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Hesuan Hu (Senior Member, IEEE) received the BS degree in computer engineering and the MS and PhD degrees in electro-mechanical engineering from Xidian University, Xi'an, China, in 2003, 2005, and 2010, respectively. He is currently a full professor with Xidian University. He is a holder of more than 40 issued and filed patents in his fields of expertise. His current research interests include discrete event systems and their supervisory control techniques, Petri nets, automated manufacturing systems, multimedia streaming systems, autonomous vehicles, cyber security, and artificial intelligence. He has more than 170 publications in journals, book chapters, and conference proceedings in the above areas. He was a recipient of many national and international awards, including the Franklin V. Taylor Memorial Award for Outstanding Papers from the IEEE SMC Society, in 2010 and the finalists of the Best Automation Paper from the IEEE ICRA Society, in 2013, 2016, and 2017. He has been an associate editor of the IEEE Control Systems Magazine, IEEE Robotics and Automation Magazine, IEEE Transactions on Automation Science and Engineering, and Journal of Intelligent Manufacturing. He is an IEEE distinguished lecturer.

Title: Robustness Analysis and Implementation in Event-driven Cyber-physical Systems

Abstract:

With the increasing popularity of IoT technology, cyber-physical systems almost cover all essential infrastructure systems, such as intelligent manufacturing systems, smart transportation systems, smart logistics systems, smart grid systems, etc. To simplify the complexity of the problem, such systems are typically described as event driven systems. In practical applications, the essence of ensuring the security of these systems is that they must be able to resist any adverse behavior, such as blocking or vulnerability, in order to achieve their robustness. In previous studies, it was always assumed that resources would not fail, but in actual systems, resource failures occur frequently due to various reasons. Here, a formal approach paradigm is adopted to analyze and implement the robustness of the system, ensuring that it will not stagnate in the event of accidents or failures, that is, processes that do not require failed resources can be free from any blocking, achieving consistent and smooth continual operation. A series of robustness analysis and control strategies were proposed in the study to address various technical challenges faced in achieving system robustness and concurrency. The ultimate goal is to provide not only feasible but also optimal solutions to effectively cope with resource failures.