WORKSHOP ON REMOTE SENSING TECHNIQUES WITH APPLICATIONS TO AGRICULTURE, WATER AND WEATHER RESOURCES

(27 February - 21 March 1989)

DIGITAL FILTERS AND THEIR APPLICATIONS

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ITALY

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Digital Filters and their Applications

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"Overall this book is good value: it contains a very large
number of references, it is up to date, well written and easy
to follow . . . I would think that the engineer needing to
design a digital filter could do little better than start by
reading this text!"
L. G. Cuthbert in Electronics and Power

1978, xvi + 384pp., $57.00   0.12.159250.2

Contents
Digital filters
Design methods of finite impulse response digital filters
Design methods of infinite impulse response digital filters
Quantization effects and noise in digital filters
Evaluation of digital filter coefficients
Software implementation of digital filters
Hardware implementation of digital filters
Applications of digital filters
Appendices. Index.

Physics of Computer Memory Devices

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1976, x + 402pp., $55.50   0.12.495050.7

"The book covers rather more than the title suggests since it
gives not only the physical principles of the various devices
but includes their organisation and circuit details where
appropriate.
"The book should thus interest all computer engineers who
wish to keep abreast of recent developments in digital com-
puter storage systems and also physicists concerned with their
underlying principles."
J. C. Cluley in The Computer Journal

Contents
Introduction
Computer architecture. History of storage techniques. References.
Delay line memories and materials
Delay line memories. Fundamental considerations. Ultrasonic bulk wave delay lines. Surface wave delay lines. References.
Matrix memories
Introduction. Magnetic memories. Ferroelectric matrix memories. Semiconductor memories. Superconductive memories. References.
Beam accessible memories
Computer storage by optical techniques. Performance limitations of beam accessible memories. Optical beam deflection. Storage materials. References.
Electromechanically accessible magnetic surface memories
Introduction. Principle of the recording and reproducing process. Magnetic surface storage devices. Magnetic recording and reproducing heads. References.
Subject index

DIGITAL SIGNAL PROCESSING

edited by V. Cappellini
Facoltà da Ingegneria
Università degli Studi
Florence, Italy

and A. G. Constantinides
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Imperial College of Science and Technology
London, England

The past decade has seen an increase in the importance of digital methods and techniques. Their greater power has enabled them to replace analogue techniques and also, as flexibility has been acquired, to find wider applications. This development is the result of several factors, including realistic-ally obtainable high efficiency, permitting better signal processing and analysis; greater flexibility in applications; and advances in computer hardware and software, particularly the introduction of microcomputers, microprocessors and fast array processors, which are also now much cheaper. These digital techniques gained importance not only in one-dimensional (1-D) signal processing, but also in two-dimensional (2-D) signal processing (digital image processing).

This book is the proceedings of a conference on digital signal processing at which speakers from twenty-two nations presented more than ninety scientific and technical lectures grouped in twenty-three sessions. The carefully edited selection of conference papers presented here provides an authorita-tive and permanent record of the proceedings, giving advanced and novel contributions in various topics and fields of application. Some are of a synthetic review nature while others contain completely new applications. They are conveniently grouped in five parts: advanced methods and techniques for designing digital filters; improvements in efficient trans-formations (Fast Fourier Transforms); implementation aspects (using microprocessors); applications, for example radar systems, biomedicine, seismology; and finally the new field of art-processing.

This work will be of interest not only to research workers in university departments of physics, engineering, communica-tions, and applied mathematics, but also to industries con-cerned with the analysis and processing of signals and images such as communications firms, broadcasting corporations, aerospace organizations, government departments and hospitals. Its sections on art-processing will have reference value in the art, architecture, archaeology and museum worlds.

Contents

List of Contributors. Conference Notes. Preface.

DATA COMPRESSION AND ERROR CONTROL TECHNIQUES WITH APPLICATIONS

Edited by: **V. Cappellini**
University of Florence
Florence, Italy

December 1985, 296 pp.,
Paperback ISBN 012.159261.8 $34.95/£29.50
Cloth   ISBN 012.159260.X $60.00/£52.00

This book presents the theory of data compression and error control coding, together with a description of their implementation and application in many areas of communications and signal processing.

The basic aspects and relationships for the different types of source and channel codes are summarized followed by a description of the most important practical techniques and a comparison of their efficiencies.

A number of software and hardware implementation problems are considered and some useful computer programs and specific hardware realizations are given. The applications covered range from space digital telemetry, speech compression and vocoders to digital processing and data transmission.

Contents:
Information Sources and Communication Channels, V. Cappellini. Source Coding, G. Longo and A. Sgarro. Data Compression Techniques, G. Benelli, E. Del Re, V. Cappellini, and F. Lotti. Channel Models and Channel Coding, G Benelli and C. Bianciardi. Error Control Coding Techniques, G. Benelli, C. Bianciardi, and V. Cappellini. Joint Source and Channel Coding. G. Benelli, E. Del Re, and V. Cappellini. Software Implementation of Data Compression and Error Control Techniques, G. Benelli, E. Del Re, and F. Lotti. Hardware Implementation of Data Compression and Error Control Techniques, V. Cappellini and E. Del Re. Applications of Data Compression and Error Control Techniques, V. Cappellini. Appendix 1: Finite Fields: A Brief Survey. Appendix 2: Computer Programs for the Implementation of Data Compression and Error Control Techniques. Appendix 3: Computer Programs for the Simulation of a Digital Communication System Including Data Compression and Error Control Techniques. Each chapter includes references. Index.

