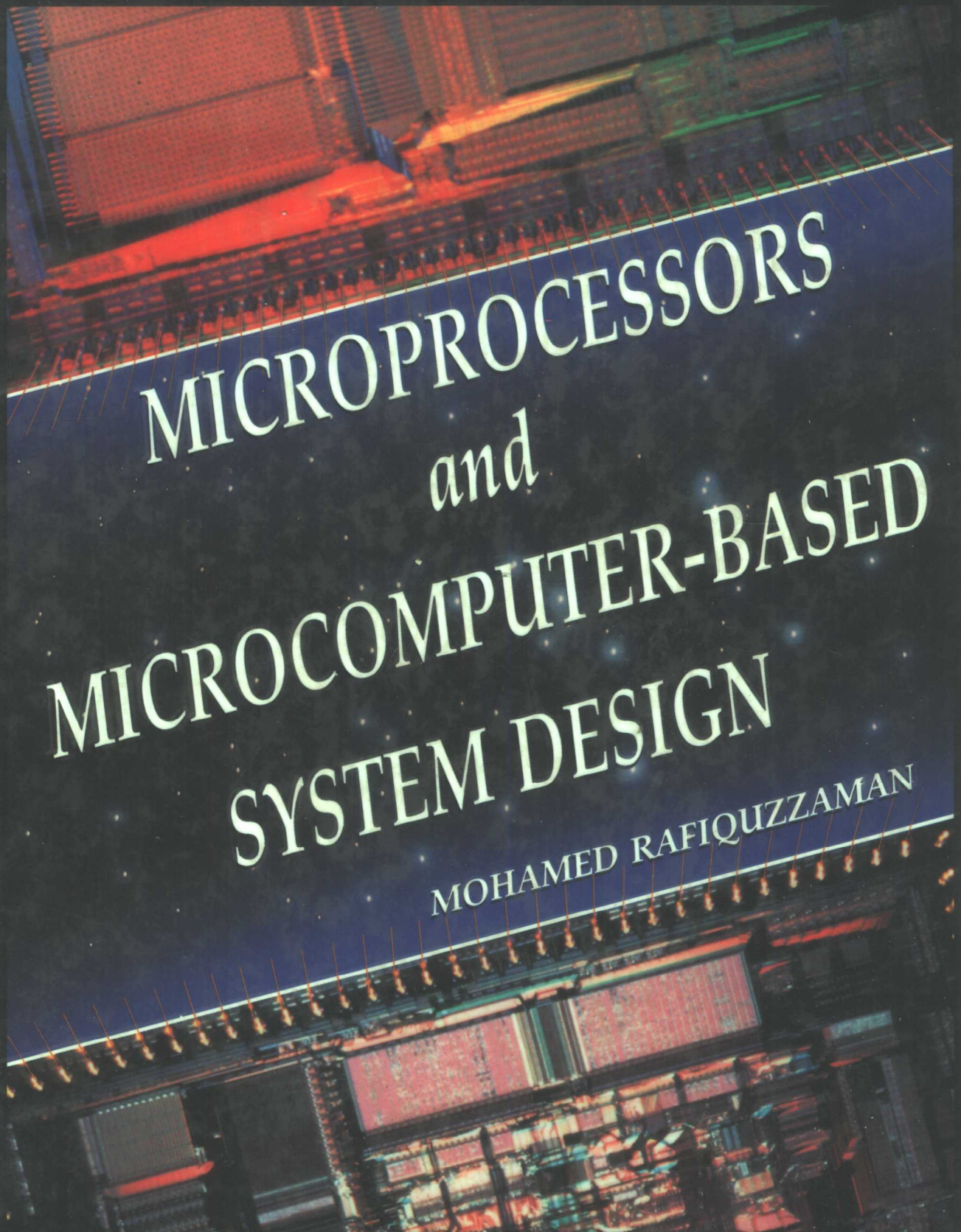
MICROPROCESSORS
and
MICROCOMPUTER-BASED
SYSTEM DESIGN
MOHAMED RAFIQUZZAMAN

MICROPROCESSORS AND MICROCOMPUTER-BASED SYSTEM DESIGN

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Cover: (Top) MC88100 RISC microprocessor; (bottom) MC68030 32-bit microprocessor. Both photos courtesy of Motorola Corporation, Inc., Phoenix, Arizona.

