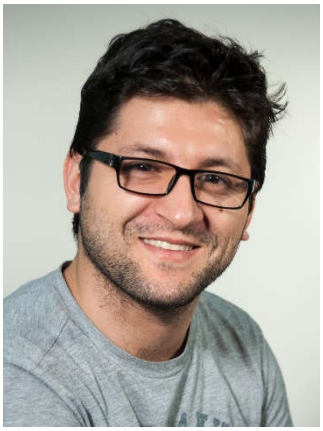
Knowledge Networks & Knowledge Transfer

Abstract.

The seminar will be a friendly talk about sharing my experience from being a student till becoming a university professor. I would like to discuss how universities can be the incubators of Creative Talents, and the role of the Sharif University of Technology, International Campus in my career pathway. Another part of the session will be allocated to knowledge transfer about important topics such as how to utilize professional social media to choose a career and shape your skills based on the market demand, how to find funded graduate positions. Also, I would like to discuss collaboration opportunities in the field of Mechatronics.

Biography.

Dr. Aydin Azizi holds a BSc in Mechanical Engineering from the Urmia University, an MSc in Mechatronics from the Sharif University of Technology and a PhD in Mechanical Engineering from the Eastern Mediterranean University. Certified as an official instructor for the Siemens Mechatronic Certification Program (SMSCP), he currently serves as a Senior Lecturer at the Oxford Brookes University. His current research focuses on investigating and developing novel techniques to model, control and optimize complex systems. Dr. Azizi's areas of expertise include Control & Automation, Artificial Intelligence and Simulation Techniques. Dr. Azizi is the recipient of the National Research Award of Oman for his AI-focused research, DELL EMC's "Envision the Future" completion award in IoT for "Automated Irrigation System", and 'Exceptional Talent' recognition by the British Royal Academy of Engineering.



Dr. Morteza Amjadi
Assistant Professor
Institute of Mechanical, Process & Energy Engineering
Heriot-Watt University
United Kingdom

Tuesday, December 15th 2020 (25/9/1399)
@ 17:00 PM Tehran Time (14:30 PM Edinburgh Time)
https://vc.sharif.edu/ch/sutic-webinar

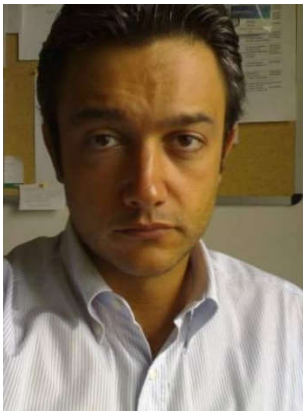
Functional Nanomaterial Composites for Soft Sensing and Actuation

Abstract.

Soft machines have many applications, ranging from multifunctional wearable medical devices for feedback therapy to prosthetics, non-invasive surgical tools, and soft robots for safe human-robot interaction. High-performance flexible sensors and actuators are the key components of soft machines. In this seminar, I will cover our latest research activities on the development of functional nanocomposites based wearable strain sensors for human motion detection and soft robotics. I will demonstrate how bioinspired structures can help to improve the sensing and skin-adhesion performance of wearable sensors. The next part of my talk will focus on the development of programmable soft actuators based on composite materials. Finally, I will address challenges associated with the design of integrated soft machines capable of multimodal sensing and controlled stimulation.

Biography.

Dr. Morteza Amjadi is an Assistant Professor in the Department of Mechanical Engineering at Heriot-Watt University, UK. He received his PhD in Mechanical Engineering jointly from Max Planck Institute for Intelligent Systems and ETH Zurich in 2018. He obtained his MSc in Mechanical Engineering from Korea Advanced Institute of Science and Technology (KAIST) in 2014. Dr. Amjadi leads the Integrated Soft Machines Lab where his team designs multifunctional soft machines utilizing novel mechanical designs, advanced materials, bioinspired structures, and digital manufacturing processes. He has published over a dozen papers in high-impact journals including Advanced Materials, ACS Nano, Advanced Functional Materials, and Advanced Science. Some of his publications are among top 1% highly cited papers in the field according to Web of Science. In 2018, he has been nominated for the prestigious Otto Hahn Medal, awarded by the Max Planck Society to young scientists for their outstanding scientific achievements.



