
Keith Waters

Curriculum Vitae

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617 965 4954
keith@ifacelab.com

- EDUCATION
- ◇ **Middlesex University:** 1995-1988, Barnet, London, UK.
Ph.D. computer graphics
Title: *The computer synthesis of expressive 3D facial character animation.*
 - ◇ **Middlesex University:** 1985, Barnet, London, UK.
M.Phil. transferred to Ph.D.
 - ◇ **Middlesex University:** 1983-1985, Barnet, London, UK.
B.A. graphic design, first class honors

SKILLS

Researcher, developer, scientist
Computer graphics, human computer interaction, computer vision
Face modeling, simulation, rendering and animation
Mobile Web, advanced mobile devices, multimodality
Large scale data visualization
C, C++, Fortran, Pascal

MOST HIGHLY
CITED
PUBLICATIONS

771 citations: ACM '87, A muscle model for animation
630 citations: A.K. Peters, '08, Computer Facial Animation
586 citations: IEEE, '93, Anyalsis and synthesis of facial image sequences

BOOKS

Computer Facial Animation, second edition, Frederic I. Parke and Keith Waters. A.K. Peters Ltd., Boston Massachusetts, ISBN 1978-1-56881-448-3 Hardcover, pp. 454, 2008.

Computer Facial Animation, Frederic I. Parke and Keith Waters. A.K. Peters Ltd., Boston Massachusetts, ISBN 1-56881-014-8 Hardcover, pp. 450, 1996 (sold out).

BOOK
CHAPTERS

Waters, K. *Simplifying the Multimodal Mobile User Interface*, Stan Kurkovsky (ed), IDG Publications, due 2009.

Waters, K., Rehg, J., Loughlin, M. and Kang, S. *Computer Vision for Human-Machine Interaction*, Roberto, C, and Pentland, A (eds.), Cambridge University Press, pages 83-96, 1998.

Waters, K. *Synthetic Muscular Contraction on Facial Tissue Derived from Computerized Tomography Data*, Taylor, R., Lavallee, S., Burdea, G. and Moges, R. eds., MIT Press, Cambridge Massachusetts, pages 191-199, 1996.

Waters, K. *Modeling Three-Dimensional Facial Expressions, Processing Images of Faces*, Bruce and Burton (eds.), Ablex, New Jersey, pages 202-227, 1992.

JOURNAL
ARTICLES

Parise, S., Kiesler, S., Sproull, L., and Waters, K. *Cooperating with life-like interfaces*. Computers in Human Behavior, 15, 123-142, 1999.

Yuencheng, L., Terzopoulos, D. and Waters, K. *Realistic Modeling for Facial Animation*, In Computer Graphics (SIGGRAPH 1997), pp. 55-62, 1995.

Waters, K. and Levergood, T. *DECface: A System for Synthetic Face Applications*, Multi-media Tools and Applications, Vol. 1, No. 4, pp. 349-366, Nov 1985.

Kiesler, S., Sproull, L. and Waters, K. *A Prisoner's Dilemma Experiment on Cooperation With People and Human-Like Computers*. Journal of Personality and Social Psychology. Vol. 70, No 1, 47-65, 1996.

Terzopoulos, D. and Waters, K. *Analysis and Synthesis of Facial Image Sequences Using Physical and Anatomical Models*, IEEE Transactions on Pattern Analysis and Machine Intelligence, pp. 569–579, Vol. 15, No. 6, June 1993.

Waters, K. and Terzopoulos, D. *The Computer Synthesis of Expressive Faces*, Philosophical Transactions of the Royal Society London [B], Vol. 335, No.1273, pp. 87–93, January 1992.

Waters, K. and Terzopoulos, D. *Modeling and Animating Faces using Scanned Data*, The Journal of Visualization and Computer Animation, Vol. 2, No.4, pp. 123–128, December 1991.

