

## Preface

The constantly changing landscape of computer engineering makes it challenging for experts and practitioners to stay informed of the field's most up-to-date research. That is why Information Science Reference is pleased to offer this four-volume reference collection that will empower students, researchers, and academicians with a strong understanding of critical issues within computer engineering by providing both broad and detailed perspectives on cutting-edge theories and developments. This reference is designed to act as a single reference source on conceptual, methodological, technical, and managerial issues, as well as provide insight into emerging trends and future opportunities within the discipline.

*Computer Engineering: Concepts, Methodologies, Tools and Applications* is organized into eight distinct sections that provide comprehensive coverage of important topics. The sections are: (1) Fundamental Concepts and Theories, (2) Development and Design Methodologies, (3) Tools and Technologies, (4) Utilization and Application, (5) Organizational and Social Implications, (6) Managerial Impact, (7) Critical Issues, and (8) Emerging Trends. The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, **Fundamental Concepts and Theories**, serves as a foundation for this extensive reference tool by addressing crucial theories essential to the understanding of computer engineering. Introducing the book is “*Human-Computer Interaction and Artificial Intelligence*” by Marcelo Fantinato, Sarajane Marques Peres, Clodis Boscarioli, and Jorge Bidarra, laying the groundwork for the field's fundamental interactions between humans and their technology. In all, the section covers topics including ontologies and controlled vocabulary, Semantic Web and software agents, hybrid intelligent systems, secure design, geospatial technology, blind user interface, and many more. It serves as a great tool for students and practitioners looking to get an understanding of the current basics within the field of computer engineering.

Section 2, **Development and Design Methodologies**, presents in-depth coverage of the conceptual design and architecture of computer engineering, focusing on aspects including architecture-centered integrated verification, ontology-based software component aggregation, tool-support for software development processes, and service composition based software solution design, to name a few. Chapters are presented in the forms of case studies, architectures, and frameworks for putting together techniques to deter and protect against computer engineering. Chapters vary in terms of technical and topical scope, with chapter authors from around the globe, such as “*Semidefinite Programming-Based Method for Implementing Linear Fitting to Interval-Valued Data*” by Minghuang Li and Fusheng Yu and “*Parallel Programming and Its Architectures Based on Data Access Separated Algorithm Kernels*” by Dake Liu, Joar Sohl, and Jian Wang. The section concludes with “*Optimal Crashing and Buffering of Stochastic Serial Projects*” by Dan Trietsch.

Section 3, **Tools and Technologies**, presents extensive coverage of the various tools and technologies used in the development and implementation of computer engineering. The first chapter, “*Assembling of Parallel Programs for Large Scale Numerical Modeling*” by V.E. Malyskin surveys the field and gives the latest technological breakthroughs and developments. Where the first two sections laid out planning and fundamentals of computer engineering, section 3 includes chapters that detail the technical aspects of the current technological state of the art. Topics include natural language processing techniques in requirements engineering, applications of visual algorithm simulation, semi-e-preinvex functions, and many more. Section 3 concludes with “*Analysis of Human Emotions Using Galvanic Skin Response and Finger Tip Temperature*” by G. Shivakumar and P. A. Vijaya, a nice transition into the broad category of applications detailed in the next section.

Section 4, **Utilization and Application**, describes how computer engineering has been utilized and offers insight on and important lessons for its applications and effects. Section four includes the widest range of chapters because it describes case studies, research, methodologies, frameworks, architectures, theory, analysis, and guides for implementation. Topics range from piece-mold-machine manufacturing planning, context-aware pervasive services for smart cities, and programming interfaces for realtime and cloud-based computing, to name a few. The section opens with “*Case Study – ‘Can You See Me?’*” by Mike DiPardo and Anne DiPardo, detailing how geographically dispersed software developers employ writing in the process of creating and troubleshooting products for use in the healthcare industry. Section 4 continues with topics such as bike transportation system design, an adventure game learning platform, and robotics. The section concludes with “*Medical Outcome Prediction for Intensive Care Unit Patients*” by Simone A. Ludwig, Stefanie Roos, Monique Frize and Nicole Yu.

