Keynote: From Models to Efficient Real-Time Software: Automotive Systems and Beyond

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About the keynote speaker

Dr. Marco Di Natale is currently IEEE member and Associate Professor at the Scuola Superiore Sant’Anna of Pisa, Italy, in which he held a position as Director of the Real-Time Systems (ReTiS) Lab from 2003 to 2006. He received his PhD from Scuola Superiore Sant’Anna in 1991 and has been Visiting Researcher at the University of California, Berkeley in 2006 and 2008/09. He has been selected in 2006 by the Italian Ministry of Research as the national representative in the mirror group of the ARTEMIS European Union Technology platform. He's been a researcher in the area of real-time systems and embedded systems for more than 15 years, being author or co-author of more than 100 scientific papers. He has been winner of three best paper awards and the Archie T. Colwell award. Marco Di Natale has served as Program Committee member and has been organizer of tutorials and special sessions for the main conferences in the area, including the Real-time Systems Symposium, the IEEE/ACM Design Automation Conference (DAC), the Design Automation and Test in Europe (DATE) and the Real-Time Application Symposium. He also served as Track Chair for the RTAS conference, and is currently chair of the Transportation track of the DATE Conference. He has been associate editor for the IEEE Transactions on CAD and the IEEE Embedded Systems Letters and is currently in the editorial board of the IEEE Transactions on Industrial Informatics.

Summary:

Automotive systems have been on the forefront in the development of standards for real-time operating systems and in the use of model-based development of software. However, due to the limited amount of distribution and concurrency, the implications in the generation of software implementations of control functions with real-time constraints have been scantily analyzed until now.

Today, the scenario is rapidly evolving while adding further complexity, with the integration of the upcoming AUTOSAR standard for the definition of application-level components and automotive software/hardware architectures.

This talk will outline some of the challenges and possible solutions for the development of modern automotive systems in a model-based flow. Also, most of the problems related to the need of preserving model semantics while offering an efficient (real-time) software implementation are common to other domains, including aeronautics and control automation. The model-based development of complex distributed embedded systems requires a much tighter integration of competencies in controls, formal methods and software architectures and platforms, which will require substantial innovation in the education programs and immediate help from the research community.