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PREFACE

The concept behind *Microprocessors and Microcomputer-Based System Design* is to present the capabilities, interfaces, and trade-offs in the practical design of microcomputer-based systems. The book accomplishes this by exploring the architectures and system design concepts associated with several popular microprocessors.

Coverage includes an 8-bit microprocessor (Intel's 8085), several 16-bit microprocessors (Intel's 8086, 80186, 80286, and Motorola's 68000), 32-bit microprocessors (Intel's 80386 and Motorola's 68020 and 68030), and a RISC microprocessor (Motorola's MC88100).

The audience of this book can be college students or practicing microprocessor system designers in industry. As a text it is for a junior, senior, or graduate course in electrical engineering, computer engineering, or computer science. Practitioners of microprocessor system design in industry will find greater detail and comparison considerations than are found in manufacturers' manuals. The book assumes a familiarity with digital logic and topics such as Boolean algebra and K-maps.

Microprocessors and Microcomputer-Based System Design has evolved from notes I have developed for courses I teach at the California State Polytechnic University, Pomona, at the University of Southern California, and in short courses for Motorola, Inc. in the Southern California area. I have made the extensive information related to the microprocessors easily understandable by the use of numerous examples, illustrations, tables, data sheets, questions, problems, and a systematic presentation.

This may well be the most voluminous book currently available on this subject. But the reader need not try to digest all of the material covered in a single course. Because of the systematic coverage, courses can be taught from this book using either the Motorola or Intel materials, or both in a combined and comparative context. Students and practitioners will wish to keep the book as a one-place reference as they consider the trade-offs of design.

Chapter 1 introduces the reader to the evolution of microprocessors, microcomputer hardware, systems software, and programming concepts, addressing modes and instructions, basic features of microcomputer devel-

opment systems, a system development flowchart, and typical practical applications, such as personal computers, robotics, real-time controllers, and fault-tolerant systems.

Chapter 2 provides a detailed coverage of 8085 hardware, software, I/O, timing, and system design.

Chapters 3 through 8 provide detailed descriptions of the architectures, addressing modes, instruction sets, I/O, and system design concepts of Intel's 8086, 80186, 80286, and 80386 and Motorola's 68000, 68020, 68030, and 88100 microprocessors.

Chapter 9 covers the basics of peripheral interfacing. Topics include keyboard/display interfacing, DMA controllers, printer interfaces, CRT and graphics controllers, floppy disk interface, and coprocessors.

Chapter 10 offers two detailed design problems. The purpose of these is to offer an opportunity to apply some of the design principles covered in the preceding chapters.

The appendices include materials on the HP 64000 microcomputer development system, data sheets on the Motorola 68000 and support chips, data sheets on the Intel 8085, 8086 microprocessors and support chips, and a glossary.

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Dr. Rafiquzzaman obtained his Ph.D. in Electrical Engineering in Canada in 1974. He worked for Esso/Exxon and Bell Northern Research for approximately 5 years. Dr. Rafiquzzaman is presently a professor of electrical and computer engineering at California State Polytechnic University, Pomona. He was Chair of the department there in 1984–1985. Dr. Rafiquzzaman is also an adjunct professor of electrical engineering systems at the University of Southern California, Los Angeles. He consulted for ARCO, Rockwell, Los Angeles County, and Parsons Corporation in the areas of computer applications. He has published four books on computers which have been translated into Russian, Chinese and Spanish, and has published numerous papers on computers.

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