Carlbon, I. et al., *Modeling and Analysis of Empirical Data in Collaborative Environments*, Communications of the ACM. Vol. 35, No. 6, pp. 74–84, June 1992.

Terzopoulos, D., and Waters, K. *Physically-Based Facial Modeling, Analysis, and Animation*, The Journal of Visualization and Computer Animation, Vol. 1, pp. 73–80, December 1990.

Waters, K. *A Muscle Model for Animating Three-Dimensional Faces*, (SIGGRAPH 87) Computer Graphics, Vol. 21, No. 4, pp. 17–24, July 1987.

REFEREED
CONFERENCE
PRESENTA-
TIONS

Dariush, B., Kang, S.B., and Waters, K. *Spatiotemporal Analysis of Face Profiles: Detection, Segmentation, and Registration*, Proc 3rd International Conf on Face and Gesture Recognition, Japan, pp. 248-253, April, 1998.

Goldenthal, G., Waters, K. Van Thong, J-M., and Glickman, O. *Driving Synthetic Mouth Gestures: Phonetic Recognition for FaceMe!* Proceedings of Fifth European Conference on Speech Communication and Technology (Euro Speech), Vol. 4, pages 1995-1998, Sept, 1997.

Waters, K. and Frisbee, J. *A Coordinated Muscle Model for Speech Animation*, Graphics Interface 1995, Canadian Human-Computer Communications Society, pp. 163–170, Ontario, Canada, May 1995.

Sproull, L., Subramani, M., Kiesler, S., Walker, J., and Waters, K. *When the Interface Is a Face*, Cambridge University Press, Human Values and the Design of Computer Technology, ed., B. Friedman, pp. 163–185, 1997.

Waters, K. and Levergood, T. *An Automatic Lip-Synchronization Algorithm for Synthetic Faces*, ACM Multimedia, San Francisco, pp. 149–156, October 1994.

Lee, Y., Terzopoulos, D., and Waters, K. *Constructing Physics-Based Facial model of Individuals*, Graphics Interface 1993, Canadian Human-Computer Communications Society, pp. 1–8, May 1993.

Terzopoulos, D. and Waters, K. *Analysis of Facial Images using Physically-Based and Anatomical Models*, Proceedings IEEE Computer Vision, Japan, pp. 727–732, May 1990.

Waters, K. *A Physical Model of Facial Tissue and Muscle Articulation Derived from Computer Tomography Data*, Proceedings of the Second Conference Visualization in Biomedical Computing, Chapel Hill, N. Carolina, SPIE, Vol. 1808, pp. 574–583, October 1992.

Waters, K. and Terzopoulos, D. *A Physical Model of Facial Tissue and Muscle Articulation*, Proceedings of the First Conference of Visualization in Biomedical Computing, Atlanta, Georgia, pp. 77–82, May 1990.

TECHNICAL
REPORTS AND
OTHER
PUBLICATIONS

Waters, K., Tucker, J., Sierra, M., et. al., *Web Rendering for Orange Devices*, Orange Labs, White Paper, May 21 2009.

Waters, K., Ondet, O., Goumount, R., and Fodor, S., *Browsing: Towards an Integrated Operator*, White Paper, Aug 4 2005.

Guillaume, G., Morvan, A., Mitukiewicz, E., Waters, K., and Lucas, P., *The Integrated Operator: A Mobile Perspective, Mobile Web Initiative*, Nov '04, 2004.

Waters, K. and Levergood, T. *DECface: An automatic Lip-Synchronization Algorithm for Synthetic Faces*, CRL Technical Report 93/4, September 1994.

Terzopoulos, D. and Waters, K. *An Algorithm for Reconstructing Faulted Sub surfaces from Scattered Data*, In Proceedings of the 4th Schlumberger Software Conference, Vol. 2, pp. 245–250, March 1990.

Waters, K. and Wang, S. *A 3D Interactive Physically-Based Micro-World*, SPIE Symposium on Electronic Imaging Science and Technology, pp. 91–98, February 1990.

