

VIPS: VIRTUALLY INVENTED PEOPLE

Since the early days of computer animation, researchers and artists have been fascinated by the digital grail of creating a life-like resemblance. Recent advances in technology have brought us closer to that reality and toward the possibility of creating credible and plausible digital human forms complete with physical, behavioral, and emotional capabilities.

Building compelling, realistic virtual people is technically challenging, drawing on many disciplines beyond computer graphics. As we move toward a generation of digital characters, we will be presented with new possibilities. Novel forms of personal interaction, as well as human-machine communication, will become viable, and the interactions will be familiar as well as intriguing.

However, what repercussions will they have on our social networks, our basic human needs, our belief systems? This panel presents the exciting new generation of VIPs explore offer a glimpse into a what the future holds for the next generation of lifelike virtual humans, and discusses the social, entertainment, and psychological challenges that these technologies imply. Ananova, the world's first virtual news anchor (www.ananova.com), combines sophisticated real-time news and information systems with advanced instant animation techniques. The technical challenge for Ananova's creators was to engineer a fully animated virtual character capable of dealing with a vast range of dynamic content. Using XML as a basis for video scripts, the Ananova team gave the character the flexibility to respond differently to any given news item and to behave appropriately in many different situations.

On the Web, Ananova can be seen in the form of streaming video. However, this is only one of many incarnations of the character currently in development. Ananova's vision of the future is one in which users will have access to a fully interactive personal information assistant that can help them find their way through an increasingly information-rich world.

The Ananova service focuses on provision of personalized, real-time breaking news. It alerts users to the information they need to know, the instant it happens. Users tailor the Ananova service to their own interests by choosing subjects from a catalog of over 3,000 topics, which is growing daily. When news breaks in their chosen areas, Ananova contacts the user via the Web, email, SMS, voice, or personal WAP page.

Andrew Burgess

Andrew Burgess is responsible for software development, Internet systems and connectivity, Web site construction, and project management for Ananova. He joined PA New Media as head of operations in January 1998 and previously worked for CompuServe UK as technical director during its period of fastest growth. He has also held positions with British Telecom and Knight-Ridder Information Services in a variety of technical and consumer-interfacing roles.

Barbara Hayes-Roth

People are social animals. As children, we play with dolls and other anthropomorphic toys. As adults, we enjoy character-based films

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and stories, as well as the colorful characters who enrich our daily lives. Equally important, whether we are working, learning, or playing, we interact more easily, more effectively, and more happily when our interactive partners are distinctive, interesting, empathetic individuals who communicate with us through natural and familiar social channels. For these reasons, we believe that smart interactive characters will offer a uniquely effective and satisfying interface between people and a variety of electronic experiences.

To fulfill their promise, interactive characters will need to have virtual "minds" that are every bit as expressive as their virtual "bodies." Like great works of art (paintings, photographs, animations, theatrical, and cinematic performances), great interactive characters will create the appearance that personality, thought, feeling, and intention drive meaningful behaviors. However, unlike the players in these traditional art forms, Virtually Invented Persons (VIPs) will not be posed or scripted. Instead, they will be open and dynamic performers, more like improvisational actors or people in their natural interactions. Thus, great VIPs will need expressive graphical bodies capable of generating meaningful but unscripted gestures and facial expressions in real time. And they will need expressive minds to manifest personality, thought, feeling, and intention in real time, in order to drive and coordinate meaningful verbal and non-verbal behaviors.

Barbara Hayes-Roth is the founder and CEO of Extempo Systems, Inc., an innovator in smart interactive characters for online learning, customer relationship management, and interactive entertainment. She led development of Extempo's award-winning technology and products. She holds a patent for the System and Method of Directed Improvisation by Computer Characters and has several other patents pending. Previously, she directed research on interactive characters, intelligent agents, and human cognition at Stanford University, the Rand Corporation, and Bell Laboratories. She has published over 100 research articles and given many invited speeches in the US and abroad. She holds a PhD in cognitive psychology from the University of Michigan, and she is a fellow of the American Association for Artificial Intelligence.

R.U. Sirius

From a virtual pop star to a virtual president. William Gibson's "Idoru" is just one among several novels that imagines a world with virtual pop stars. How will virtual celebrities and (eventually) politicians impinge on our social reality and our perceptions of reality? What role does giving synthetic intelligence a face play in preparing us for a human society entertained, entranced, and governed by reasoning machines? And as we move into a world in which even the neighborhood plumber has a persona that's up for periodic reinvention, to what

extent will we attempt to virtualize ourselves? Will we get to lead many simultaneous lives? These entertaining and interesting questions have no answers, but they do provide us with abundant opportunity for imagining.