Section 5, **Organizational and Social Implications**, includes chapters discussing the organizational and social impact of computer engineering. The section opens with “*Multicultural Software Development*” by Heli Aramo-Immonen, Hannu Jaakkola, and Harri Keto. Managers and academics alike will find troubleshooting technologies and tools for addressing their information technology needs. Other selected chapters within the section include “*Review of Kansei Research in Japan*” by Seiji Inokuchi and “*Open Source – Collaborative Innovation*” by Avi Messica. It concludes with “*VPRS-Based Group Decision-Making for Risk Response in Petroleum Investment*” by Shouyang Wang, Wuyi Yue and Gang Xie detailing a decision support system linking a geographic-information-systems-based simulation of basin-scale water quality with a linear programming decision model for improving water resources management.

Section 6, **Managerial Impact**, presents focused coverage of computer engineering as it relates to effective uses of resource allocation, forecasting, modeling, supply chain management, human resource management, and much more. When a business’ success depends on computer engineering, it is the duty of the management to understand what they should be doing to help their employees and manage the information in their company. The section opens with “*Deliberate Leadership*” by Kristen Lamoreaux and Dibi Varghese. It continues with topics including best practices guidelines for agile requirements engineering practices, application management, and performance enhancing techniques, to name a few. Section 6 concludes with “*Activity Driven Budgeting of Software Projects*” by Alexander Baumeister and Markus Ilg, a look into a new activity based approach that is based on business specific cost data that can be easily integrated into existing management accounting systems.

Section 7, **Critical Issues**, presents coverage of academic and research perspectives on computer engineering tools and applications. The section begins with an expository chapter, “*Towards a Wider Application of the Systems Approach in Information Systems and Software Engineering*” by Doncho

Petkov, Denis Edgar-Nevill, Raymond Madachy, and Rory O'Connor. This chapter opens the section by providing possible directions for the wider application of the systems approach to information systems development. Section 7 has many chapters like this, detailing theory and analysis more so than technologies or management strategy. Critical issues include why virtual worlds are important, playing as producing, and law, to name a few. Other highlights in section 7 include “*Knowledge, Truth, and Values in Computer Science*” by Timothy Colburn and Gary Shute, and “*Bridging the 15 Million Person Mentoring Gap*” by Caroline Kim Oh and Theresa Stroisch. Section 7 concludes with “*Shifting Legitimation along Information Infrastructures Growth*” by Gianluca Miscione, a fascinating look at the institutional dimension of scaling of information systems through the interplay of globally distributed software development with organizational processes.

Section 8, **Emerging Trends**, highlights areas for future research within the field of computer engineering, opening with “*Women in Brazilian CS Research Community*” by Mirella M. Moro, Taisy Weber, and Carla M.D.S. Freitas. Section 8 offers the cutting edge within the field, and suggestions for the future research directions in computer engineering. The final two chapters of the book include the latest research in technology and implementation of computer engineering: “*Abstractions and Middleware for Petascale Computing and Beyond*” by Ivo F. Sbalzarini, and “*Computing Gamma Calculus on Computer Cluster*” by Hong Lin, Jeremy Kemp, and Padraic Gilbert.

Although the primary organization of the contents in this multi-volume work is based on its eight sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume. Furthermore to ensure that the scholar, researcher, and educator have access to the entire contents of this multi volume set as well as additional coverage that could not be included in the print version of this publication, the publisher will provide unlimited multi-user electronic access to the online aggregated database of this collection for the life of the edition, free of charge when a library purchases a print copy. This aggregated database provides far more contents than what can be included in the print version, in addition to continual updates. This unlimited access, coupled with the continuous updates to the database ensures that the most current research is accessible to knowledge seekers.

As a comprehensive collection of research on the latest findings related to using technology to providing various services, *Computer Engineering: Concepts, Methodologies, Tools and Applications*, provides researchers, administrators and all audiences with a complete understanding of the development of applications and concepts in computer engineering. Given the vast number of issues concerning usage, failure, success, policies, strategies, and applications of computer engineering in organizations, *Computer Engineering: Concepts, Methodologies, Tools and Applications* addresses the demand for a resource that encompasses the most pertinent research in technologies being employed to globally bolster the knowledge and applications of computer engineering.