Building for the scientist

Michael Brawne

Design, Construction and Refurbishment of Laboratories.
Edited by R. Lees and A. F. Smith.
Ellis Horwood/Halsted: 1984. Pp.375. £37.50, $79.95.

LABORATORIES are among the most expensive and least permanent of buildings. Any attempt to increase awareness of the difficulties in designing them must be welcomed, and must be seen as a contribution towards more satisfactory solution of an especially intractable building problem. Economics, of course, are often a decisive factor and it is at the same time especially important to keep the apparently high capital cost in perspective: as W.P. Horswell, one of the contributors to this volume, points out, the capital cost of a science department at a British university, calculated as an annual mortgage payment, is only 14 per cent of the running cost — 86 per cent goes to recurrent costs — and is only 7 per cent if buildings and land alone are counted. This, however, is a relationship that rarely influences the decisions of universities and other institutions funding laboratory buildings.

It was the aim of the editors, two scientists at the Laboratory of the Government Chemist in London, that the work of the 40 contributors should build up into a kind of mosaic to cover a wide range of issues and enable the designer of a new or a refurbished laboratory to avoid the major pitfalls. The foreword, moreover, suggests that the information should be widely relevant in both developed and developing countries.

As might be expected, the 36 chapters which make up the book differ both in intention and quality. Many of them contain useful information, clearly set out; some deal with generalities, without in the short space available going beyond these; and a few do no more than to set out checklists, which may be helpful reminders to those who already know the answers but do little to transmit any knowledge. Few say anything original, but there are some surprises. For example, in his paper on safety, N.H. Pearce of Bristol University suggests that the accepted wisdom on fire escapes, enshrined in legislation and enforced by fire officers, may actually make conditions much worse by trapping smoke rather than allowing it to disperse.

Nor is there necessarily unanimity among the contributors. As in science itself there will always be different views of what is most appropriate in a laboratory building. Not only are the final decisions invariably the upshot of a set of value judgements made by the designer, but laboratories are continually changing to reflect advances in scientific and technological research and to house the new equipment best suited to that research. Developments of the recent past have resulted in a drift towards opposite ends of the scale; towards very large equipment, as in radioastronomy or nuclear research institutions such as CERN, or towards miniaturization. A common factor, however, is that many controlling, measuring and recording instruments are in some way dependent upon computer technology, yet little of that impact is described in the book. At an elementary level, for example, the use of visual display units has serious implications for lighting but no mention of this is made in the pertinent chapter.

A number of the issues covered — on flexibility and adaptability, on safety, on the choice between conversion of an old building or construction of a new one, on reliability principles or building appraisal in use — have clear application to other building types and are thus of general interest. Some of the more particular discussions also have relevance beyond laboratory design since a number of other types of building — for the manufacture of electronic components or the processing of food — may well need much the same conditions. Thus, for all its failings, the book should have appeal beyond those principally concerned with laboratories.

It should never be forgotten that a laboratory is not only a place of work but is a kind of home for a large number of people. In the conversations I have had with scientists in both the physical and the life sciences for whom I have designed laboratories, the final and most searching questions were always about "what will it be like to be there?". It is assumed that there will be enough fume cupboards or adequate electrical screening; what is difficult to pin down and capture is that elusive sense of place. The book says nothing about this. Perhaps the editors felt that it was unimportant or outside their mandate; so, unfortunately, have too many others who have been responsible for laboratory buildings. □

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Ways to deal with discrete data

P.W. Hawkes

Digital Image Processing Techniques.
Edited by Michael P. Ekstrom.
Academic: 1984. Pp.372. $49.50, £40.
Applications of Walsh and Related Functions: With an Introduction to Sequency Theory.
By K.G. Beauchamp.
Academic: 1985. Pp.308. $55, £33.50.

MANY books have now been published on image processing, ranging from full-scale treatises to multi-author texts on certain specialized topics. Ekstrom's volume repeats much material already presented in more detail elsewhere, but it aims to meet a need not yet specifically catered for: how can an outsider know which of the many branches of image processing he ought to study in depth to solve his particular problem, and what hardware and software is already available? This is indeed a problem, for the introductory volumes are thick and the advanced ones incomprehensible to the uninitiated.

Ekstrom has invited a distinguished team to contribute short accounts of most of the main themes of image processing, from which the reader can rapidly grasp what the methods are capable of doing and whether they might be of use to him. The chapters cover enhancement, restoration, detection and estimation, 3-D reconstruction, coding, spectral estimation and analysis, and a longer concluding contribution surveys architecture, display hardware, software and the various systems. This should therefore be regarded as a guidebook rather than a textbook, and as such it is extremely successful.

Image processing is the subject of one of the chapters in Beauchamp's new book on discrete functions, which conveniently brings together much scattered material, but which, owing no doubt to this diversity, is very uneven. The opening chapters on the functions and transforms themselves are clear and full, including many interesting details about such important questions as the problem of shift-variance and the conversion from one transform to another.

The second half of the book, in which applications as various as seismology, medical signal processing, image enhancement and restoration, non-sinusoidal electromagnetic radiation and minimization of logic functions are discussed in 120 pages, is much less satisfactory. In some cases the text provides a good introduction to the more detailed literature, but in others the treatment is so inadequate that omission of the topic would have been the better course. Section 6.3.3 on image restoration occupies barely one page, for example, and, still in Section 6.3, it is not much use to be told that "optical... images [are] always positive quantities and therefore do not obey completely normal statistical operations". Conversely, the four pages on nonlinear applications of signal processing do succeed in conveying the originality of Walsh functions. This, then, is a useful book, but one which could have been much better. □

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