


**S. Mangairkarasi, D. Jerusha, A. Muthulakshmi**

# Software Robot Design

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|---|---|
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## Product Description

In a world where robotics is advancing at an unprecedented pace, driven by advancements in artificial intelligence and machine learning, a strong grasp of the foundational tools is essential. SOFTWARE ROBOT DESIGN serves as a comprehensive and indispensable guide to the Robot Operating System (ROS), the versatile, open-source framework that has revolutionized the way intelligent and autonomous robots are designed, programmed, and deployed.

Authored by esteemed scholars—Dr. D. Jerusha, Dr. A. Muthulakshmi, and Dr. S. Mangairkarasi—this book equips readers with the practical and theoretical knowledge necessary to develop robust robotic systems, expertly bridging the gap between theoretical concepts and hands-on implementation. The book adopts a structured approach, meticulously covering the journey from setting up the essential Ubuntu/Linux environment and ROS basics to tackling complex subjects like sensor integration (LIDAR, cameras, IMUs), programming robotic actuators (motors, joints), and performing simulation in Gazebo.

Crucially, it delves into ROS Navigation, providing detailed instruction on robot localization using AMCL, map handling, and path planning using the move_base stack. Designed to be a valuable resource, this text is essential for students aspiring to enter the field, researchers exploring advanced applications, and industry professionals seeking to implement complex ROS-based solutions. The inclusion of practical examples, code snippets in C++ and Python, and dedicated chapters on interfacing ROS with embedded boards like Arduino and Raspberry Pi, ensures the knowledge is academically rigorous and directly aligned with industry demands.

Salient Features:

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• ROS Core Architecture: Provides in-depth coverage of fundamental ROS concepts, including Nodes, Topics, Services, and Messages, to establish a solid, modular foundation for distributed robot software development.

• Sensor-Actuator Programming: Offers practical guidance on interfacing and programming essential robotic sensors (LIDAR, IMU) and actuators (motors, joints), enabling precise control over a robot's perception and physical interaction.

• Real-World Navigation: Details the complete ROS Navigation Stack, including global and local path planning, AMCL localization, and costmap configuration for autonomous, obstacle-avoiding movement.

• Practical Coding Examples: Utilizes C++ and Python, the primary languages in robotics, to provide extensive code snippets and exercises, bridging theoretical understanding with hands-on development of ROS packages and nodes.

• Embedded System Interfacing: Includes dedicated chapters on integrating ROS with Arduino and Raspberry Pi, allowing developers to extend the framework to low-level hardware control and cost-effective robotic platforms.

• Simulation and Modeling: Teaches readers how to create robot models using the Unified Robot Description Format (URDF) and how to test and visualize their systems using Gazebo and RViz.

• Linux Environment Setup: Begins with a comprehensive review of Ubuntu Linux and essential Shell Commands, ensuring readers are proficient in the core operating environment required for all ROS development.

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## Table Of Contents


- Programming the Robots Sensors and ROS
- ROS Fundamentals
- ROS Programming
- Robotics Projects Using ROS
- ROS Navigation


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# Programming in Python

| | |
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## Product Description

This comprehensive textbook, The Complete Guide to Programming in Python, is a foundational resource designed to transform absolute beginners into proficient Python developers. The core theme of the book is simplicity meets versatility: Python's global popularity is rooted in its highly readable syntax and its powerful application across diverse fields like web development, data science, and automation.

The book's primary purpose is to deliver a systematic, hands-on learning experience. It begins by establishing the fundamentals—such as the easy-to-understand syntax, diverse expression types, and key data structures like Numeric, Sequence (Lists, Tuples), and Mapping (Dictionaries)—before seamlessly progressing to advanced topics. Readers will master essential control flow techniques, including conditional statements (if/elif/else, match-case) and iterative loops (for/while), and learn to structure complex code using Object-Oriented Programming (OOP) principles (Inheritance, Polymorphism). The practical value is reinforced by specialized units on handling errors through robust exception handling, interacting with the PyMongo database, and building visually appealing applications using Tkinter. The target audience includes students in computer science, newcomers to programming, and professionals from any domain who require a solid, application-focused grounding in one of the world's most demanded programming languages.

Salient Features:

• Foundational Syntax Mastery: An ideal starting point covering all of Python's core features, from its easy-to-understand syntax and diverse expression types (Arithmetic, Logical) to detailed rules for operator precedence.

• Comprehensive Data Structures: A dedicated section that thoroughly explores all built-in data types: Numeric (int, float), Sequence (list, tuple, string), Mapping (dict), and Set

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types, complete with practical code implementations.

• Control Flow and Logic: Offers full coverage of flow control mechanisms, from basic if-else and nested conditions to the modern match-case statement, ensuring the ability to write robust program logic.

• Essential Built-in Functions: Provides an extensive, tabulated reference of over 50 vital built-in functions, each accompanied by practical code snippets demonstrating its correct usage and return value.

• OOP Principles Explained: Delivers clear, practical instruction on Object-Oriented Programming, covering Inheritance, Polymorphism (Overriding, Overloading), and Data Abstraction using Python-specific examples.

• Ecosystem and Libraries: Introduces the vast Python ecosystem, detailing how to create and use custom modules and presenting key external libraries like NumPy and Pandas for data manipulation.

• GUI Application Development: Step-by-step guidance on creating rich Graphical User Interfaces (GUIs) using the standard Tkinter library, thoroughly covering layout managers and all essential widgets.

• Practical Database Integration: Hands-on instruction for connecting to and performing full CRUD (Create, Read, Update, Delete) operations on a NoSQL database, specifically using the PyMongo library for MongoDB.

