

BOOK REVIEW

Virtual Reality Technology

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Virtual Reality Technology (2nd ed.)
Grigore C. Burdea and Philippe Coiffet
2003, Wiley-Interscience
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While e-collaboration technologies have been around for more than 30 years, the advent of the Internet and the World Wide Web has revolutionized the way in which these technologies are implemented and used (Kock, 2005, 2005b), arguably in a way that many technology trailblazers see as somewhat disappointing. Initially, in the 1960s and 1970s, these technologies supported primarily geographically distributed interaction among a relatively small number of individuals housed in research centers and universities. The sophistication of e-collaboration technologies steadily increased in the 1980s, particularly in terms of task-specific features (Bannon, 1993; Grudin, 1994). This period saw the development of new e-collaboration technology paradigms (Briggs et al., 2003; Markus, 2005) such as those

underlying group decision support systems (e.g., Meetingworks) and e-collaboration development suites (e.g., Lotus Notes).

Since the Internet-based infrastructure to support distributed interaction was not fully in place in the 1980s or even in the early 1990s, powerful and sophisticated e-collaboration technologies in this period became largely restricted to supporting collaborative work and communication among collocated or quasi-collocated groups of individuals (e.g., individuals working in the same campus and interacting through an extended local area network). Later, especially since the mid-1990s, and in an apparent technologically backward move, much less powerful and sophisticated Internet- and Web-based e-collaboration technologies appeared in the market, primarily because of the relatively low bandwidth available. This is the period in which we are living now, where the promise of instant and high-quality movie watching, conference participation, and other bandwidth-intensive activities over

the Internet is still a dream. Arguably, we are getting closer to that dream, though, as bandwidth availability increases. However, so is the number of users competing for that bandwidth.

Parallel to these e-collaboration developments, an exciting field has been quietly accumulating discoveries, most of which have been discussed in small academic and industry research circles. That field is virtual reality. It seems that the field of virtual reality has the potential to revolutionize e-collaboration, as long as enough bandwidth is available. There are many aspects of virtual reality technologies that make them exciting. From an e-collaboration perspective, one of those aspects (and certainly not the only one) is virtual reality's ability to allow an individual to assume different personas while engaging in e-collaborative interactions, and to even have several virtual personas, which the individual would wear in different virtual circumstances (e.g., playing the role of a salesperson, as opposed to that of a consultant).

Unfortunately, there is not much out there in terms of technical books for those who would like to be introduced to the field of virtual reality. The most notable exception is *Virtual Reality Technology* by Grigore C. Burdea and Philippe Coiffet, whose second edition was published in 2003 by Wiley-Interscience (a Chinese edition was scheduled to appear in June 2005). Burdea is a professor at Rutgers, the State University of New Jersey, and also author of another Wiley book titled *Force and Touch Feedback for Virtual Reality*. Coiffet is Director of Research at the French National Scientific Research

Center (CNRS) and a member of the National Academy of Technologies of France.

Virtual Reality Technology is a broad-coverage book that also graces the reader with some in-depth coverage of specific virtual-reality-related topics. The book is nicely organized into nine chapters. It begins with an introduction to virtual reality (Chapter 1), which includes an historical review of the evolution of virtual reality technologies. It then moves on to the discussion of input devices typically used in virtual reality environments (Chapter 2), output devices (Chapter 3), and computing architectures that enable computing-intensive virtual reality applications (Chapter 4). Chapters 5 and 6 introduce the reader to key virtual reality modeling and programming issues and are followed by a chapter devoted to the analysis of human factors (Chapter 7). In Chapter 8, the book discusses several traditional virtual reality applications in the medical, education, arts, entertainment, and military domains. The book concludes in Chapter 9 with a discussion of emerging applications of virtual reality technologies in manufacturing, robotics, and information visualization.

The book has many positive aspects, including a detailed table of contents and an extensive index, which make jumping back and forth while reading as painless as possible. This is very helpful, since many readers may find themselves having to reread earlier sections of the book, as the book progresses in its discussion of increasingly complex virtual reality technology topics.

The book is very direct and to the point, with many sections addressing key topics being no more than one or two pages long. It is also easy to read, with a few mathematical equations here and there. The mathematics discussed in the book is unlikely to turn off many readers, particularly those that are somewhat math-averse, since it is presented to supplement the text and is often accompanied by explanatory notes. Finally, the book is full of great illustrations, diagrams, and photographs; as well as movies on the accompanying CD.

Unlike many other books that try to introduce readers to state-of-the-art technology topics, *Virtual Reality Technology* does not have many glaring weaknesses. For example, many state-of-the-art technology books fail to discuss technological impacts on people and society. This book presents such a discussion in Chapter 7, which covers several human factor issues, including user performance, health and safety, and societal issues. Moreover, the book's many review questions and references presented at the end of each chapter make it quite appropriate for adoption in graduate and undergraduate technology-related programs in the US and other countries. For this and for many other reasons, the book is likely to become a classic in the field of virtual reality. The book's adoption as a textbook is facilitated by the inclusion on its accompanying CD of a laboratory manual covering VRML and Java 3D programming techniques.

Nevertheless, there are a couple of aspects in which the book could be im-

proved, and that can be easily addressed in future editions. The book could benefit from a glossary, especially since it discusses a number of complex concepts that have specific names and acronyms and which many readers (especially those who are new to virtual reality) may not find very easy to memorize as they progress through the book. Also, the authors sometimes present important concepts in an oversimplified fashion, apparently in an attempt to be as direct and to the point as possible when discussing key topics. For example, the authors state that robots "are mechanical arms that perform physical actions on their environment" (p. 362). The term *robot* arguably refers to a larger variety of devices than just mechanical arms, which probably can be classified as a particular type of robot. These types of simplifications can be found throughout the book. While they do not detract too much from the many positive aspects of the book, looking more like distractions than factually incorrect assertions, some readers may find them a bit annoying.

All in all, Burdea and Coiffet's book is required reading for those interested in virtual reality issues. Its conceptual coverage and historical reviews of virtual reality-related topics are likely to make it as conceptually current 10 years from now as it is today. Let us hope that the authors keep writing and publishing new editions of the book every few years so that the same can be said about the state-of-the-art virtual reality technology topics covered in the book. They did set up a companion web site (www.vrtechnology.org), where new developments and book

supplements are posted. *Virtual Reality Technology* is a must-have for institutional libraries that serve technology readers, and a very desirable addition to the personal libraries of technology-oriented researchers and professionals.

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