THE UNIVERSITY OF TORONTO DYNAMIC GRAPHICS PROJECT

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Dynamic Graphics Project
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The University of Toronto's Dynamic Graphics Project is an interdisciplinary research laboratory within the Computer Science Department and the Computer Systems Research Institute. The lab's mission is advanced research and graduate instruction; its theme is the enhancement of human creativity through advances in human-computer interaction, user interface design, and interactive computer graphics (Baecker, 1987). Our research spans input and interaction devices and techniques, user interface management systems, computer-supported cooperative work, cognitive modelling, software engineering, computer program visualization, computer animation, multi-media, graphics modelling, and graphics rendering.

CURRENT HCI RESEARCH PROJECTS

Computer Supported Cooperative Work: Building on our past work on computer-supported meeting environments (Mantei, 1989), and on the design of integrated interactive media environments (Buxton and Moran, 1990), we are investigating the enhancement of collaboration at a distance via video and voice transmission and via groupware intended to facilitate group work. We are exploring ways in which the audio and video image, by virtue of being a software controllable presentation, can give participants a sense of presence of the other collaborating individuals (Mantei et al, 1991; Louie et al., 1991). We are studying how people work collaboratively and exploring how to apply the resulting understanding to the appropriate design of groupware for collaborative text editing (Posner, et al., 1991) and collaborative design (Lu and Mantei, 1991). We are also exploring methods to support the user-centred design and evaluation of CSCW technologies, including the development of video data capture and analysis tools (Harrison and Baecker, 1991).

Human Computer Interaction in Software Engineering: The methods and techniques for improving user interfaces have had little impact on the established methods of software engineering. We are organizing user interface techniques according to the type of human behavior information they provide and determining where and how to modify the software development process to incorporate the techniques (Mantei and Teorey, 1989). A further goal is to embed the techniques in CASE tools to supplement the formal aspects of software specification, development, and testing. We are also improving interfaces for software development via command history mechanisms (Lee, 1989).

Computer Program Visualization: Computer program visualization is the use of graphics, including typography, graphic design, animation, cinematography, and interactive computer graphics, to portray and elucidate the function, structure, and processing of computer programs. We have recently completed a major research program exploring the use of designed and typeset presentations of computer program source text (Baecker and Marcus, 1989). Current directions, based in part on earlier work in the animation of sorting algorithms (Baecker, 1981), concentrates on the animation of program behaviour, including the role of user control (Baecker and Buchanan, 1990), colour, sound, and three-dimensional display of both sequential and concurrent programs (Price, 1990).

Input and Interaction Techniques: Our objective in this area is to investigate ways in which input techniques and technologies can accelerate the process whereby novices begin to perform like experts (Buxton, 1990a). We believe that methods of interaction provides strong reinforcement for the chunking that is the foundation for cognitive skill. We are exploring a variety of input technologies and designs to obtain a better understanding of their affordances, and then validating hypotheses through formal experiments. Our main concerns have been with two-handed input, formal models of direct manipulation transactions (Buxton, 1990b; Brown et al. 1990; MacKenzie, 1989), gesture-based interaction (Buxton, 1990c), the relationship between human error and different modes of feedback (Sellen et al., 1990; MacKenzie et al., 1991), non-speech audio (Buxton, 1989), and animated interfaces (Baecker and Small, 1990; Baecker et al., 1991).

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MEMBERS

Prof. Ronald Baecker, Computer Science, Electrical Engineering, and Management

Prof. Marilyn Mantei, Computer Science, and Library and Information Science

Prof. William Buxton (Adjunct), Computer Science

Prof. Eugene Fiume, Computer Science

Dr. Abigail Sellen, Visiting Scientist

Roughly 10 Ph.D. students and 15 M.Sc. students

COLLABORATING HCI FACULTY

Computer Science: Profs. Ric Holt and Fred Lochovsky

Industrial Engineering: Profs. Mark Chignell and Paul Milgram

Landscape Architecture: Prof. John Danahy

Library and Information Science: Profs. Joan Cherry and Andrew Clement

Psychology: Profs. Paul Muter and Ian Spence

Sociology: Prof. Barry Wellman

Computer Science, University of Guelph: Prof. Tom Carey

GRADUATES

Our graduates are active in careers in research and teaching at sites including the University of Alberta, Carnegie-Mellon University, Alias Research, Apple, Bell Laboratories, Bell Northern Research, Bellcore, Microsoft, Pixar, SCO, and Xerox PARC. Their products including a number of distinguished Ph.D. dissertations (Myers, 1988; Fiume, 1989; Naiman, 1990) as well as an Academy Award (Lasseter and Reeves, 1989).

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