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## Table Of Contents


- Introduction to python
- Operating on File
- GUI Programming
- Database and Networks


## Author


**K. Abinaya**

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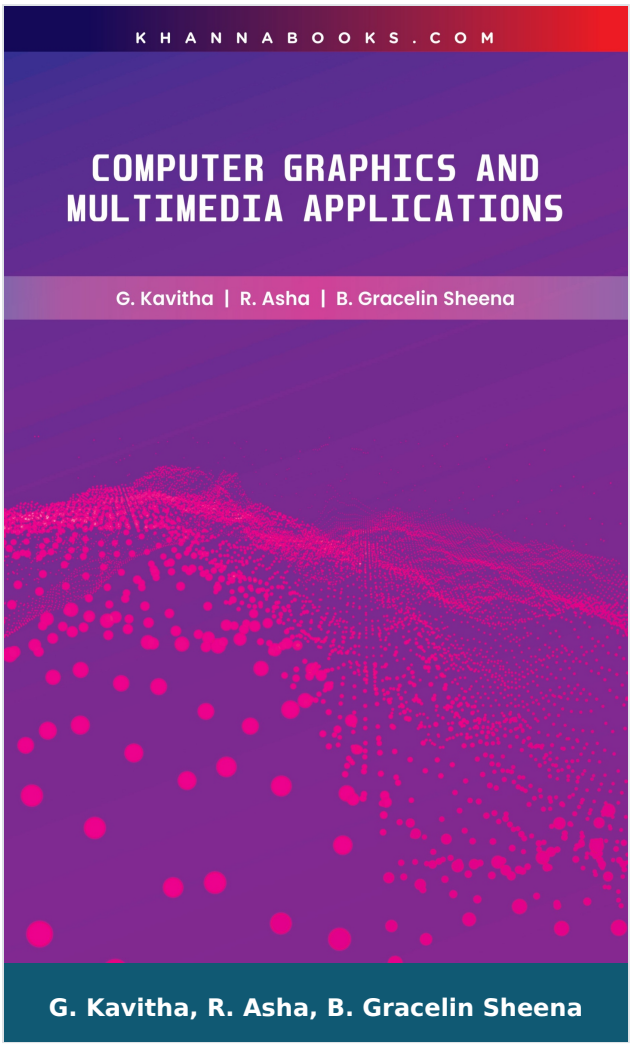

**Saraswathi**

Saraswathi Devi for given me the support and encouraging me to achieve goals successfully. I co-authored books on "Computer Fundamentals", Data Science with Machine Learning using R. Dr. K. L. Vasundhara, HOD & Assoc. Professor, Dept. of Mathematics, Thank my Mentor Prof. M. V. Ramana Murthy (Former Head and BOS Chairman, Dept. of Mathematics and Computer Science, OU, Hyderabad) for his guidance, time, ideas and help. I am greatly indebted to Sri Krishna Rao (Correspondent, Stanley College of Engineering and Technology for Women, Hyderabad) for his support. It is imperative on my behalf to remember my behold Mother Late Smt. K. Varalakshmi and my Father-in-Law Late Sri. Yerasuri Gopala Krishna Murthy for their divine blessings. Recipient of "UTTAMA ADYAPIKA AWARD" 2022, " JYSTA ACH ARNA AWARD" 2024 and authored 16 papers in various National & International Journals, Co- authored books on " Engineering Mathematics-IV", "Data Science with Machine Learning using R". AICTE nominated expert for Data Analytics and having 6 Patents. Prf.


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# Computer Graphics And Multimedia Applications

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| **Author :** | G. Kavitha, R. Asha, B. Gracelin Sheena |
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## Product Description

### Computer Graphics And Multimedia Applications

This comprehensive textbook, Computer Graphics and Multimedia Applications, serves as an essential guide to the theoretical foundations and practical implementations of modern digital visualization and interactive media. Designed to bridge the gap between abstract computer science concepts and tangible real-world applications, the book offers a deep dive into the architecture of graphics systems, from the evolution of display devices—including Cathode Ray Tubes (CRT), Raster Scan, and contemporary Flat Panel Displays like LCD and Plasma—to the mathematical precision required for rendering.

The core theme revolves around mastering the generation and manipulation of visual data, covering crucial Output Primitives like line and circle drawing, with a meticulous comparison of efficient rasterization techniques such as the DDA and Bresenham's algorithms. Beyond 2D, the text meticulously explores advanced three-dimensional concepts, including various projection methods, detailed illumination and shading models (Lambertian, Phong), and sophisticated techniques for visible surface detection and texture mapping.

Crucially, the book seamlessly integrates these graphics principles with an in-depth exploration of Multimedia Applications, detailing core components, compression standards like JPEG and MPEG, audio/video processing, and animation techniques such as tweening and cel animation. This makes it an invaluable resource for undergraduate and postgraduate students in computer science and engineering, as well as professionals and researchers seeking to build foundational and practical expertise in digital design, interactive systems, and digital media development.

### Salient Features

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- **Optimized Drawing Algorithms**: Features a comparative analysis of the DDA and Bresenham’s algorithms, emphasizing the use of simple integer arithmetic for high-speed, accurate line and circle rasterization.
- **Display Device Technology**: Explores the mechanics and history of graphical output, covering Cathode Ray Tube (CRT) operation, Refresh CRTs, and modern Flat Panel Displays including Plasma and LCD.
- **Core 3D Visualization**: Provides an in-depth look at three-dimensional concepts such as Parallel and Perspective Projection, equipping the reader with knowledge to transform 3D scenes onto a 2D view plane.
- **Advanced Shading Models**: Detailed sections on rendering realism through illumination, covering techniques like Lambertian and Phong shading, and methods for generating realistic shadow effects on surfaces.
- **Multimedia Compression Standards**: Dedicated unit on digital media technology explaining crucial compression techniques like JPEG and MPEG, including their underlying Discrete Cosine Transform (DCT) and motion-compensation logic.
- **Graphics System Architecture**: Comprehensive overview of the components of a typical graphics system, detailing various input devices (e.g., mouse, trackball, digitizer) and hard-copy devices (printers, plotters).
- **Practical Animation Techniques**: Covers the core principles of creating motion, outlining the process of tweening (in-betweening) to generate fluid animation frames, alongside Cel Animation methods.

