



# EMBEDDED SYSTEMS



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FIRST EDITION

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**Title of the Book:** Embedded Systems

**Edition:** First - 2023

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**ISBN: 978-93-5762-133-5**

**MRP: Rs. 600/-**

**PUBLISHER & PRINTER: Alpha International Publication (AIP),  
3/725/2, Kammangudi, Adichapuram,  
Thiruvarur District, Tamilnadu- 614717, INDIA**

**Email: [editoraippublications@gmail.com](mailto:editoraippublications@gmail.com)**

**Website: [www.alphainternationalpublication.com](http://www.alphainternationalpublication.com)**



# SYLLABUS

**UNIT I INTRODUCTION TO EMBEDDED SYSTEM DESIGN**  
Complex systems and microprocessors- Embedded system design process -Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis - Specifications- System analysis and architecture design - Quality Assurance- techniques - Designing with computing platforms - consumer electronics architecture - platform-level performance analysis.

**UNIT II ARM PROCESSOR AND PERIPHERALS**  
ARM Architecture Versions - ARM Architecture - Instruction Set - Stacks and Subroutines - Features of the LPC 214X Family - Peripherals - The Timer Unit - Pulse Width Modulation Unit - UART - Block Diagram of ARM9 and ARM Cortex M3 MCU.

**UNIT III EMBEDDED PROGRAMMING**  
Components for embedded programs- Models of programs- Assembly, linking and loading - compilation techniques- Program level performance analysis - Software performance optimization - Program level energy and power analysis and optimization - Analysis and optimization of program size- Program validation and testing.

**UNIT IV REAL TIME SYSTEMS**  
Structure of a Real Time System -- Estimating program run times - Task Assignment and Scheduling - Fault Tolerance Techniques - Reliability, Evaluation - Clock Synchronization.

**UNIT V PROCESSES AND OPERATING SYSTEMS**  
Introduction - Multiple tasks and multiple processes - Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms - Evaluating operating system performance- power optimization strategies for processes - Example Real time operating systems-POSIX-Windows CE. Distributed embedded systems - MPSoCs and shared memory multiprocessors. - Design Example - Audio player, Engine control unit - Video accelerator.



## Author's Profile



**Dr. Aniket S. Kothawale** is currently working as Assistant Professor in Electronics Department at Tuljaram Chaturchand College of Arts, Science and Commerce, (Autonomous), Baramati, affiliated to Savitribai Phule Pune University, Pune. He has more than 11 years of teaching experience. He obtained his Bachelor of Science degree in Electronic Science in Tuljaram chaturchand College, Baramati, & Master degree from Modern College Pune. He obtained his Ph.D degree in Electronics from J.J.T University Rajasthan, India. He published a book entitled "Wireless Sensor Network". He has been granted one patent. He published more than 10 research paper in national & international journals. He has a strong passion for WSN, IOT, Embedded System. Moreover, He taught different courses like Microcontroller and Embedded system, Analog & Digital Electronics, Microwave and Antenna, Verilog, Optical fiber Communication, Microprocessor Architecture & Programming, Basics of Computer organisation, Control system, Digital Communication & Networking, Wireless communication & IoT etc. to post graduate and under graduate classes. His area of interests are internet of things (IoT) & WSN, embedded system, sensor to name but few.



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**AIP**

Alpha International Publication (AIP)

www.alphainternationalpublication.com | editor@ippublications@gmail.com



ISBN 978-93-5762-133-5



9 789357 621335

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