

Short Bio of Kamel Barkaoui

Kamel Barkaoui is full professor (Exceptional Class) at the Department of Computer Science of Conservatoire National des Arts et Métiers (Le Cnam - Paris). He obtained his Ph.D in Computer Science (1988) and Habilitation à Diriger des Recherches (1998) from Université Paris 6 (Sorbonne University).

His research interests lie in the field of formal methods for specification, verification, control and performance evaluation of concurrent and discrete-event systems and include also artificial intelligence, process mining, metaheuristic optimization, and machine learning. Kamel Barkaoui has been visiting professor or invited researcher in the following universities: Polytechnique Montréal (Canada), Xidian University (China), Tshwane University of Technology (South Africa), Tecnológico de Monterrey (Mexico), King Saud University (Saudi Arabia), New Jersey Institute of Technology (USA), Macau University of Science and Technology (Macau), University of Pisa (Italy), University of Zaragoza (Spain) and Maghrebien Universities (Algiers, Bejaia, Constantine, Tunis, Sfax).

He supervised more than 36 PhD theses; he published 55 papers in International Journals and more than 150 peer-reviewed papers in international conferences and contributed to several books. He leaded or participated in more than 10 international research projects. He received the Outstanding Paper Award at the IEEE Int. Conf. on System Man and Cybernetics (IEEE SMC 1995) and is recipient of the Prime d'Excellence Scientifique (MESRI) since 1998.

Kamel Barkaoui served on PCs and as PC chair and OC chair of several international workshops and conferences in his areas of research. He was Program Committee chair of the 3rd International Colloquium on Theoretical Aspects of Computing (ICTAC 2006) and of the 13th Colloquium on Modelling of Reactive Systems (MSR 2021), General chair of the 18th International Symposium on Formal Methods (FM 2012), General chair of the 35th International Conference on Application and Theory of Petri Nets and Concurrency (Petri Nets 2014) and of the 14th International Conference on Application of Concurrency to System Design (ACSD 2014). He is founder and Steering Committee chair of the International Conference on Verification and Evaluation of Computer and Communication Systems (VECoS).

He was a Guest Editor for Formal Aspects of Computing Journal (FACJ), Journal of Systems and Software (JSS), ACM Transactions on Embedded Computing Systems (TECS), Innovations in Systems and Software Engineering - A NASA Journal (ISSE), Journal of Discrete Event Systems (DEDS) and referee for several prestigious international Journals on Computer Science and on Automatic Control. Kamel Barkaoui is currently Associate Editor for the International Journal of Critical Computer-Based Systems (IJCCBS), for IEEE/CAA Journal of Automatica Sinica and for Editorial Board Member for ARIMA Journal and Current Chinese Science Journal. He was elected member of the Tunisian Academy of Sciences, Letters and Arts (Beit al Hikma) in 2015 and vice-president of the African Society of Digital Sciences (ASDS) in 2022.

<http://cedric.cnam.fr/lab/author/barkaoui/>

Google Scholar : <https://bit.ly/3zLLKTS>

Title : On the Structure Theory of Petri nets

Abstract: Petri nets are a popular formalism which are especially suitable for modeling and verification of concurrent, asynchronous and non deterministic systems. From early times, the computer science community working on concurrency theory pointed out the importance of structure in Petri nets for a better faithful and understandable modelling. However, the checking of behavioral properties do not take into account the explicit interplay between conflict and synchronisation exhibited on its structure but is rather fully performed on the reachability graph i.e. after recasting the model in terms of labelled transition systems or Kripke structures on which a computation path (as particular run or history of a process) is described as a finite sequence of transitions.

- In this talk, we first give a brief survey on results of structure theory devoted to investigate the relationship between the structure and the behavior of Petri net model.
- We then focus on an approach capable of unifying many existing structural results in a coherent way. This unified strategy also leads to new concepts and new structural analysis techniques applicable to large subclasses of Petri nets, which are more computationally efficient than purely behavioral approaches.
- We shall also touch upon the notion of local persistency (and its structural characterization) which, combined with partial order techniques, can reduce enormously the redundancy inherent to the interleaving semantics which is the main reason of the state explosion problem inherent to model-checking technique.
- Finally, we show the success of practical use of structure theory, in particular, for systems of sequential processes with cooperation and resource sharing.