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## Table Of Contents


- Basics of Computer Graphics
- 2D Transformations and Viewing
- 3D Concepts and Fractal Geometry
- Visible Surface Detection Methods
- Introduction to Multimedia


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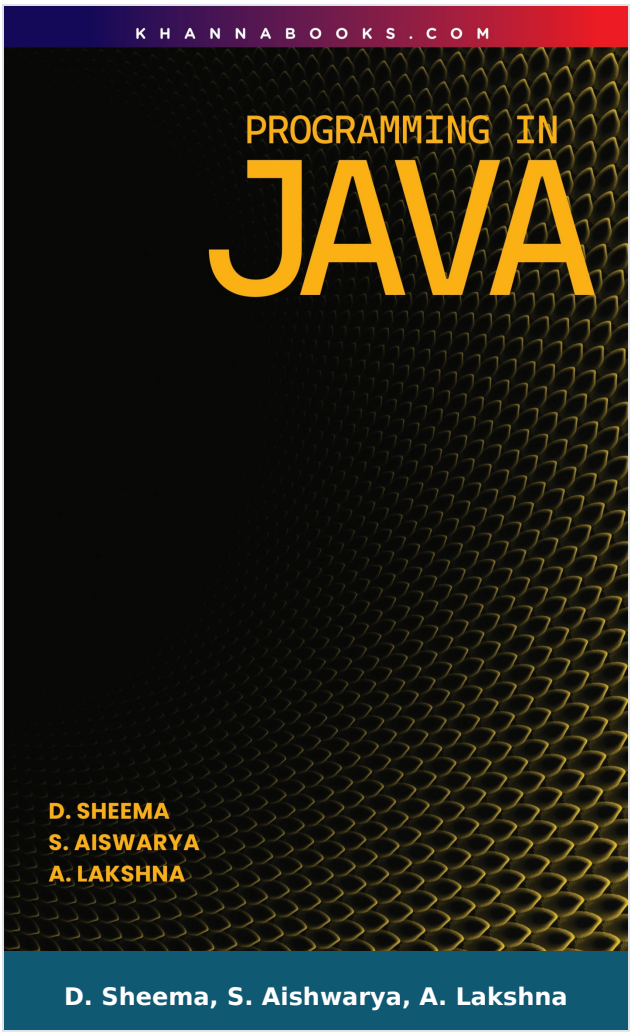
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# Programming in Java

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## Product Description

This book is your complete resource for learning Programming in Java. Designed for both students and aspiring developers, it offers a robust and comprehensive path to mastering the Java language. You will start by building a strong foundation in Java basics, including the concepts of the Java Virtual Machine (JVM) and bytecode that enable its famous platform independence. The book then systematically covers the core principles of Object-Oriented Programming (OOP), such as inheritance, polymorphism, and encapsulation. By progressing to advanced topics like exception handling, I/O programming, Collections, and database connectivity (JDBC), you will gain the skills necessary to develop secure, high-performance applications.

Salient Features:

• Foundation to Advanced: Provides a clear, step-by-step learning curve, covering all topics from Java basics, data types, and tokens to enterprise technologies like JDBC, Servlets, and JSP.

• Write Once, Run Anywhere: Detailed explanation of the Java Virtual Machine (JVM) and Bytecode, highlighting the language's key feature of platform independence (WORA).

• Object-Oriented Mastery: In-depth coverage of OOP concepts including Classes, Objects, Inheritance, Method Overloading, and Method Overriding, with clear code examples.

• Focus on Robustness and Security: Emphasis on Java's built-in features for early error checking, runtime safety, and security mechanisms to protect applications.

• Practical Learning: Includes real-world examples and step-by-step instructions for setting up the Java Development Kit (JDK) and compiling and running your first programs.

• Key Programming Constructs: Thorough discussions on essential structures like Java Tokens, Access Modifiers, Operators, Control Flow Statements, and Exception Handling for writing efficient code.

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## Table Of Contents


- Java Basics
- Object Oriented Programming
- Packages, Interfaces and Threads
- File Streams and Collections Framework
- GUI Programming, Database Connectivity, Server-Side Programming


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**A. Deepa, M.P. Vaishnnave, S. Bangaru Kamatchi**

# Artificial Intelligence

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## Product Description

Artificial Intelligence serves as a comprehensive and structured guide to the fundamental principles, techniques, and transformative real-world applications of AI. Recognizing AI as one of the 21st century's most essential technologies, this book is an invaluable resource for mastering the concepts required to understand and develop intelligent systems. It is meticulously designed to guide readers from foundational concepts, such as the history of AI and the nature of intelligent agents, through increasingly sophisticated methodologies.

The core themes delve into problem-solving paradigms, including uninformed and informed search strategies like A* search, Hill Climbing, and Genetic Algorithms, alongside the critical aspects of optimal decision-making in competitive environments using techniques like Alpha-Beta Pruning. A significant portion is dedicated to Knowledge Representation and Reasoning, exploring formal logic (Propositional and First-Order), Ontological Engineering, and the mechanisms of logical inference like Forward and Backward Chaining. Furthermore, the text addresses acting logically in uncertain, real-world settings by utilizing Bayesian networks and decision theory to ensure rational planning.

By integrating theoretical foundations with practical implementation examples, this book is an essential resource for students, educators, researchers, and professionals seeking to bridge the gap between academic knowledge and the creation of intelligent systems capable of solving complex, real-world challenges.

Salient Features

• Search & Problem Solving: Details a full spectrum of search algorithms, including uninformed (BFS, DFS) and advanced heuristic strategies like A* search, Hill Climbing, and Simulated Annealing.

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• Game Theory Insights: Covers optimal decision-making strategies in adversarial environments, featuring comprehensive coverage of Minimax search and efficiency enhancement via Alpha-Beta Pruning.

• Logical Reasoning: Presents a deep dive into Knowledge Representation using First-Order Logic, Situation Calculus, and practical inference mechanisms like Forward and Backward Chaining.

• Uncertainty Handling: Explains Probabilistic Reasoning and Decision-Making in non-deterministic environments, focusing on the application of Bayes's rules and the semantics of Belief Networks.

• Planning Methodologies: Explores agent planning techniques from state-space search to Partial Order Planning (POP), offering methods for both theoretical plan representation and real-world action execution.

• Practical Learning:Promotes a holistic learning experience by blending theoretical depth with practical implementation through problem-solving exercises and complex real-world examples in each unit.

• AI Applications: Dedicates an entire unit to transformative applications like Natural Language Processing (NLP), Machine Translation, Information Retrieval, and core Robotics concepts.