APPLICATIONS OF WALSH AND RELATED FUNCTIONS

With an Introduction to Sequency Theory

K.G. Beauchamp
Director of Computer Services
University of Lancaster
Lancaster, UK

New and exciting applications for Walsh and Related Functions (e.g. Haar, Slant, Cosine, etc.) have resulted from recent developments, particularly in image processing, communication, and Boolean logic design. The properties of these functions suit them to use in signal processing situations as well as to many of the newer digital processes and promise to contribute to the solution of many current research problems.

The tutorial introduction to sequency theory linked by a chapter on hardware to the discussion of specific applications will prove invaluable to the scientist, researcher or engineer seeking an overview of the main lines of development in the use of these functions.

Applications discussed include spectral analysis, digital filtering, image processing and pattern recognition. Recent progress in non-sinusoidal radar and spread spectrum communication is one of the uses described in the field of communications. The final chapter summarises a new field for the functions, namely Boolean logic design and analysis in which significant results have proved possible.

The substantial developments which have taken place since publication of Ken Beauchamp's *Applications of Walsh Functions* in 1975 attest to the growing importance and interest in this subject.

Contents:

Part 1: Theory and Practice. The Sequency Functions: Introduction. Orthogonality. The Walsh function series. The Haar function series. Mixed function series. Discrete sampled functions. **Transformation:** Introduction. The discrete Walsh transform. Fast Walsh transform algorithms. The discrete Haar transform (DHT). The discrete slant transform (DST). Shift-invariant transformation. Transform conversion. Two-dimensional transformation. **Analysis and Processing:** Introduction. Correlation and convolution. Digital filtering waveform synthesis.

Part 2: Applications. Signal Processing: Introduction. Spectroscopy. Speech processing. Medical applications. Seismology. Non-linear applications. **Image Processing:** Introduction. Image compression. Image enhancement and restoration. Pattern recognition. **Communications:** Introduction. Multiplexing. Coding. Non-sinusoidal electromagnetic radiation. **Logic Design and Analysis:** Introduction. Rademacher-Walsh ordering. Synthesis of digital networks. Minimisation of logic functions. Fault diagnosis.

DIGITAL FILTERS AND THEIR APPLICATIONS

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Computer Science, Information Processing, Communications; Theory of Computation; Systems Hardware; Systems Software; Data Communications, Networks; Computing in Medicine, Biology

Digital Signal Processing - 84

Proceedings of the International Conference, Florence, Italy, 5-8th September, 1984

Edited by V. CAPPELLINI, Department of Electrical Engineering, University of Florence and IROE · C.N.R., Florence, Italy and A.G. CONSTANTINIDES, Department of Electrical Engineering, Imperial College of Science and Technology, University of London, London, England

APPROXIMATE MONTH OF PUBLICATION: DECEMBER

Digital Signal Processing is one of the fastest growing areas both in terms of research and applications. Advances in signal processing contribute to a wide range of fields including communications, radar systems, image processing, remote sensing, geophysics, biomedicine, pattern recognition, robotics and electrical power systems. Digital Signal Processing as a discipline is relatively young, being barely recognizable as such less than twenty years ago. The remarkable impetus, however, that Digital Signal Processing received as a result of developments in digital circuit technology (LSI, VLSI, microprocessors, etc.), the diversity of fields to which it can contribute, and the grown recognition of its fundamental role in underpinning a vast array of modern industrial applications means that it is

NORTH-HOLLAND

Amsterdam and New York

now an established, mature and unquestionably essential discipline.

This book presents the Proceedings of the International Conference on Digital Signal Processing, held at the Congress Palace in Florence, September 5-8, 1984, the fourth in a regular triennial series. Speakers from 26 Nations presented about 180 scientific and technical lectures grouped in regular and special Sessions after a careful selection performed through an International Technical Committee. Conference papers reported here, therefore, provide an authoritative and permanent record of the contributions. Some papers are more theoretical or of review nature, whilst others contain new implementations and applications. They are conveniently grouped into 16 fields. In particular new digital filtering design methods, implementation architectures and digital image processing techniques with special advanced applications (speech processing, biomedicine, pattern recognition and robotics) are presented.

Overall, the book gives an up-to-date advanced "scenario" of the wide interdisciplinary nature of Digital Signal Processing, which is becoming more important in its diverse manifestations (theory, implementation, applications).

This work will be of interest not only to researchers, professors and students in university departments of engineering, communications, physics and applied mathematics, but also to engineers and managers of industries concerned with the analysis and processing of signals and images and other organizations and establishments (such as broadcasting corporations, aerospace organizations, government departments and hospitals).