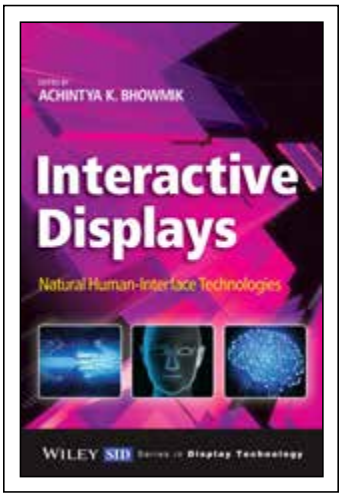
book reviews

Interactive Displays: Natural Human-Interface Technologies, Achintya Bhowmik (ed.), Wiley, 2015.

Reviewed by Jyrki Kimmel



The latest addition to the SID–Wiley Series in Display Technology books is *Interactive Displays*, a volume edited by Achintya Bhowmik from Intel. *Interactive Displays* is of particular interest because it expounds on topics rarely dealt with in display literature.

It opens with an overview of the basic principles of vision and the history of human–computer interaction paradigms. The heart of the book deals with touch interaction, voice interaction, various technologies for the three-dimensional sensing of the proximity of a flat-panel display, gaze interaction, and multimodal paradigms for interaction and biometrics. The volume concludes with a look forward to the ultimate displays of the future, which will be able to sense the entire 3-D visual field.

The writers of the individual chapters have been recruited from among the top researchers in the fields of interaction technology and information displays. Geoff Walker from Intel gives an excellent and comprehensive overview of touch; the way voice is employed in the user interface receives an expert treatment by Andrew Breen and colleagues from Nuance; gaze tracking is clearly explained by Heiko Drewes from Ludwig-Maximilians-Universität; and multimodal input technologies are clearly classified by Joseph J. LaViola and co-workers (University of Central Florida), to cite just several examples.

The topic of interactive displays is increasingly relevant to today's display-centric human–machine interaction paradigm. For developers charged with creating intuitive user interfaces, this book will provide a wide breadth of information. Many of the chapters can be treated as reviews of the state of the art in their respective fields, and the reference lists are extensive, providing the reader with a great starting point to become familiar with any particular interaction modality that might be focused upon. The treatment of individual topics is a bit uneven among chapters, with some having been written in a more concise and cursory way and others focusing on just a single application field. Altogether, however, the reader is presented with a body of knowledge that has been thus far missing from the literature in information displays.

The editor, along with colleagues well known in the field of displays, Jim Larimer (ImageMetrics) and Philip Bos (Kent State University), conclude *Interactive Displays* with a section on the display technology of the future. This chapter describes how difficult it is to realize a display that utilizes the plenoptic function of the visual field. The interaction paradigms with this "display technology of the future" are presented only with regard to the 3-D visual field. This can hardly be regarded as a gross omission, as such technology is the grand challenge of display technology, but this topic might have provided an opportunity to bring together the various themes of the book in a kind of closure. In all, however, I recommend *Interactive Displays* as a welcome addition to the SID–Wiley Series in Display Technology.

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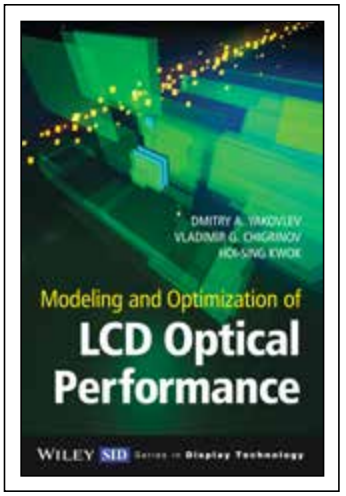
Modeling and Optimization of LCD Optical Performance, by Dmitry A. Yakovlev, Vladimir G. Chigrinov, and Hoi-Sing Kwok. Wiley, 2015.

Reviewed by Sally Day



Modeling and Optimization of LCD Optical Performance is one of the latest books in the SID–Wiley Series on Display Technology. It is written by Dmitry A. Yakovlev, Vladimir G. Chigrinov, and Hoi-Sing Kwok. The book is a detailed treatise on the methods of modeling the optical properties of the classic liquid-crystal (LC) modes: twisted nematic (TN), supertwisted nematic (STN), and ferroelectric LC (SSFLC). The chapters tend to alternate between detailed descriptions of theory, starting from how Maxwell's equations are used to provide the matrix methods for accurate modeling and practical examples in which the models are applied. The theories are described thoroughly, leading into discussions of the most important aspects that must be included in order to obtain precise simulation of the optical performance of displays. The book assumes a working knowledge of liquid-crystal physics and device structures.

For example, the authors apply the Jones matrices to some LC layers and investigate different parameter spaces, thereby anticipating the different polarization modes and states for a number of different LC modes. This is followed by a discussion of the modes and an analysis of the case for reflective modes, explaining how mode analysis can aid in the choice of LC structure in display design. An example is given for the design of bistable displays. This is presented along with an interesting analogy that includes Smith charts, a section that is likely to be interesting to electronic engineers in particular.

Different liquid-crystal modes are described, along with a theory that can be used to predict some of the liquid-crystal director structure and visco-elastic behaviors. Examples are given of modeled results, with a discussion of viewing-angle properties provided before the modeling methods have been fully explored. Necessarily, the modes that are