Foreword

Three-dimensional user interfaces are finally receiving their due! Research in 3D interaction and 3D display began in the 1960s, pioneered by researchers like Ivan Sutherland, Bob Sproull, Fred Brooks, Andrew Ortony, and Richard Feldman. Although many commercially successful 3D applications exist—computer-aided design and simulation, radiation therapy, drug discovery, surgical simulation, scientific and information visualization, entertainment—no author or group of authors has written a comprehensive and authoritative text on the subject, despite a continuing and rich set of research findings, prototype systems, and products.

Why is that? Why is it that this book by Doug Bowman, Ernst Kruijff, Joe LaViola, and Ivan Poupyrev is the first thorough treatment of 3D UIs?

Perhaps it was our digression during the last 20 years to the WIMP GUI. After all, the Windows, Icons, Menus, and Pointers GUI is used very widely by millions of users. Mac OS and Microsoft Windows users know it well, as do many UNIX users. Indeed, every user of the Web works with a GUI, and this year there are many hundreds of millions of them. Two-dimensional GUIs will be with us for a long time. After all, a lot of the workaday world with which we deal is flat—not just our Web pages but our documents, presentations, and spreadsheets too. Yes, some of these can be extended to 3D, but most of the time, 2D is just fine, thank you very much. Furthermore, pointing and selecting and typing *are* relatively fast and relatively error-free—they work, and they work well.

Perhaps it is that not as many people use 3D GUIs as use the 2D WIMP GUI, and so they are not thought to be as important. But the above list of 3D applications involves multibillion-dollar manufacturing industries, such as aerospace and automotive, and equally large and even more important activities in the life-saving and life-giving pharmaceutical and health care industries.

Perhaps it was that we needed the particular set of backgrounds that Doug, Joe, Ivan, and Ernst bring to the table. Doug comes out of the GVU Center at Georgia Tech, where he worked on 3D UIs with Larry Hodges and others and learned the value of careful user studies and experimentation, and he is now a member of an influential HCI group at Virginia Tech; Joe works at Brown with Andy van Dam, a long-time proponent of rich 3D interaction; Ivan comes from the HIT Lab at the University of Washington, where he worked with Tom Furness and Suzanne Weghorst, and now works with Jun Rekimoto at Sony CSL; and Ernst works with Martin Goebel in the VE Group at Fraunhofer IMK in Germany.

Whatever the case, I am excited and pleased that this team has given us the benefit of their research and experience. As I reviewed the draft manuscript for this book, I jotted down some of the thoughts that came to my mind: comprehensive, encyclopedic, authoritative, taxonomic; grounded in the psychological, HCI, human factors, and computer graphics literature; grounded in the personal research experiences of the authors, their teachers, and their students.

I myself have long preached the importance of integrating the study of the computer with the study of the human. Indeed, this is the key premise on which I built the GVU Center at Georgia Tech. This book certainly follows that admonition. There are numerous discussions of human issues as they relate to 3D navigation and interaction, drawing on references in psychology and human factors.

This is indeed a book for both practitioners and researchers. The extensive literature reviews, examples, and guidelines help us understand what to do now. Combined with the research agenda in Chapter 13, The Future of 3D User Interfaces, the material also helps us have a sense of what it is that we do not yet know.

I particularly commend to readers the Chapter 11 discussion of evaluating 3D UIs. We in the computer graphics community have tended to design devices and techniques and then "throw them over the wall" to the user community. This is not the route to success. Careful study of user needs coupled with evaluation as part of the ongoing design cycle is much more likely to lead to effective techniques. The authors, all of

whom have grappled with the difficult task of designing 3D interfaces, know from first-hand experience how crucial this is. Their section 11.4, on the distinctive characteristics of the 3D interface evaluation process, is a wonderful codification of that first-hand knowledge.

Thanks to Doug and Ernst and Joe and Ivan!

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