Waters, K. and Terzopoulos, D. *Interactive Visualization of 3D Geophysical Data on a Graphics Super workstation*, In Proc of the 4th Schlumberger Software Conference, Vol. 2, pp. 229–333, March 1990.

Celniker, G., Chakravarty, I., Highnam, P., Waters, K. and Anderson, B. *An Interactive 3D Graphical Computing Environment for Electromagnetic Tool Modeling and Log Interpretation*, Research Note, SDR EMG-002, August 5, 1991.

Waters, K. *Animating Human Heads*, Proceedings of Computer Graphics, Online Publications, pp. 89–97, September 1987.

PATENTS

US: 5,657,426, Method and Apparatus for Producing Audio-Visual Synthetic Speech, Waters, K. and Levergood, T. Issued Aug 12th 1997.

US: 5,884,267, Automated Speech Alignment for Continuous Natural Speech Goldenthal, B., Van Thong, J-M. and Waters, K. Issued Mar 16th 1999.

US: 5,936,615, Image-Based Touch Screen, Waters, K. Issued Jul 10th 1999.

US: 6,016,148, Automated Mapping of Facial Images to Animation Wireframe Topology, Kang, S., Waters, K. Issued Jan 18th 2000.

US: 6,031,539, Facial Image Method and Apparatus for Semi- Automatic Mapping a Face onto a Wireframe Topology, Kang, S. and Waters, K. Issued Feb 29th 2000.

US: 6,052,132, Technique for Providing a Computer Generated Face Having Coordinated Eye and Head Movement, Christian, A., Avery, B., and Waters, K. Issued Apr 18th 2000.

US: 6,256,046, Method and Apparatus for Visual Sensing of Humans for Active Public Interfaces, Waters, K., Loughlin, M., Rehg, J. and Kang, Issued Jul 3rd 2001.

EP: 1 646 037 A2, Method and Apparatus for Enhancing Speech Recognition Accuracy by Using Geographic Data to Filter a Set of Words. Waters, K. Benoit, S. Issued: April 4th 2009.

PATENTS
PENDING

EP Patent pending: Gesture Driven Mobile Browsing, Waters, K., Lassey, B., Zakielarz, P. and Williams C. 2006.

EP Patent pending: A System and Method for Managing Widgets, Waters, K. and Rosenblatt, K. Filed: Nov 14th 2008.

EP Patent pending: A Method and Apparatus for Navigating Web User Interfaces on Mobile Devices Using Clutch-Tilt and Clutch-Snap Gestures, Waters, K. Sierra, M. Tucker, J. Filed: May 2nd 2009.

PROFESSIONAL ◇
EXPERIENCE

Akamai Technologies Inc., Boston, MA March - August 2010: Principal Architect. Assisted with the acquisition of Velocitude a mobile content adaptation company. Engaged in strategic activities for a global mobile CDN.

- **Generated** the key technical due diligence report, directed the technical team integration and created resource plans.
- **Technical strategic planning** for global content acceleration within mobile operator networks.

