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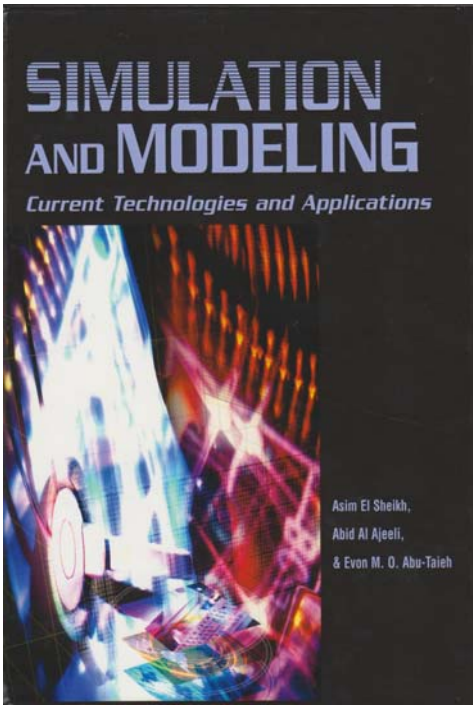
SIMULATION AND MODELING:
CURRENT TECHNOLOGIES AND APPLICATIONS



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The book tackles the current technologies and applications in simulation and modeling (SM) in a systematic, comprehensive manner and combines different methods, views, theories, and applications of simulations into one volume. This book offers insight into the computer science aspect of simulation and modeling while integrating the business practices of SM.

Simulation and Modeling: Current Technologies and Applications presents many based simulation methodologies that may be customized and used in the simulation of a wide variety of problems. The book also presents a model-based approach resulting in simulation architecture that integrates proven design concepts, such as the model-view-controller paradigm, distributed computing, Web-based simulations, cognitive model-based high-fidelity interfaces and object-based modeling methods. Additionally, this book shows how simulation allows the identification of critical variables in the randomized clinical trial by measuring their effects on the simulation model's "behaviour".

This essential publication is for researchers, academics, practitioners, and students in an array of fields including: Multimedia Technology, Biomedical Technology and Informatics, business, manufacturing, and health care.

Chapter I aims to give a comprehensive explanatory platform of simulation background, reviewing simulation definition, forms of models, the need for simulation, simulation approaches and modelling notations. *Chapter II* introduces the basic concepts of distributed simulation applied to real life industrial cases with particular reference to IEEE 1516 High Level Architecture (HLA): one of the de facto standards for distributed simulation. *Chapter III* presents an object –oriented approach for the development of an optical burst switching (OBS) simulator, called OBSim, built in Java. *Chapter IV* illustrates how natural language modelling (NLM), a conceptual modelling language, methodology for requirements determination can be extended to serve as a blueprint for business (or management) simulation by proving an initial model for creating a business simulation. *Chapter V* introduces a suggested system development life cycle "relay race methodology" (RRM). *Chapter VI* provides a new model-based simulation methodology that may be customized and used in the simulation of a wide variety of problems involving multiple source-destination flows with intermediate agent. *Chapter VII* presents a model-based approach that we adopted for investigation of the critical issues in the command and control of remotely operated vehicles (ROVs) through an interactive model-based architecture. *Chapter VIII* reports on the use of simulation in supporting decision-making about what data to collect in a randomized clinical trial (RCT). *Chapter IX* addresses the problem of modelling finished products and their associated subassemblies and/or raw materials. *Chapter X* illustrates the use of mathematical modelling and simulation to discover the reasons for data to behave in certain ways, as it suggests the use of simulation and modelling of knowledge-mining architecture by using

recurrent hybrid nets; particularly in view that hybrid nets combine arithmetic and integrator elements to and from nodes for modelling the complex behaviour of intelligent systems. *Chapter XI* demonstrates development of a novel compromise linear programming having fuzzy resources (CLPFR) model as well as its simulation for a theory-of-constraints (TOC) product mix problem. *Chapter XII* focuses on human-in-the-loop simulation, which ought to be used for design and integration of all car functionality affecting the driver. *Chapter XIII* discusses business process simulation, while illustrating the relationship between business process reengineering (BPR) and change management. *Chapter XIV* introduces virtual reality and augmented reality as a basis for simulation visualization. *Chapter XV* aims to develop artificial mechanisms that can play the role emotion plays in natural life, in order to build agents with the mission to "to bridge life" to several applications, amongst other things: information, transactions, education, tutoring, business, entertainment and e-commerce.

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