Ενσωματωμένα Συστήματα

Ο αθέατος ψηφιακός κόσμος

Μηνάς Δασυγένης
Δημήτριος Σούντρης

Abstract

This book covers the entire syllabus of the course "Embedded Systems," both in the departments where the authors teach and in several other departments, as detailed in the proposal's maturity documentation. The book follows two thematic axes—Hardware and Software—which are presented hierarchically. In the hardware section, the categories and architectures of embedded systems are described, along with the implementation technologies. Emphasis is placed on modeling using popular system description languages. The hardware domain is thoroughly addressed with detailed descriptions of each component. In the software section, real-time operating systems are analyzed, and development environments are presented, including methods for design and optimization. A dedicated chapter focuses on hardware/software co-design. Additionally, IMEC's DTSE methodology

for energy consumption optimization and performance enhancement, as well as design validation, is developed. The software section concludes with the description, design, and implementation of examples and applications in embedded systems, aiming to highlight the connection between theory and practice. The book includes four appendices, presented as laboratory exercises, which can be used in the practical component of the course. These appendices cover a wide range of technologies used in the design and implementation of embedded systems, including 8-bit microcontrollers, 32-bit microprocessors, and hardware/software co-design on FPGAs. They expand upon the theory and techniques discussed in the main chapters. We believe that this book provides comprehensive coverage of the Embedded Systems course material as it is taught in higher education.