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S. Nakajima, J.-P. Talpin, M. Toyoshima, H. Yu (Eds.)

Cyber-Physical System Design from an Architecture Analysis Viewpoint

Communications of NII Shonan Meetings

- Provides practitioners and researchers with a comprehensive introduction to the architecture-centric modeling, analysis, and verification of cyber-physical systems (CPS)
- Demonstrates the effectiveness of the technologies with industrial sample cases from the automotive and aerospace sectors
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Providing a wide variety of technologies for ensuring the safety and dependability of cyber-physical systems (CPS), this book offers a comprehensive introduction to the architecture-centric modeling, analysis, and verification of CPS. In particular, it focuses on model driven engineering methods including architecture description languages, virtual prototyping, and formal analysis methods. CPS are based on a new design paradigm intended to enable emerging software-intensive systems. Embedded computers and networks monitor and control the physical processes, usually with the help of feedback loops where physical processes affect computations and vice versa. The principal challenges in system design lie in this constant interaction of software, hardware and physics. Developing reliable CPS has become a critical issue for the industry and society, because many applications such as transportation, power distribution, medical equipment and tele-medicine are dependent on CPS. Safety and security requirements must be ensured by means of powerful validation tools. Satisfying such requirements, including quality of service, implies having formally proven the required properties of the system before it is deployed. The book is concerned with internationally standardized modeling languages such as AADL, SysML, and MARTE.

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