Dr. Edoardo Artioli
Associate Professor
Department of Civil Engineering and Computer Science
University of Rome – Tor Vergata
Rome, Italy

Thursday, December 17th 2020 (27/9/1399)
@ 17:00 PM Tehran Time (14:30 PM Rome Time)
https://vc.sharif.edu/ch/sutic-webinar

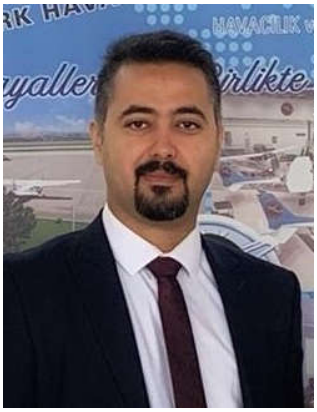
Recent developments of the Virtual Element Method for nonlinear solid mechanics applications

Abstract.

The Virtual Element Method (VEM) is a recent methodology to approximate partial differential equation problems. It is a Galerkin method which can be considered as an evolution of the Finite Element Method (FEM). In contrast to FEM, VEM is able to naturally manage several mesh complexities, such as polytopal shapes or hanging nodes. In addition to this flexibility, it has been realized that VEM is also able to efficiently deal with other non-trivial situations, for instance problems with internal constraints (incompressibility for solids and fluids is an example), or problems with high-continuity requirements (the fourth-order Kirchhoff plate is an example). The price to pay is that the shape functions are not explicitly known and thus they are called virtual. In this presentation we will first review the basic VEM framework for 2D elasticity formulated in primal form. Subsequently, we will present a selection of development and results in several application fields, such as complex nonlinear material behavior, homogenization, virtual elements with curved edges, and contact mechanics.

Biography.

Dr. Edoardo Artioli graduated in Civil Engineering from the University of Bologna, where he completed his doctoral studies in Structural Mechanics in 2006. He was then post-doc at the University of Pavia, and visiting scholar at the University of California - Berkeley in 2007 and subsequent years. He joined the faculty at the Department of Civil Engineering and Computer Science of the University of Rome – Tor Vergata in 2008 where he since serves as Associate Professor of Solid and Structural Mechanics. His main research interests regard computational methods for advanced nonlinear material behavior (plasticity, shape memory alloy, architectured 3D printed materials) and the development of numerical methods for nonlinear solid and structural mechanics. In the recent years he has been involved in the development of the innovative Virtual Element Method with an emphasis to problems of solid mechanics.



Dr. Masoud Latifi Navid
Assistant Professor
Mechatronics Engineering Department
University of Turkish Aeronautical Association
Ankara, Turkey

Saturday, December 19th 2020 (29/9/1399)
@ 17:00 PM Tehran Time (16:30 AM Ankara Time)
https://vc.sharif.edu/ch/sutic-webinar

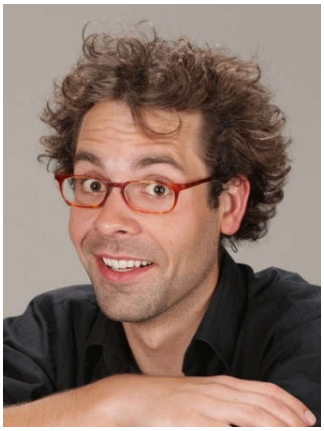
Application of Robotics in Development of Novel Composite Materials

Abstract.

Fiber reinforced composites and self-repairing materials have been widely used in high tech applications like aerospace technologies. The self-repairing materials technology can decrease the disaster risks for protecting human life and environment resources (e.g. soil and groundwater resources). Applying the coating on a water or fuel tank, the coating self-repairs any puncture or cracks caused by either internal corrosion or external impacts. In order to develop such advanced composite materials, there is a need to apply the robotics and control engineering during the manufacturing and implementation procedures. Development and implementation procedures of a novel fiber reinforced composite structure and a type of self-repairing sandwich composite coating are investigated. The behavior of the developed materials in the ballistic tests is shown.

Biography.

Dr. Masoud Latifi Navid received his Bachelor degree from the Mechanical Engineering Department in 2007 and then his Master degree in Mechatronic Engineering from Sharif University of Technology, International Campus (SUTIC) in 2009. He was awarded the Tübitak PhD Student scholarship and received his PhD degree in the Mechanical Engineering from Middle East Technical University. He started working as a lecturer at the University of Turkish Aeronautical Association since January 2014, and then joined since 2018 as an Assistant Professor to the Mechatronic Engineering Department. In addition to his academic studies, he has valuable experiences in entrepreneurship and the projects. He received several prizes and grants such as the New Ideas New Jobs (YFYI2017) Elginkan Foundation Grand Prize, Tech Ankara Project Market-2017 Award, Roboik-2019 Award, Tübitak-1512 Multiphase Entrepreneurship Grant and Tübitak- 1507 SME Research, Development & Innovation Grant. In addition, his project was selected and granted as one of the top projects among 4300 worldwide applications in the international ISDB-Transformers-2018 competition held in Cambridge within the scope of the UN's Sustainable Development Goals in 2018.