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## Table Of Contents


- Introduction and Problems Solving
- Informed Search and Game Playing
- Knowledge and Reasoning
- Acting Logically
- AI Applications


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# Object Oriented Analysis and System Engineering

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## Product Description

OBJECT ORIENTED ANALYSIS AND SYSTEM ENGINEERING serves as a foundational and comprehensive guide to Object-Oriented System Development (OOSD), a cornerstone of modern software engineering. In today's rapidly evolving technological landscape, the book addresses the critical need for robust, scalable, and maintainable software solutions by providing a structured methodology for building complex, reusable, and efficient systems.

The book delivers the fundamental concepts of object-oriented thinking, commencing with an in-depth exploration of object basics, including objects, classes, inheritance, polymorphism, and encapsulation. It systematically covers the entire Object-Oriented System Development Life Cycle (OOSDLC), offering a holistic view from initial requirements Analysis to Design and final Software Quality Assurance.

The practical value of this text lies in its detailed coverage of object-oriented methodologies—such as Rumbaugh's OMT, Booch, and Jacobson's methods—and the standard Unified Modeling Language (UML) for modeling, design, and documentation. Furthermore, it emphasizes the importance of a use-case driven approach for requirements identification and the application of reusability and component-based development for producing high-quality software. This essential reference is explicitly designed for a wide audience, including students, academicians, researchers, developers, industry professionals, and technology enthusiasts who are seeking to develop a strong background in object-oriented system development and leverage its power for creating innovative solutions.

Salient Features:

• Core OOSD Concepts: Introduces foundational OOSD principles, including encapsulation, inheritance, polymorphism, and object-message communication, establishing a solid base

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for advanced object-oriented programming.

• Unified Methodologies: Details seminal O-O approaches like Rumbaugh's OMT, Booch, and Jacobson's methodologies, emphasizing their unification via the Unified Approach to standardize the software development process.

• UML and Modeling: Explores the Unified Modeling Language (UML) as the industry standard, detailing its static, dynamic, and use-case diagrams to accurately model complex system structures and behaviors.

• Use-Case Driven Analysis: Teaches practical object identification using a problem-driven approach, employing use-case modeling and classification techniques to clearly define system requirements from the user's perspective.

• Design Axioms & Layers: Explains Object-Oriented Design (OOD) with key axioms and corollaries, detailing the design of the Access (persistence/databases) and View (user interface) layers of the system.

• Object Persistence: Provides an in-depth look at managing data persistence using Object-Oriented Database Management Systems (OODBMS) and Object-Relational Database Management Systems (ORDBMS) for complex data handling.

• Software Quality Assurance: Focuses on the impact of object orientation on testing, covering the development of comprehensive test cases, test plans, and measuring system usability and user satisfaction.

• Reusability Focus: Stresses the critical benefit of reusability, providing strategies and guidance for maximizing component-based development to accelerate project timelines and ensure robust, maintainable code.

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## Table Of Contents


- An Overview of Object Oriented System Development
- Object Oriented Methodologies
- Object Oriented Analysis
- Object Oriented Design
- Software Quality


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Kamatchi K. S., Sundaravelrani

# Open Source Software


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## Product Description

### Open Source Software

Open-Source Software (OSS) has fundamentally transformed the modern technological landscape, becoming the backbone of computing by driving innovation, collaboration, and democratizing access to powerful tools.

Open Source Software is a comprehensive guide designed to equip both seasoned developers and newcomers with the theoretical and practical knowledge needed to thrive in the open-source ecosystem. The book starts with an in-depth exploration of the legal landscape, clarifying complex topics such as copyright, patents, and licensing (including GPL, MIT, and Apache) to ensure legal compliance in open-source projects.

The technical journey delves into the foundational tools, including the indispensable GNU/Linux operating system and its core utilities, compilers, and linkers. It masters open-source programming techniques such as version control (Git), code reviews, and effective development toolchains. Ultimately, this text empowers you to contribute to and leverage OSS systems, transforming you from a user into a vital participant in the global open collaboration movement.

**Salient Features:**

- **Legal and Licensing Mastery**: Comprehensive coverage of Intellectual Property (IP) Rights and the core concepts of Free Software (the four freedoms). Detailed analysis of copyleft licenses (GPL, AGPL) versus permissive licenses (MIT, Apache, BSD).
- **GNU/Linux System Essentials**: Installation and configuration of GNU/Linux distributions, including mastering basic shell commands for file/directory management.

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- **Server Configuration**: Practical instruction on setting up and managing open-source Email (Postfix), Web (Apache), File (NFS), and Proxy Services.
- **Programming and Debugging Tools**: Deep understanding of GNU LIBC Libraries, Compilers, and Linkers, along with powerful tools for Memory Debugging/Profiling (Mpatrol and Valgrind).
- **Scripting and Automation**: Hands-on introduction to Bash, SED, and AWK scripting for system automation and data manipulation.
- **GUI Application Development**: Introduction to cross-platform GUI Programming using open-source frameworks like Qt and GTK+, including techniques for Localization.
- **FOSS Philosophy and Trends**: Examination of the FOSS philosophy and trends, including its global and Indian adoption and potential.

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- Overview Of Free/Open Source Software
- Linux
- Open Source Tools and Technologies for Hardware and E-Mail server
- Understanding GNU LIBC Libraries, compilers and linker
- Open-source Programming Techniques
- Exercise