- ◇ **Orange Labs Boston, MA 2002 - 2009:** Senior Director of Research.
Created small highly motivated engineering teams. Set the technical direction of mobile Web applications, open mobile Linux design and multimodal interaction. Promoted by France Télécom to Senior Expert in Services and Usages 2004.
 - **Designed an open mobile device** – and developed in rapid succession a series (4) of high performance open mobile Linux handsets (20) with WebKit as a core Web layout engine for the visual interface. Led the design of *end-to-end top-to-bottom* mobile Web application service architecture supporting the device.
 - **Drove Web compliant mobile Web mini-app development** to demonstrate the power of Web compliance for mobile widget services for remote and local apps developed with JavaScript, AJAX, CSS, XHTML, DOM, and XMLHttpRequest, capable running on Google Android G1, Apple iPhone, Nokia N95, WM6.0 and Linux prototypes. Knowledgeable of local/remote technical issues and solutions. Encouraged the use of widget packaging and delivery mechanisms.
 - **Created mobile browsing services** – using widgets on Opera Mobile (customized under contract) and Minimo (Mozilla contract) for Orange mobile signature devices (S60 and WM 5.0) for experiments with next-generation mobile applications. Formulated, designed and executed trials in the UK and Spain.
 - **Instrumental in promoting the Mobile Web Initiative** – within Orange to engage in the W3C Mobile Web Initiatives and Mobile Best Practices. Multiple internal and external press engagements, technical conferences, workshops, presentations and reviews.
 - **Led the multimodal domain** – directing multiple programs and projects throughout Orange R&D. Approved technical approaches and budgets for programs within the company. Generated key technical mobile multimodal roadmaps.
 - **Created a mobile multimodal prototype service** – for France Telecom business unit PageJaunes operating on Sony Ericsson P900 and Orange SPV handsets using in-network services. Executed consumer field trials on the streets of Paris generating valuable interaction data.
 - **Active participation in W3C Standards** – chair and co-author of the Device Delivery Context Interfaces, promoted the Mobile Web Initiative for Orange within the W3C, significant contributor to the W3C Multimodal Interaction Framework and drove XHTML1.1, CSS2.1, ECMA-262, DOM level 2 and XMLHttpRequest Web standards into the Orange group device requirements.
- ◇ **LifeF/X Inc., MA 1999–2002:** Senior Technology Officer.
Defined the technologies required for LifeF/X IPO in '99 as a founding member of the company. Created the company's technical direction for life-like CG characters. Originally developed for the film and television markets transformed the technology into consumer and professional products:
 - **Player** - a real-time (30fps, 10kbps) ActiveX player. Shipped four versions.
 - **FaceMail** - an embedded Player in Office Mail using TTS and voice synchronization.
 - **FaceXpress** - audio processing and animation content authoring. Shipped Feb '02.
 - **POD** - Stand-In creation from a single face image in minutes. Product with Kodak.
 - **Designed and engineered** the first prototype player from which all subsequent products were derived, capable of real-time animation and speech synchronization to a text-to-speech engine. Architected and designed the core player engine.
 - **Grew** the company hiring senior technical leads, engineering management and a core software team.

- **Led** the technical development of LifeF/X streaming technology in conjunction with a third party nellymoser Inc., Dec 2000. Created a technology with their codecs capable of data rates of approximately 10kbps with latencies of less than 1 sec.
 - **Invented** the core lip-synchronization speech technology for IBM's ViaVoice text-to-speech and real voice synchronization (nellymoser Inc.,) products. Subsequently developed numerous internal viseme/phoneme editing tools.
 - **Designed** the server side text-to-speech engine with AT&T Naturally Speaking. Assisted the AT&T TTS group develop their first wav file-processing product.
 - **Built** a service bureau for customer data processing. Generated \$0.3M revenue.
 - **Generated** the Kodak engagement for LifeF/X. Defined the production system to semi-automatically create Stand-Ins in a few minutes with minimal user interaction.
 - **Interviewed** by The Learning Channel and Discovery Channel(PBS) as a visionary on the future in 2025, Oct 2001.
- ◇ **Compaq Computer Corporation, MA 1998–1999:** Senior member of the research staff, Cambridge Research Laboratory, Massachusetts.
- *Jul 98–Sept 99:* **Created** the Multi-use-Camera Project (MuC). Invented a vision-based touch screen and Invisible-Mouse interfaces. Transferred prototypes to the Commercial Portable group within Compaq.
 - *Jun 99:* **Promoted** to Senior Member of the Research Staff.
 - *Apr 99:* **Invented** a unique Message Panel system using a real time vision sensor and audio/visual feedback on a Compaq Presario 5560. Presented a live demonstration at Innovate 1999, Houston Texas for 5,000 top Compaq customers. Replicated the demonstration in June at DECUS, Rode Island.
 - *Nov 98:* **Demonstrated FaceWorks** in during Compaq CEO Eckhard Pfeffer's keynote presentation at Comdex Las Vegas. FaceWorks was a live demonstration simultaneous broadcast on the Internet.
- ◇ **Digital Equipment Corporation, MA 1991–1998:** Consulting Engineer, Cambridge Research Laboratory, Massachusetts.
- *97–99:* **Technical** and engineering manager for **FaceWorks** a Multimedia authoring tool for W95 and WNT running on Pentium class machines and a streaming facial animation Web client. Team consisted of 10 software and engineers. Contributions over a nine month period:
 - **Business plan author** presented to senior Digital management.
 - **Generated** detailed technical specifications for **FaceWorks** a real-time Multimedia authoring Tool for W95 and WNT. The product involves mapping Jpeg images to 3D geometry and time aligning spoken speech to facial actions. The delivery mechanism was a real-time streaming client using RealNetworks RealMedia SDK's (G2). The software development was based on reusable COM and ActiveX components. Assigned and managed the technical team through QA to shipping using the following development and code management tools, MSVC++ 5.0, COM, MS Source Safe and Visual Intercept.
 - **Employed** a team of software engineers: 6 full-time Digital staff - 3 at CRL and 3 remote in Australia. Hired additional 4 contract software developers over the lifetime of the project.
 - **Engineered** the core facial animation software to animate and three-dimensional face rendering that lip-synchronize at a minimum of 15fps. This involved custom texture rendering algorithms running on standard Pentium class machines.