Dr. Robert West
Assistant Professor
School of Computer and Communication Sciences
École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland

Monday, December 21st 2020 (1/10/1399)
@ 16:30 PM Tehran Time (14:00 PM Lausanne Time)
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Crosslingual Document Embedding as Reduced-Rank Ridge Regression

Abstract.

We introduce Cr5 (Crosslingual reduced-rank ridge regression), a method for embedding documents written in any language into a single, language-independent vector space. For training, our approach leverages a multilingual corpus where the same concept is covered in multiple languages (but not necessarily via exact translations), such as Wikipedia. Our method starts by training a ridge-regression-based classifier that uses language-specific bag-of-word features in order to predict the concept that a given document is about. We show that, when constraining the learned weight matrix to be of low rank, it can be factored to obtain the desired mappings from language-specific bags-of-words to language-independent embeddings. As opposed to most prior methods, which use pretrained monolingual word vectors, postprocess them to make them crosslingual, and finally average word vectors to obtain document vectors, Cr5 is trained end-to-end and is thus natively crosslingual as well as document-level. Moreover, since our algorithm uses the singular value decomposition as its core operation, it is highly scalable. Experiments show that our method achieves state-of-the-art performance on a crosslingual document retrieval task. Finally, although not trained for embedding sentences and words, it also achieves competitive performance on crosslingual sentence and word retrieval tasks.

Biography.

Dr. Robert West is a tenure-track assistant professor of Computer Science at EPFL (the Swiss Federal Institute of Technology, Lausanne), where he heads the Data Science Lab. He received his PhD in Computer Science from Stanford University, his MSc from McGill University, Canada, and his undergraduate degree from Technische Universität München, Germany. His research aims to understand, predict, and enhance human behavior in social and information networks by developing techniques in computational social science, social network analysis, machine learning, and natural language processing. Bob also collaborates closely with the Wikimedia Foundation, in his role as a Wikimedia Research Fellow. He is a co-founder of the Wiki Workshop and the Applied Machine Learning Days.

Dr. Fadi Aldakheel
Assistant Professor
Institute of Continuum Mechanics
Leibniz Universität Hannover
Hannover, Germany

Tuesday, December 22nd 2020 (2/10/1399)
@ 17:00 PM Tehran Time (14:30 PM Hannover Time)
https://vc.sharif.edu/ch/sutic-webinar

Simulation of Fracture Processes using the Global-Local Approach

Abstract.

The modeling of crack formation can be achieved in a convenient way by continuum phase-field approaches to fracture, which are based on the regularization of sharp crack discontinuities. Phase-field modeling of fracture has been attracting considerable attention in recent years due to its capability of capturing complex crack patterns in various problems in solid mechanics. For efficient and robust numerical solution procedures, we develop a multi-scale approach where the characteristic length of the local scale is of the same order as its global counter part. This is accomplished by introducing the so-called Global-Local approach. Hereby a multi-physics problem at fracture is solved on a lower (local) scale, while dealing with a purely linear elastic problem on an upper (global) scale. Besides its feasibility for having two ad-hoc finite element models for the global and local domain, enables computations/couplings with legacy codes for industrial applications in more efficient settings. Another important aspect of this contribution is the development of an adaptive Global-Local approach, where a predictor-corrector scheme is designed in which the local domains are *dynamically updated* during the computation. To cope with different finite element discretizations at the interface between the two nested scales, a *non-matching* dual mortar method is formulated. Hence, more regularity is achieved on the interface.

Biography.

Dr. Fadi Aldakheel graduated in Mechanical Engineering from the University Aleppo, Syria in 2006. He then completed his M.Sc. in Computational Mechanics of Materials and Structures in the University of Stuttgart, Germany in 2011, where he also completed his PhD in the Institute of Applied Mechanics in 2016. During the period 2016 - 2017, he has been working as Postdoctoral Research Associate at the Institute of Applied Mechanics, University of Stuttgart, Germany. Currently, he is the Chief Engineer and the Leader of "Material Modeling and Damage Mechanics" Group at the Institute of Continuum Mechanics, Leibniz University, Hannover. His research interests include Phase-Field Approach, Theory of Porous Media, Fracture Mechanics, Gredient-Extended Theory and Finite Element Technology.