## Author


**Kamatchi K. S.**

P. Jeyanthi, Sankari M., Kamatchi K. S.

**Sundaravelrani**

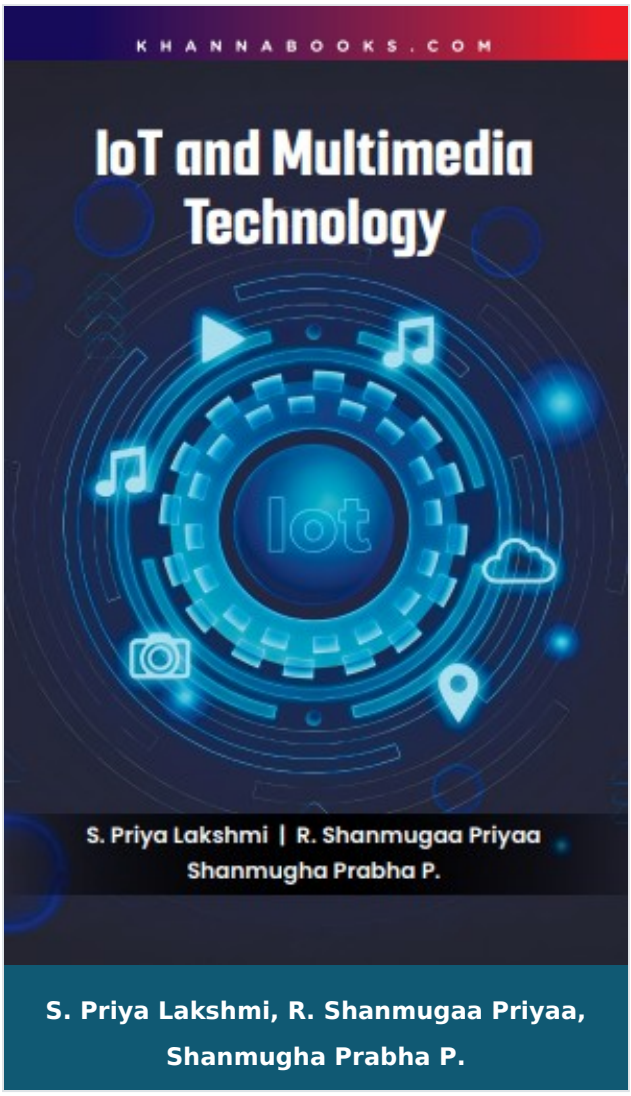
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**S. Priya Lakshmi, R. Shanmugaa Priyaa, Shanmugha Prabha P.**

# IOT and Multimedia Technology

| | |
|---|---|
| **Author :** | S. Priya Lakshmi, R. Shanmugaa Priyaa, Shanmugha Prabha P. |
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## Product Description

### IOT and Multimedia Technology

The book IOT AND MULTIMEDIA TECHNOLOGY serves as a comprehensive and essential guide to the transformative convergence of the Internet of Things (IoT) and Multimedia Big Data (MMBD) Computing. This powerful synergy is fundamentally reshaping the digital landscape, enabling intelligent data processing, real-time analytics, and innovative applications across critical sectors such as healthcare, smart cities, and industrial automation.

The primary purpose of this text is to provide a profound understanding of the interconnected evolution and far-reaching impact of these technologies by examining both fundamental principles and state-of-the-art solutions. A core theme addresses the critical challenge of effectively managing the massive volume and velocity of multimedia data while ensuring minimal energy expenditure in resource-constrained IoT devices. Readers will delve into complex technical areas, including the architectural foundations for real-time data stream monitoring, advanced transport protocols, and the deployment of guaranteed Quality of Service (QoS) models like DiffServ and IntServ. The book maintains a structured, academic approach that skillfully balances theory with practical application, featuring numerous case studies from military surveillance to precision agriculture.

This resource is an indispensable tool for a broad target audience, including students and academics seeking advanced knowledge, technology enthusiasts, and industry professionals or researchers looking to master the multidisciplinary approaches required to navigate and contribute meaningfully to this rapidly advancing field.

**Salient Features:**

- **Deep Learning Analytics**: Explores Deep Learning models like CNNs and RNNs, demonstrating their efficacy for Multimedia Big Data analysis, pattern recognition, and anomaly detection in vast IoT data streams.
- **Network QoS Models**: Detailed coverage of Guaranteed Service Models such as DiffServ and IntServ, alongside QoS-aware routing and queuing techniques, crucial for reliable multimedia delivery.
- **Energy-Efficient Design**: Addresses the critical challenge of Energy Conservation in multimedia IoT, presenting solutions like energy-efficient protocols, cross-layer optimization, and energy harvesting technologies for resource-constrained devices.
- **Multimedia Transport**: In-depth analysis of transport protocols (TCP and UDP) for interactive and non-interactive applications, including techniques for jitter removal and transcoding considerations in streaming.
- **Embedded Network Evolution**: Traces the development of the Embedded Internet through WSNs, M2M Communications, and the innovative architecture of Information-Centric Networking (ICN).
- **Key Protocol Standards**: Focuses on essential hardware and session control protocols that form the backbone of advanced systems, including H.322, SIP, MGCP, RTSP, and RTP/RTCP.
- **Real-World Case Studies**: Features practical applications in Precision Agriculture, Military Surveillance, Smart Cities, and Video Conferencing, highlighting the limitless frontiers of multimedia big data in IoT.

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- Multimedia Transport
- Evolution Embedded Internet
- Application Environment


## Author


**S. Priya Lakshmi**

R. Shanmugaa Priyaa, S. Priya Lakshmi, Shanmugha Prabha P.

**R. Shanmugaa Priyaa**

R. Shanmugaa Priyaa,

**Shanmugha Prabha P.**

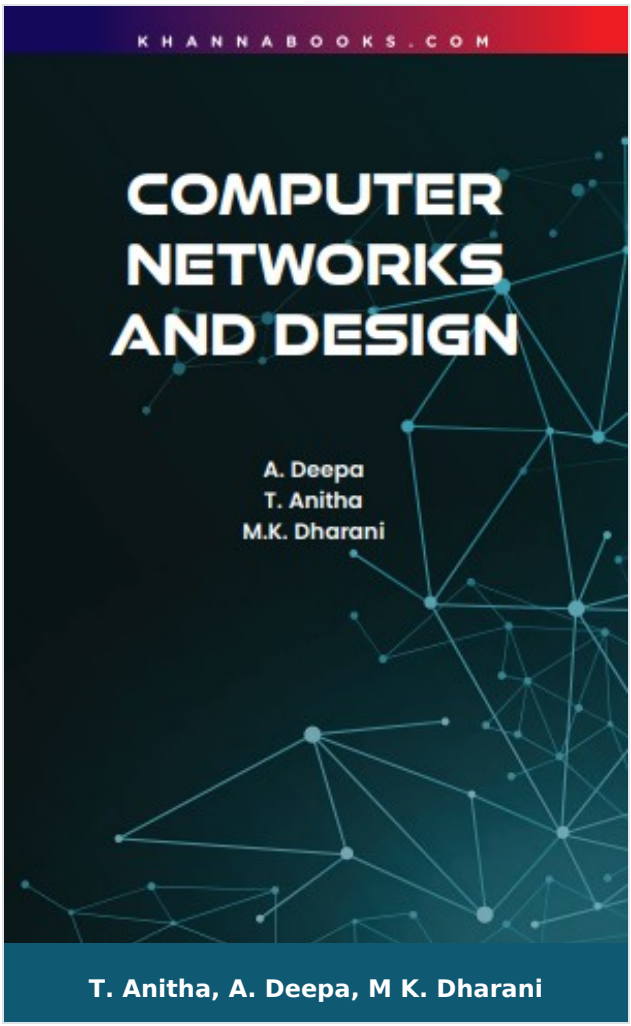
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T. Anitha, A. Deepa, M K. Dharani

