

Preface

Microprocessor and microcontrollers have revitalized the instrumentation world and now become ubiquitous. However, due to their niche role, when a particular microcontroller is discontinued, the entire product based on it has to be revamped, and the evolution of the technology means that the newer upgraded versions cannot be used in its place due to binary and socket incompatibility. Another issue which arises is of redundant hardware in microcontrollers posing a basic bottleneck in system optimization—many resources remain unutilized for routine applications.

In order to achieve portability, power efficiency, higher throughput, and less latency, the only alternative is to use the soft processor cores with FPGAs for small- and medium-scale production as they become more economic as compared to ASICs. Many vendors have come out with readymade cores such as NIOSII from Altera, Picoblaze and Microblaze from Xilinx. Building the system on FPGAs with these cores will not only facilitate earlier and easier market opportunities but will also give the advantage of using readymade full proof design alternatives, reducing the inconvenience of committing mistakes and debugging. The present book will explore the “know-how” for synthesizing chips for every embedded needs.

Methodologies in digital design have undergone tremendous changes over the past three decades. The use of FPGA and HDL for implementing digital logic has become widespread in the recent past, and use of FPGA in embedded systems is increasing almost day by day. A sign of the increasing importance of this area is that most of the technical institutes and engineering colleges have incorporated FPGA as the core subjects.

The domain of embedded systems is quite large and is centered around general-purpose processors and microcontrollers. The Altera FPGA forum receives numerous posts by newcomers to the technology asking questions on configuring FPGA, interfacing SRAM, building NIOS II system—this book is for those users as it essentially addresses most of these questions. The motivation behind writing this book was to ease out the difficulties faced by the students and researchers, so that they are not dependent on their supervisors to understand the field of reconfigurable embedded platform. To this end, it has many worked-out case studies in different areas of electronics like basic digital designs, sensors and measurement, biomedical

instrumentation. It is intended for graduate, postgraduate, and research students from the electrical, electronics, computer and instrumentation engineering backgrounds as a ready reference during their work.

We promise potential readers that this book will reduce the steep learning curve and will help them quickly develop their embedded systems application in the shortest possible time frame. We recommend that the readers begin by reading through the summary paragraphs of each chapter, which will introduce each section and provide an overall picture of how the book is organized and how it will help them in creating their own design.

We would like to thank our student community and friends—their work in various industries helped identify the problems used in the case studies.

Though this book is intended for beginners in the area wherein the students aspire to learn skills building FPGA platform, a prerequisite knowledge in C/C++ and HDL will greatly help in understanding the complexities more easily. Since these two languages are now part of regular curriculum, we feel the students can directly start working on case studies.

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Hands-on Experience with Altera FPGA Development
Boards

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