- **Developed** content from a weekly 30 min audio steaming newsletter by Jeff Harrow from a server at CRL. Specified the Internal Web site externally designed by Onward Tech. Assisted in a Digital internal field test of the client with 1,000+ downloads.
 - **Garnered** strategic partnerships from **ABC** Starwave and OneZero Media to use **FaceWorks** to generate content for the Real Networks Developers Conference. OneZero Media developed character called Charlie. Interviews by ABC Australia (broadcast Spring 1998) and OneZero Media (broadcast nationwide 2/27/98) about **FaceWorks** and character Web animation.
 - *95–97*: **Led** the Vision-based **HCI** group involving 4 researchers in prototyping the first Smart Kiosk. This involved implementing vision sensing and audio/visual feedback mechanisms. The prototype was developed on 3 synchronized 233 MHz Digital Alpha UNIX workstations using TCP/IP. Patented invention.
 - *94–95*: **Designed**, implemented and shipped **DECface** for the Digital Alpha AXP UNIX Multimedia suite. This product complimented **DECTalk**.
 - *93*: **Evaluated** the Kubota V 6/20 graphics system for Alpha AXP team. Evaluation was provided to Digital engineering and marketing.
 - *93*: **Assisted** D. Wecker in Bob Palmer’s 1993 Comdex CEO perspective presentation by providing the core facial animation code that was ported to the first Digital Alpha NT workstation. Created synthetic personas of Bob Palmer and other senior corporate VP’s. Promoted to Consulting Engineer based on these contributions to the company.
 - *91–94*: **Productive** member of the visualization group. Computer Graphics, Multimedia, Computer Vision, physically based modeling, medical volume visualization and surgical simulation research. Involved in creating many external demonstrations for example **SIGGRAPH** Digital Booth in 95&96, Digital Innovation showcase at DECworld 93 which appeared on local Channel 5 News. Worked on the DECMPP12000, a massively parallel system for skin tissue dynamics. Generated many significant publications in the field and filed patents (see below).
- ◇ **Schlumberger Lab for Computer Science** 1988–1991: Member of the scientific staff, Austin, Texas.
 - **Implemented** scientific visualization and interaction techniques of forward modeling borehole and seismic simulations on a SGI 4D graphics workstation using Silicon Graphics Iris GL.
 - **Developed** an interactive visualization interface for the Formation Micro-scanner and the Electromagnetic Induction borehole tools.
 - **Developed** 3D seismic data visualizations on the Connection Machine-2 system and the Silicon Graphics workstations over a Virtual Memory Interface to the CM2. Involved in dramatically reducing total time for seismic processing using massively parallel processing. Investigated very large-scale volume visualization techniques involving parallel data slicing from the CM2 data vault.
 - ◇ **IO Research Ltd.**, 1988: Freelance software engineer, London, England. **Developed** an interactive three-dimensional face articulation package for Designer3D – an in-house modeling and animation system running on I486 PC’s using Pascal.
 - ◇ **BenchMark Technologies Ltd.**, 1987: Freelance software engineer, London, England. **Developed** three-dimensional graphics display algorithms on their custom Graphic Image Processing board over a three-month period. Generated animation sequences for SIGGRAPH 1987 technical paper: *”A Muscle Model for Three-Dimensional Facial Animation”*.
 - ◇ **Cal Video Graphics** 1985: Designer, London, England. **Produced** 3D promotional advertisements for Audi and Texas Homecare with video production of the Bosh FGS and VAX 11/785.