# Computer Networks and Design

| | |
|---|---|
| **Author :** | T. Anitha, A. Deepa, M K. Dharani |
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## Product Description

**Computer Networks and Design**

In the current era, where network infrastructure is the fundamental backbone of modern enterprises, this book serves as a comprehensive and practical guide to understanding the principles of effective computer network design and implementation. It addresses the ever-increasing need for well-designed, secure, and highly efficient network architectures across businesses of all sizes.

The core theme of the book is a structured, top-down approach to mastering the entire network lifecycle, moving from determining requirements and analyzing existing infrastructure to completing the final design, deployment, and long-term maintenance. It provides detailed coverage of fundamental design methodologies, including modular and hierarchical network design strategies that ensure scalability and efficiency. Beyond foundational concepts like LAN connectivity (Ethernet, Token-Ring) and the OSI model, the text delves into critical modern topics such as Virtual Private Networks (VPNs), Intranets, and Extranets for secure remote communication.

This resource is an ideal tool for a target audience including students of computer science and engineering, network professionals, and IT managers seeking to enhance their expertise in building and managing robust network infrastructures effectively. By bridging theoretical concepts with practical insights on networking tools (simulation, baselining) and evolving technologies (IP PBX, FoIP, xDSL), the book equips readers with the essential skills to design and optimize future-proof, high-performance network solutions.

**Salient Features:**

- **Modular Design Focus**: Details modular and hierarchical network design methodologies to improve scalability, management, and fault tolerance across complex LAN and WAN environments.

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- L**AN to Mainframe**: Covers underlying LAN concepts like Ethernet and InterLAN Switching, and provides specialized guidance on secure connectivity and integration with legacy Mainframe systems.
- **Virtual Security Architectures**: Dedicated unit on VPNs, Intranets, and Extranets, focusing on planning, management, and secure remote access implementation using technologies like IPSec VPNs.
- **Network Optimization Tools**: Introduces practical tools and techniques for network analysis, including network baselining as an effective planning tool and simulation methods for designing multimedia networks.
- **Real-time Communication**: Explores the integration of Voice over IP (VoIP) and Video over IP networks, detailing the setup of IP PBX telephony and Videoconferencing systems over IP networks.
- **Broadband Access Technologies**: Discusses emerging technologies in data communications, including the merits of xDSL technology and necessary preparations for utilizing high-speed cable modems.
- **Layered Design Analysis:** Provides a foundational review of the OSI model and various network topologies (Bus, Star, Mesh), offering a strong theoretical background for practical design decisions.

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- Fundamentals of Network Design
- Underlying LAN Concepts
- VPNs, Intranets and Extranets
- Networking Tools and Simulation
- Evolving Technologies


## Author


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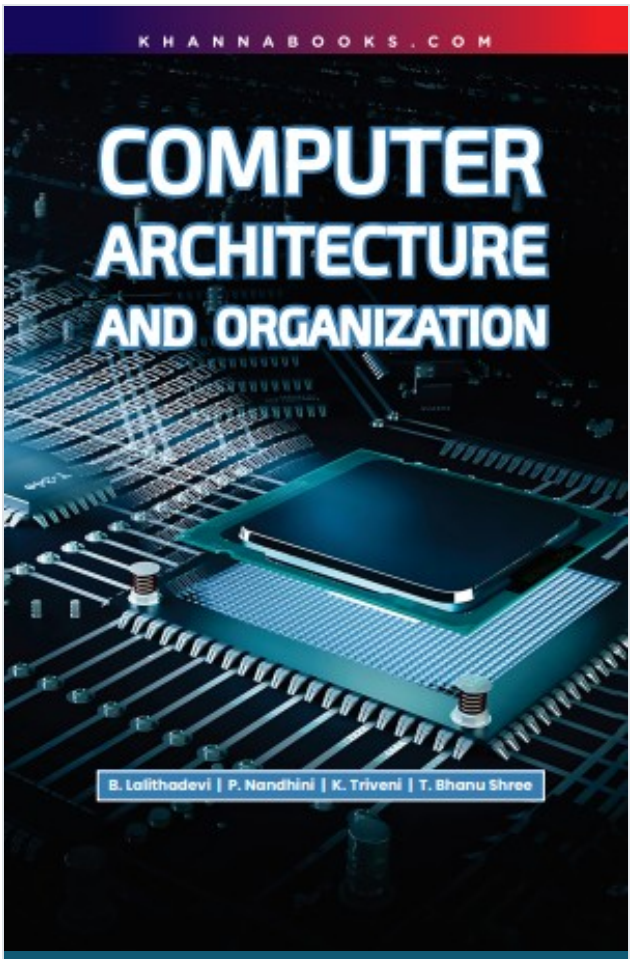
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**B. Lalithadevi, P. Nandhini, K. Triveni, T. Bhanu Shree**

# Computer Architecture and Organization

| | |
|---|---|
| **Author :** | B. Lalithadevi, P. Nandhini, K. Triveni, T. Bhanu Shree |
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## Product Description

**Computer Architecture and Organization**

This book, "COMPUTER ARCHITECTURE AND ORGANIZATION," offers a comprehensive and structured exploration of the fundamental principles that govern the operation and design of modern computing systems. As technology continues its rapid advance across fields like artificial intelligence, healthcare, and communication, understanding the internal workings of a computer is crucial for creating high-performance and efficient architectures.