R.U. Sirius was editor-in-chief of the world's first technoculture magazine, *Mondo 2000*, from 1989-1993. Since then, he has authored several books including *The Cyberpunk Handbook and Design For Dying* (with Timothy Leary), and written hundreds of articles for periodicals including *Time*, *Wired*, *Esquire*, and *Salon*. He is currently editor-in-chief of *Alternating Currents*, a quarterly print journal, and chairman of *The Revolution*, a political party.

Thomas Vetter

The challenge of creating virtual persons has always been attractive to humans. With the rapid development of computer graphics, many new forms of synthesians are being developed or discussed. One direction of this research and thought is to create a virtual copy of a real, existing person, a copy that simulates not only visual appearance and voice, but also language, specific knowledge, and behavior.

The focus of research in the computer graphics group at Universität Freiburg is how to create a convincing visual copy of a person's face from a small number of photographs, perhaps even a single image, or from video material. Our goal is to create novel, photo-realistic images and motion sequences that were not part of the original material. The challenge is to understand the minimal requirements necessary to build a convincing computer graphic model of a person's face from images and to understand the perceptual sensitivity of human observers to the variability of an individual face.

Our approach is based on a method that we call a morphable model. It is a general, flexible 3D face model. In an analysis by synthesis loop, a given novel image can be reconstructed by the model. Coded or described in terms of the internal model parameters, a face in an image can be rotated, re-illuminated, and animated. Starting from state-of-the-art image modeling techniques, we explore future directions in automated techniques for manipulation of portraits.

Learning the appearance of faces from other example faces might be a paradigm that could be transferred to simulation of more complex phenomena, such as facial gesture or even behavior and language.

Thomas Vetter is head of the Computer Graphics Group at Universität Freiburg, Germany. He studied mathematics and physics at Universität of Ulm, where he did his PhD on neuronal signal processing. In 1991, he joined a group led by Tomaso Poggio at the Center for Biological and Computational Learning at the Massachusetts Institute of Technology, where he worked on visual object recognition and learning strategies for representations of object classes. In 1993, he joined the Max-Planck-Institute Biologie in Tübingen, Germany, where he started his work on models for analysis and synthesis of face images, which is still his main focus of research.

Keith Waters

The human face is the most expressive component of any Virtually Invented Person (VIP) so getting the face "right" is vital. The face has to be believable, especially if we are presented with a representation of a real person. In fact we are "wet wired" to interpret images of faces, which makes the task even harder, because even the subtlest incorrect movements are easily detectable. If it looks like a person, we expect it to behave like a person.

The goal of creating a synthetic representation that is indistinguishable from a real person has been the subject of much investigation over the last decade. Achieving this goal has been technically challenging. Not only does the physical representation of the face have to be accurate, but also the face has to move, talk, and act in a plausible fashion. Progress has been made in some key areas of facial synthesis, while other areas remain relatively unexplored. So what aspects of facial synthesis are easy, and what aspects are hard? What areas of investigation are required to bring life to VIPs? Understanding where some of these technical boundaries exist helps us build new and exciting artifacts.

Keith Waters is currently the senior technical officer of LifeFX. Prior to joining the company, he was a principal member of the technical staff at Compaq Computer Corporation's Cambridge Research Laboratory. While at Compaq, he studied novel forms of human computer interaction, including facial animation synthesis. He is co-author of a standard text in the field, *Computer Facial Animation*, and he has published numerous papers on the subject. While at Compaq, he was responsible for development of FaceWorks, a Windows-based multimedia authoring tool for synthetic faces. Prior to 1999, he was at Digital Equipment Corporation, where he developed DECface, a real-time synthetic face utilizing DECTalk, a software text-to-speech engine.

Kathryn Saunders

Kathryn Saunders is a founding partner of ThinkTech, a consulting firm that designs and develops location-based and e-based experience strategies. She has been actively involved with SIGGRAPH for many years. She is Panels Chair for 2001, and for SIGGRAPH 99, she chaired Emerging Technologies, where she developed and executed the Millennium Motel concept and curated several elements including the entry portal and Route 66.

Trained as an architect, she practiced architecture with two of Canada's leading design firms and has taught architecture at two Canadian universities. Prior to her current post, she was executive director of the Digital Media Institute and creative director, digital media, at the Royal Ontario Museum. At the museum, she developed MYTHICA, an educational entertainment destination that uses a profiling system, wireless technologies, and intelligent autonomous agents to deliver personalized information before, during, and after a visit, based on the visitor's behavior and aspirations. A recipient of many interactive media awards, she has consulted and lectured around the globe from North America to Saudi Arabia and Japan.