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2. Record Nr.	UNINA9910418353203321
Autore	Taha Walid <1972->
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I: Core Concepts -- 1. What is a Cyber-Physical System? -- 2. Modeling Physical Systems -- 3. Hybrid Systems -- 4. Control Theory -- 5. Modeling Computational Systems -- 6. Coordinate Transformation (Robot Arm) -- Part II: Selected Topics -- 7. Game Theory -- 8. Communications -- 9. Sensing and Actuation -- Part III: Appendix -- A. Acumen Reference Manual -- Index.
Sommario/riassunto	In this concise yet comprehensive Open Access textbook, future inventors are introduced to the key concepts of Cyber-Physical Systems (CPS). Using modeling as a way to develop deeper understanding of the computational and physical components of these systems, one can express new designs in a way that facilitates their simulation, visualization, and analysis. Concepts are introduced in a cross-disciplinary way. Leveraging hybrid (continuous/discrete) systems as a unifying framework and Acumen as a modeling environment, the book bridges the conceptual gap in modeling skills needed for physical systems on the one hand and computational systems on the other. In doing so, the book gives the reader the modeling and design skills they need to build smart, IT-enabled products. Starting with a look at various examples and characteristics of Cyber-Physical Systems, the book progresses to explain how the area brings together several previously distinct ones such as Embedded Systems, Control Theory, and Mechatronics. Featuring a simulation-based project that focuses on a robotics problem (how to design a robot that can play ping-pong) as a useful example of a CPS domain, Cyber-Physical Systems: A Model-Based Approach demonstrates the intimate coupling between cyber and physical components, and how designing robots reveals several non-trivial control problems, significant embedded and real-time computation requirements, and a need to consider issues of communication and preconceptions.