Designed specifically for students and professionals in computing technology, this text effectively balances theoretical concepts with practical applications to prepare readers for advanced studies and successful careers. The journey begins with the essential building blocks, detailing general register organization, instruction cycles, and the vital stack organization that facilitates efficient data manipulation and function calls.

The content systematically progresses through the core components, providing a clear explanation of the Arithmetic Logic Unit (ALU), including complex operations like Booth multiplication and floating-point arithmetic. Crucially, the book dedicates significant coverage to memory organization, exploring the essential memory hierarchy, cache memory (including mapping and replacement policies), and virtual memory implementation. Finally, it addresses contemporary system design challenges by covering Input-Output (I/O) mechanisms such as Direct Memory Access (DMA), and the complexities of modern multiprocessor systems, including interconnection structures and advanced cache coherence protocols. With its clear explanations and structured approach, this book serves as an indispensable resource for mastering the architecture and organization that powers the digital world.

**Salient Features:**

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- **General Register Organization**: Deep dive into how CPU registers (PC, AC, DR, IR) and the Last-In, First-Out (LIFO) stack organization manage data and control flow for high-speed instruction execution.
- **Instruction Set Comparison**: Compares and contrasts different instruction set architectures like MIPS, RISC, and CISC, alongside an analysis of one-, two-, and three-address instruction formats.
- **Advanced Arithmetic Units**: Comprehensive coverage of ALU micro-operations and complex computational algorithms, including Booth's multiplication and detailed procedures for floating-point arithmetic operations.
- **Memory Hierarchy Mastery**: In-depth analysis of the memory hierarchy, including the structure and function of cache memory, virtual memory, and specialized Content-Addressable Memory (CAM).
- **Efficient I/O Management**: Explores mechanisms for input-output data transfer, detailing concepts like Direct Memory Access (DMA), priority interrupts, and the principles of I/O processor (IOP) function.
- **Multiprocessor Architectures**: Essential concepts for parallel computing, examining interconnection structures, interprocessor communication and synchronization techniques, and interprocessor arbitration for shared resources.
- **Cache Coherence Protocols**: Critical focus on maintaining data integrity across multiple processor caches, explaining the need for and implementation of cache coherence mechanisms in high-performance computing.

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- General registers
- Arithmetic logic unit and computer arithmetic
- Memory organization
- Input-Output Organization
- Characteristics of multiprocessors


## Author


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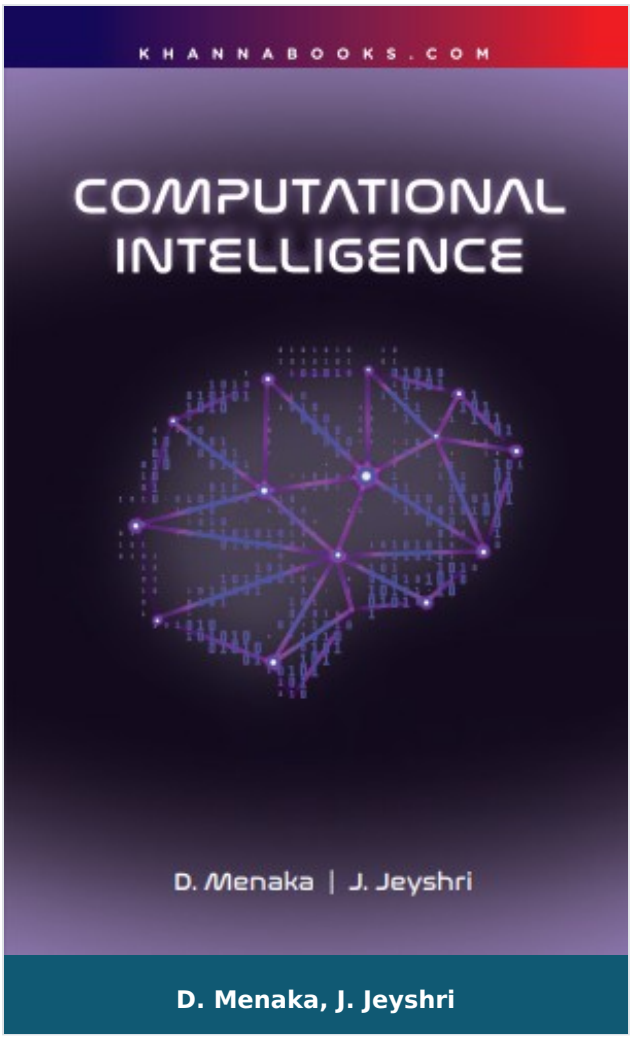
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D. Menaka, J. Jeyshri

# Computational Intelligence

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## Product Description

### Computational Intelligence

Computational Intelligence serves as a comprehensive and insightful guide into a field that stands at the forefront of the rapidly evolving digital era, powering advancements from data analytics to autonomous systems. This book is dedicated to providing a structured yet accessible overview of Computational Intelligence (CI), a powerful paradigm that solves complex real-world problems by leveraging techniques inspired by natural intelligence. The core theme is the integration of diverse concepts, including artificial intelligence, machine learning, neural networks, evolutionary computing, and fuzzy logic.

The text offers a careful balance between theoretical depth and practical relevance, ensuring that complex methodologies are made clear and engaging for a wide audience, which includes students, educators, researchers, and professionals. Chapters cover fundamental principles, key algorithms, and recent advancements, empowering readers to not only understand but also implement intelligent computational models. To foster practical knowledge, the book integrates real-world case studies and examples that demonstrate the application of CI techniques across crucial domains such as healthcare, finance, robotics, and optimization. By focusing on algorithmic design and real-time applications, this academically rigorous work inspires innovation and provides the tools necessary to contribute effectively to the future of intelligent computing.

**Salient Features:**

- **Foundational AI Concepts**: Covers the principles of Artificial Intelligence, including its foundations, different types of AI, and the architecture and operation of various intelligent agents.