- ◇ **British Broadcasting Corporation** 1985: Internship as an Assistant Designer, Current Affairs department, Lime Grove, London, England.
Assigned to **Newsnight** a nightly news program. Trained to use traditional and electronic graphics on the newly introduced Quantel Paintbox.

- TEACHING ◇ **Middlesex University** 1985–1987: Research Assistant Lecturer, London, England.
Taught the undergraduate BA Art and Design students on the fundamentals of two and three-dimensional Computer Graphics using PICASSO and Prism Fortran software. Lectures and tutorials for the MA Computing in Design course. Lectures on the internal and external retraining courses including the introduction and advanced courses in Computer Graphics. Individual lectures at Gloucestershire Graphic Design Department, South Glamorgan Institute, and Harrow College.

- STANDARDS SERVICE ◇ **A Next Generation Delivery Context Interface**, Waters, K., and Rosenblatt, K. W3C International Workshop on Distributed Web Applications, Dublin, Ireland, June 5-6, 2007.
Delivery Context: Client Interfaces (DCCI) 1.0 Accessing Static and Dynamic Delivery Context Properties. W3C Candidate Recommendation, Dec 2007.
A Device Description Repository: An Integrated Operator’s Perspective, K. Waters et, al. W3C International Workshop on the Implementation of a Device Description Repository, Madrid, Spain, July 12 2006.
Mobile Web Initiative Event: Mobile Web Challenges and Potential, London, UK, Nov 15 2005.
W3C Mobile Web Initiative Towards an Integrated Operator: A mobile perspective, Nov 11, 2004.
Delivery Context Interfaces: DCI: Accessing Static and Dynamic Properties. W3C Candidate Recommendation, Nov 2006.
W3C Multimodal Interaction Framework, W3C Note, May, 2003.

- RECENT PUBLIC PRESENTATIONS ◇ **Mobile Internet World 08**: Mobile Content and Entertainment, Oct 2008.
International Wireless Consortium IWPC: Green Devices and Accessories, Sept 2008.
Mobile Mondays: Browsers - Driving the Web or Driven by the Web? June 2008.
Mobile Internet World 07: How the Mobile Internet will Change Your Life. Nov 2007.

