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Book Review

MICROPROCESSOR PROGRAMMING AND APPLICATION FOR SCIENTISTS AND ENGINEERS (Data handling in science and technology, Vol. 1.)

Richard R. Smardzewski

Elsevier Science Publishers. Amsterdam – Oxford – New York – Tokyo 1984. XIII + 353 pp, 83 Figures, 42 references.

The role of microprocessors has increased explosively in the past ten years and they are now used in more and more appliances. Scientists taking part in the design and construction of instrument systems, instruments, control equipment and automation (chemists, physicists, biologists and engineers) cannot avoid working with microprocessors. This book provides excellent help in the profound study of MP techniques, as its language is easy to understand and does nor require any preliminary knowledge. The basic steps of MP programming are illustrated by 35 experiments using the very popular 6502 processor (a product of Rockwell International Co; this MP was built into the Commodore, Acorn, BBC and APPle computers).

The book consists of ten well-dissected chapters, which are completed by 2 appendices and a bibliography.

Chapter 1 – Computer organization. This gives brief information about the construction of a computer and about the hierarchy of different program languages. This chapter is also about the AIM 65 MC produced by the RIC.

Chapter 2 – Number systems code conversion. This provides a clear initiation into the binary, octal, decimal and hexadecimal number systems, into their interconversion, and into the four rules of arithmetic within the binary number system. Communication with the Central Processing Unit requires code conversion, as the input and the output of the CPU involve exclusively digital information, while the user usually communicates by alfanumeric signals. This chapter gives appropriate information about the different conversion methods of these signals.

Chapter 3 – This sums up the basic circuits of computers (logic gates, drivers, flip-flops, decoders, multiplexers, etc.).

Chapter 4 – The MPU 6502. This is the most important chapter of the book. It introduces the architecture, the registers, and the instruction and addressing modes of the MP 6502. These are illustrated by 20 experiments.

Chapter 5 – The VIA 6522. The 6522 Versatile Interface Adaptor contains 16 8-bit wide internal registers, which are able to perform 5 special operations: input/output, timing, shifting, function control and interrupt control.

Chapter 6 – Monitor routines.

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Chapter 7 – Data acquisition. The perception sensors and the conversion of low-level laboratory signals, analog to digital converters, sample and hold circuits. This chapter is an excellent introduction to the circuits of the relation between the measured signals and the microcomputer.
Chapter 8 – Control. This chapter describes the interface circuits of the systems (the driving circuits of the relays, stepper motors, programmable-gain amplifiers, thyristors and the power MOSFET).
Chapter 9 – Data communication interfaces. This introduces three widely-used types of digital interfaces, which organize the digital communication of computers.
Chapter 10 – Program development. The contents of the chapter: assembler, fourth language, structured programming, flowcharts, development systems. At the end of the book there are two Appendices: the data sheets of the microprocessor family produced by the Rockwell Int. Co. (the R 650X and the R 651X), the R 6522 VIA and the Microcomputer AIM 65 and the instructions of the 6502. As the use of microprocessors is still increasing, we warmly recommend this book to all scientists engaged in laboratory and industrial measurement, process control, automatics and data processing.

(The book is available in the USA and Canada: Elsevier Science Publishers Co. Inc., PO Box 1663, Grand Central Station, New York NY 1016.)

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