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- **Neural Networks & Deep Learning**: Details the structure of Artificial Neural Networks (ANNs), Single/Multi-Layer Perceptrons, and modern Deep Learning algorithms, covering both supervised and unsupervised learning.
- **Fuzzy Logic & Hybrid Systems**: Explores Fuzzy Logic, Fuzzy Set Theory, and Fuzzy Reasoning, culminating in advanced hybrid models like Neuro-Fuzzy and Cooperative Fuzzy Neural Networks (CFNN).
- **Evolutionary Algorithms**: Provides an introduction to Genetic Algorithms, detailing concepts like search space, reproduction, and selection methods essential for optimization problems.
- **Swarm Intelligence Techniques**: Dedicated coverage of optimization algorithms inspired by collective behavior, including Particle Swarm Optimization (PSO) and Ant Colony Optimization (ACO) variants.
- **Practical Search Strategies**: Explains key Problem-Solving Agents and algorithms, differentiating between Uninformed and Informed search strategies used for efficient goal-directed problem-solving.
- **Real-World Case Studies**: Integrates practical applications and case studies across vital sectors like healthcare, finance, robotics, and logistics, demonstrating the implementation of CI techniques.
- **Ethical & Future Trends**: Discusses the ethical considerations and challenges of AI, alongside future trends like Explainable AI (XAI) and Quantum AI, preparing readers for responsible deployment.

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- Swarm Intelligence


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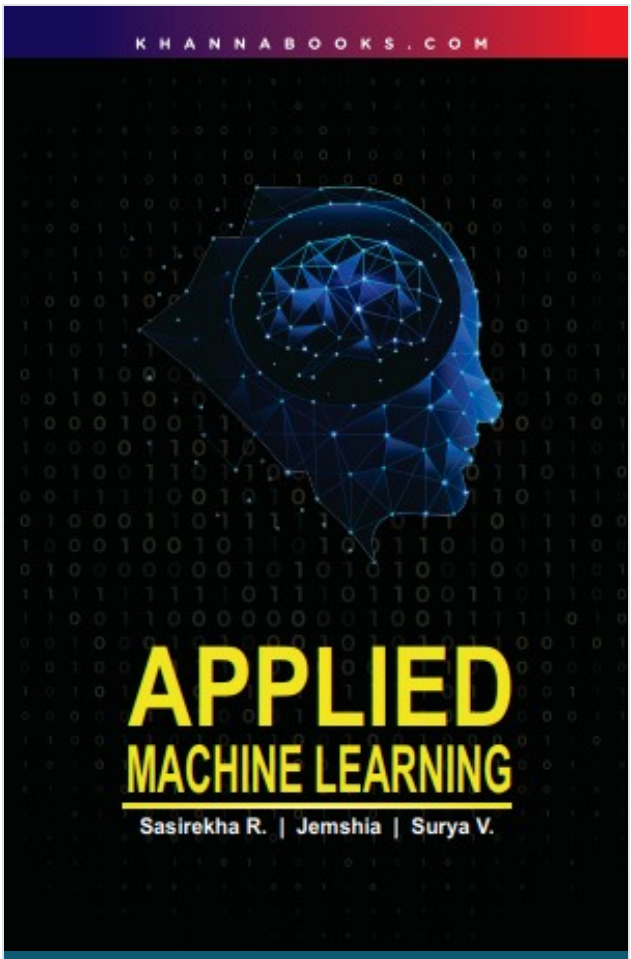
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**Sasirekha R., Jemshia, Surya V., Pavithrababu**

# Applied Machine Learning

| | |
|---|---|
| **Author :** | Sasirekha R., Jemshia, Surya V., Pavithrababu |
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## Product Description

**Applied Machine Learning**

In an era where data is growing exponentially, Machine Learning (ML) has become the definitive tool for solving complex problems across every major industry, from healthcare and finance to autonomous systems and natural language processing.

Applied Machine Learning is designed to bridge the gap between theoretical research and real-world implementation. This book provides a solid foundation, covering core concepts such as supervised and unsupervised learning, feature engineering, and model evaluation. Readers will gain a deep understanding of essential algorithms like linear regression, decision trees, support vector machines, and neural networks.

With a crucial focus on practical application, the text uses Python and industry-standard libraries like Scikit-learn, TensorFlow, and PyTorch to provide step-by-step coding examples. Beyond model development, it addresses critical challenges, including data bias, model interpretability, and ethical considerations, emphasizing the need to build responsible and transparent ML systems. Whether you are an aspiring data scientist, a software engineer, or a business leader, this book is your comprehensive guide to leveraging AI-driven insights and transforming industries.

**Salient Features:**

- **Foundational Learning Paradigms**: Detailed coverage of Supervised, Unsupervised, Semi-Supervised, and Reinforcement Learning models and their real-world applications.
- **Essential Algorithms**: In-depth study of core algorithms, including K-Means Clustering, Fuzzy K-Means, Decision Trees, and various Neural Network architectures.

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- **Practical Implementation**: Hands-on focus on Python programming and popular ML libraries (Scikit-learn, TensorFlow, PyTorch) for effective solution deployment.
- **Data Strategy**: Comprehensive chapters on Data Representation, covering structured vs. unstructured data, feature engineering, normalization, and techniques for handling missing data.
- **Model Optimization**: Clear explanation of the Bias-Variance Tradeoff and the Occam's Razor principle for selecting models that achieve optimal generalization.
- **Statistical Backbone**: Exploration of the statistical foundations of ML, including Probability Theory, Bayes' Theorem, Sampling Methods, and Inferential Statistics.
- **Business Applications**: Includes units on Business Intelligence (BI), Data Warehousing, OLAP, the CRISP-DM Model, and Intelligent Information Retrieval Systems.
- **Future Trends**: Analysis of the latest Applications and Trends of Machine Learning across key sectors like Healthcare, Finance, E-commerce, and Autonomous Systems.

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- Data Clustering & Decision Tree Learning
- Business Intelligence and Data Mining


## Author


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Sasirekha R., Jemshia, Surya V.

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Jemshia, Surya V.

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