- SELECTED LIST OF INVITED TALKS ◇ **ATR**: 6th Symposium on Face and Object Recognition, Japan, July 1999.
AT&T Seminar Series: *Computer Facial Animation*, November 1998.
MPEG4 meeting: Very Low Bit-Rate Coding (VLBC), University of Illinois Urbana: High Fidelity Facial Animation, October 1998.
Life-Like Computer Characters: Snowbird, Utah, October 1994.
NSF Workshop: *Computer Generated Faces*, Upenn, April 1994.
MIT AI Lab: September 1994.
MIT Computer Vision Lab: Feb 1994.
MIT Sensory Communication Lab: September 1993.
Harvard Robotics Lab: November 1993.
Dept of Radiology University of Pennsylvania, March 1993.
Dept of Radiology University of Washington: *Physically-Based Modeling for Facial Synthesis and Analysis*, 1993.
CSERIAC: Crew System Ergonomic Information Analysis Center, March 1992.
Royal Society: Discussion Meeting: Processing the Facial Image, London UK, July 1991.
SIGGRAPH Panel: *Facial Animation: Past, Present and Future*, 1997.
SIGGRAPH Panel: *Virtually Invented People*, July '01.
SIGGRAPH Course 2: *Computer Vision for Computer Graphics*, Florida, 1994.
SIGGRAPH Course 22: *State of the Art in Facial Animation*, Dallas, July 1990.

SIGGRAPH Course 26: *State of the Art in Facial Animation*, Boston, July 1989.
Imagina'95: *DECface: A Lip-Synchronization Algorithm for Synthetic Faces*, Monte Carlo, France, February 1995.
Imagina'88: *3D Facial Animation*, Monte Carlo, France, February 1988.
Imagina'87: *3D Computer Generated Faces*, Monte Carlo, France, February 1987.

PROFESSIONAL ACTIVITIES AND SERVICE NSF Research grant proposal review committee, Sept 1999.
Ph.D. supervision for Joe Frisbee RLE labs MIT.
Ph.D. supervision for Rebecca Hwa, Harvard Computer Science Dept.
Area Editor for Graphical Modeling and Image Processing Academic Press. Editorial board for the Journal of Visualization and Animation, John Wiley and Sons, UK.
Program committee ICSC'95 Image Analysis Applications and Computer Graphics, Hong Kong.

AWARDS
1988: Grand Prix Parigraph Research Category, Paris.
1988: Third Place Graduate, National Computer Graphics Association, USA.
1986: Supreme Award Winner, Computer Animation Film Festival, London.
1986: Student Award Winner, Computer Animation Film Festival, London.
1985: Thames Television Bursary to the USA.
1985: First Place Calcomp International Art Award LA, USA.

EXHIBITIONS, TV BROADCASTS AND NEWS MEDIA
2001 **Broadcast:** PBS, *The future in 2025*, The Learning Channel & Discovery Channel.
1998 **Article:** Computer Graphics World, *Facial animation head on*.
1998 **Broadcast:** Australian Broadcasting Corporation (ABC) *The Face Quantum*.
1998 **Broadcast:** Australian Broadcasting Corporation (ABC) Broadcast, *Synthespians*, The Wild Wild Web.
1995 **Article:** Washington Post June 1: *User-Friendly?*
1994 **Article:** The New York Times: Science Section June 28: *Japanese Put a Human Face on Computers*.
1993 **Exhibit:** *The Human Body*, Centre Georges Pompidou, France.
1992 **Broadcast:** BBC2, *Antenna*, UK.
1991 **Broadcast:** BBC2, *The Human Face*, UK.
1988 **Exhibit:** *Les Chemins du Virtuel*, Centre Georges Pompidou, France.
1988 **Broadcast:** European television center, *Ondes de Choc*, Metropole, France.
1988 **Broadcast:** BBC2 *Welcome to my world*, UK.
1987 **Broadcast:** Belgian Television, *Charbon Velliers*.
1987 **Broadcast:** BRTV Germany, *Computertreff*.
1986/87 **Broadcast:** BBC2, *Micro-Live*, UK.
1986 **Exhibit:** *Art, Science, and Industry*, Imperial College, London.
1986 **Exhibit:** Thames Television Bursary Exhibition, London.
1985 **Exhibit:** *Electronic Paintbrush*, Museum of Science and Industry, LA USA.
1984 **Broadcast:** BBC2 *Debut*, UK.
1984 **Broadcast:** Télévision Française TF1, *Eiffel Tower* France.