The 2007 Visualization Career Award

Stuart Card

The 2007 Visualization Career Award goes to Stuart Card, PARC, in recognition of sustained work in information visualization and human-machine interaction.

Since the 1970's, Stuart Card and his colleagues at PARC have developed methods based on task analysis, approximation, and calculation for analyzing human-machine interaction at design time and have built novel interfaces based on these methods. The mouse, the use of lines to group pull-down menus, and multiple desktop workspaces are examples of elements in common use in GUI interfaces as a result of these methods. He pioneered the area of information visualization, developing a reference model and a taxonomic characterization of the space of possible designs. In collaboration with his colleagues in PARC's User Interface Research group, which he headed, he developed user attention-reactive visualizations that used models of the user and task to increase the information communication rate to the user, for example, the information visualizer, the cone-tree, the perspective wall, degree-of-interest trees, the time-tree, the information grid, the web forager, and the 3Book. The IEEE VGTC is pleased to award Stuart Card the 2007 Visualization Career Award.

Stuart Card
Palo Alto Research Center
Award Recipient 2007

Biography

Stuart Card is a Senior Research Fellow at the Palo Alto Research Center. He received an A.B. degree in physics from Oberlin College in 1966. When Oberlin got its first computer, he became interested in computing and stayed for a year after graduation, first as assistant to the director and then as acting director of the Oberlin College Computing Center. Watching users, he became fascinated by the systematic subgoal structure of user behavior as users sought to overcome computer and program obstacles. Herbert Simon visited the campus to give a lecture on the emerging field of artificial intelligence, and after talking with him, Card decided to go to Carnegie Mellon University to study with Simon and his colleague Allen Newell, who became his thesis advisor.

At Carnegie Mellon, Card followed his own program of study combining computer science and psychology. Newell envisioned a new applied science of human with computers based on the theories of information processing psychology. He convinced the newly formed Xerox PARC to create a research unit with a ten year mandate to create this science. Newell, Card, and another student of Newell's, Tom Moran, formed the pioneering team.

As one of the first fruits of this effort, Card studied alternative input devices for the new office systems PARC was building. His theoretical characterization of why the mouse emerged as the best device in terms of Fitts's Law was a major factor leading to the mouse's commercial introduction by Xerox, Apple, and the industry. Other computational theories and methods for analyzing human-machine system designs followed. The Model Human Processor allowed simple calculations like maximum typing or handwriting rates and animation requirements. The GOMS and Keystroke-Level Model allowed estimates of task time for computer-based routine cognitive skills. These were summarized in the book The Psychology of Human-Computer Interaction, the first book to use the term "human-computer interaction" in its title.

Later work expanded the areas of human-machine interaction addressed. For example, Card worked with George Robertson and Jock Mackinlay to lay out the design space of possible computer input devices. With Austin Henderson, he generated the window working set characterization of user behavior with windows, leading to the Rooms multiple workspace system. He then began to focus with Robertson and Mackinlay on visualization of non-physical, abstract information, leading to a series of user attention-responsive "focus+context" visualizations, such as the cone tree and the web forager, collectively called the information visualizer. The design space of possible visualizations and examples of these were summarized in the book Readings in Information Visualization: Using Vision to Think with Mackinlay and Ben Shneiderman. Work with Peter Pirolli on information foraging theory and sensemaking extended the work into human interaction with information generally, especially the Internet.

The work of his group has resulted in a dozen Xerox products as well as the contributing to the founding of three software companies, Inxight Software, Outride, and Content Guard. Card is a Fellow of the Association for Computing Machinery (ACM), the first recipient of the ACM Computer-Human Interaction (SIGCHI) Lifetime Achievement Award, the first member of the ACM CHI Academy and a member of the National Academy of Engineering. He is the recipient of the 2007 Bower Award and Prize for Achievement in Science for fundamental contributions to the fields of human-computer interaction and information visualization. He has also received an honorary Doctor of Science from Oberlin College.

Award Information

The IEEE VGTC Visualization Career Award was established in 2004. It is given every year to an individual to honor that person's lifetime contribution to visualization. VGTC members may nominate individuals for the Visualization Career Award by contacting the awards chair, Bill Lorensen, at http://tab.computer.org/vgtc/.