

Gabriel Robles-De-La-Torre, PhD

Neuroscientist, Computer Engineer

PROFESSIONAL OBJECTIVES

Research on human haptic perception and performance in real/virtual environments; perception-based haptic rendering algorithms; human multisensory integration in real/virtual environments (vision and touch). My background in both scientific research and computer engineering provides me with special qualifications to solve interdisciplinary problems in these areas.

SPECIAL SKILLS

Proficiency in finding imaginative solutions for research and practical problems. Have demonstrated this in industrial and academic positions, involving research, engineering and management responsibilities.

Leadership and organizational skills backed by eighteen years of experience in computer system analysis, design and implementation. My experience ranges from real-time human-machine interfaces to mission-critical systems, and from microprocessors to massively parallel supercomputers.

Self-motivated and perseverant.

Excellent communication and interpersonal skills.

Fluent in English and Spanish. Working knowledge of Italian.

EDUCATION AND AWARDS

2008 Profiled in Marquis Who's Who in the World, 25th Silver Anniversary Edition.

2008 Member, New York Academy of Sciences. Membership granted in appreciation of an invited lecture.

1998 PhD, neuroscience, Brandeis University, USA. Supported by Fulbright and Brandeis U. fellowships.

1995 MS, neuroscience, Brandeis University, USA. Supported by Fulbright and Brandeis U. fellowships.

1992 Computer engineer, National Autonomous University of México (UNAM).

PUBLICATIONS

- 2008** Robles-De-La-Torre G. "Principles of Haptic Perception in Virtual Environments". Invited book chapter in Grunwald M (Ed.), *"Human Haptic Perception"*, Birkhäuser Verlag. In preparation.
- 2006** Robles-De-La-Torre G. "The Importance of the Sense of Touch in Virtual and Real Environments". IEEE Multimedia 13(3), Special issue on Haptic User Interfaces for Multimedia Systems, pp. 24-30.
- 2006** Portillo-Rodriguez O, Avizzano CA, Bergamasco M & Robles-De-La-Torre, G. "Haptic rendering of sharp objects using lateral forces ". IEEE RO-MAN 06, U.K.
Reviewed in *The Economist* and in *MIT's Technology Review Online* (see Media section below).
- 2004** Robles-De-La-Torre G. & Sekuler R. "Numerically Estimating Internal Models of Dynamic Virtual Objects". ACM Transactions on Applied Perception, 1(2), pp. 102-117.
- 2004** Hayward V, Astley OR, Cruz-Hernandez M, Grant D & Robles-De-La-Torre G. "Haptic Interfaces and Devices", Sensor Review 24(1), pp. 16-29.
- 2003** Howarth P, Clemes S, Hodder S, Moffitt K, Robles-De-La-Torre G, Ruddle R, Steed A. "Review of the Handbook of Virtual Environments: Design, Implementation, and Applications". Presence, Vol. 12, April, pp. 231-236.
- 2002** Robles-De-La-Torre G. "Comparing the Role of Lateral Force During Active and Passive Touch". Proceedings of Eurohaptics, University of Edinburgh, U.K., pp. 159-164.
- 2001** Robles-De-La-Torre G & Hayward V. "La force au bout des doigts". Pour la Science (French edition of Scientific American). Invited paper, October issue, p. 15.
- 2001** Robles-De-La-Torre G & Hayward V. "Force Can Overcome Object Geometry in the perception of Shape Through Active Touch". Nature 412, pp. 445-8. **Reviewed in Flanagan JR, Lederman SJ, "Neurobiology: Feeling bumps and holes", News and Views, Nature 412, 2001, pp. 389-91.**

PUBLICATIONS (cont'd)

- 2000** Robles-De-La-Torre G & Hayward V. "Virtual Surfaces and Haptic Shape Perception", Proceedings, Haptic Interfaces for Virtual Environment and Teleoperator Systems Symposium, ASME International Mechanical Engineering Congress & Exposition, USA, pp. 1081-1087.
- 1997** Robles-De-La-Torre G & Sekuler R. "Learning a Virtual Object 's Dynamics: Spectral Analysis of Human Subject 's Internal Representation ". Abstract, Proceedings of the International Conference on Vision, Recognition, Action: Neural Models of Mind and Machine, Boston University, USA
- 1996** Robles-De-La-Torre G & Sekuler R. "Learning the Dynamics of a Virtual Object: Practice Builds an Internal Model ". Society for Neuroscience Abstracts, USA.
- 1993** Robles-De-La-Torre G & Fernández-Anaya G. "Optimum Polytopal Vector Quantization with Computed Progressive Decoding ". Proceedings of the IEEE-CIE International Conference on Signal Processing, Beijing, China.

EXPERIENCE IN BASIC/APPLIED RESEARCH AND COMPUTER SYSTEMS

- 2004- Present** Collaboration with Dr. Carlo A. Avizzano on haptic rendering. Perceptual Robotics Center (PERCRO), Italy.
- 2004- Present** Private consultant (including invention/grant evaluation and project review) for US and European institutions, including the European Commission (by invitation). European work performed in Italy, Belgium, U.K. and Luxembourg.
- 2004 Sept.- 2005 Aug.** Research Fellowship. Collaboration with Dr. J. Randall Flanagan on haptic perception of shape. Cognition & Action Laboratory, Queen's University, Canada.
- 2004 June-Dec.** Honorary Research Fellowship, Sensory Motor Neuroscience Center, University of Birmingham, U.K. Collaboration with Dr. Alan Wing on haptic perception of shape.
- 2004 Jan.** Visiting scientist, Robotics Laboratory, University of Siena, Italy. Collaboration with Dr. Federico Barbagli on haptic rendering.
- 2002-03** Project leader, Petroleum Institute of México. Identified untapped, innovative opportunities for haptic technology R & D in oil & gas exploration. Applied specialized knowledge in neuroscience and engineering to conceptualize related, specific applications. Prepared successful internal funding proposals to develop these applications. Led two PhDs in basic research related to these projects. Consulted for the Oil Exploration Dept. on stereoscopic visualization. Other responsibilities included: task planning and assignment, evaluation of engineering requirements and current technologies, advice/presentations to senior executives, preparation of budgets.
- 1999-2001** Postdoctoral scientist, Haptics Laboratory, Center for Intelligent Machines, McGill University, Canada. Collaboration with Dr. Vincent Hayward. Research on haptic perception of shape using virtual objects. Discovered how the haptic shape of a physical object can be perceptually altered in a radical manner through the simultaneous presentation of a specially-designed virtual object. Designed perception experiments. Used real-time programming and the PenCAT/pro haptic interface to implement the experiments. Wrote research protocol, designed test materials, recruited and tested subjects.
- 1999** Postdoctoral scientist, Center for Vision Research, York University, Toronto, Canada. Stereopsis research applied to 3D film technology.
- 1997-98** Research associate, Ashton Graybiel Spatial Orientation Laboratory, Brandeis University. Collaboration with Drs. P. DiZio, J. Lackner and R. Sekuler. Extended my dissertation 's work to measure human visuomotor learning when haptic and visual cues were combined. Designed required experiments. Used real-time programming and the PHANToM haptic interface to implement the experiments. Designed materials, recruited and tested subjects.
- 1995 summer** Researcher, Department of Computer Science, Brandeis University. Designed vector quantizers with a massively parallel supercomputer (MASPAR/2 with 4096-nodes).

EXPERIENCE IN BASIC/APPLIED RESEARCH AND COMPUTER SYSTEMS (cont'd)

- 1993-98** Original research for my doctoral dissertation. Experience in concepts and methods of neuroscience research, including those of experimental psychology (perception, learning, visuomotor integration, normal aging) and computational modeling of brain function (neural networks, human memory).
- 1993** Project leader, Multivision-Comband Corporation, México. Led staff to analyze, design and implement mission-critical systems in México's leading pay TV company (real-time database transactions, remote programming of setup boxes, automated customer service).
- 1991-92** System analyst/programmer, Intellimap Inc., México. Developed geographical information systems. Performed database analysis, design and implementation. Projects included public works planning, optimal selection of business location.
- 1991-92** Research on signal compression (optimal vector quantizer design) for my engineering thesis.
- 1989-91** UNAM/Control Data Corp. Fellow. Developed scientific computation benchmarks for mainframes (CDC, UNISYS) and applications for university researchers.
- 1989** Systems analyst/programmer, Mexican Government. Developed information system to track public work contractors.

TEACHING EXPERIENCE

- 1994-96** Teaching assistant. Brandeis University. Courses: Sensory Processes, Visual Perception.
- 1993** Lecturer. Iberoamerican University, México. Course taught: Numerical Analysis.
- 1991** Lecturer. National Autonomous University of México, School of Engineering. Courses taught: Advanced Programming, Structured Programming and Laboratory of Computer Memories and Peripheral Devices.

SELECTED INVITED LECTURES

- 2007** New York Academy of Sciences, USA.
- 2005** School of Information Technology and Engineering, University of Ottawa, Canada.
- 2004** The David Bodian Seminar in Neuroscience, Krieger Mind/Brain Institute, Johns Hopkins University.
- 2004** Department of Psychology, Queen's University, Canada.
- 2004** Department of Computer Science, University College London, U.K.
- 2004** Sensory Motor Neuroscience Center, University of Birmingham, U.K.
- 2004** Inter-Departmental Center "Enrico Piaggio", University of Pisa, Italy.
- 2004** Department of Information Engineering, University of Siena, Italy.
- 2002** Sensory Motor Neuroscience Center, University of Birmingham, U.K.
- 2001** Max Planck Institute for Biological Cybernetics, Tübingen, Germany.
- 1999** Center for Intelligent Machines, McGill University, Montréal, Canada.
- 1998** Department of Psychology, Queen's University, Kingston, Canada.

CONFERENCE COMMITTEES AND REVIEW ACTIVITIES

- 2007** Program Committee member and reviewer, Haptic Audio Visual Environments and their Applications, University of Ottawa, Canada.
- 2006** Program Committee member and reviewer, Haptic Audio Visual Environments and their Applications, University of Ottawa, Canada.
- 2006** Reviewer, First International Workshop on Haptic and Audio Interaction Design, University of Glasgow, Scotland.
- 2005** Reviewer, Virtual Reality journal, Special Issue on Haptic Interfaces and Applications.
- 2005** Reviewer, Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems.
- 2005** Program Committee member, Haptic Audio Visual Environments and their Applications, University of Ottawa, Canada.
- 2005** Ad hoc reviewer, Experimental Brain Research, Springer-Verlag GmbH.

CONFERENCE COMMITTEES AND REVIEW ACTIVITIES (cont'd)

- 2005** Awards Committee member, World Haptics Conference, Pisa, Italy.
- 2005** Program Committee member and reviewer, International Symposium on Non-visual & Multimodal Visualization, London, U.K.
- 2004** Ad hoc reviewer, Presence:Teleoperators and Virtual Environments, MIT Press.
- 2004** Ad hoc reviewer, SPIE's Conference on Visualization and Data Analysis 2005, San Jose, USA.
- 2004** Session chairman: "Multimodal Visualization", International Symposium on Non-visual & Multimodal Visualization, London, U.K.
- 2004** Co-Chair, International Symposium on Non-visual & Multimodal Visualization, London, U.K.
- 2004** Program Committee member and reviewer, Eurohaptics conference, Technische Universitaet, Munich, Germany .
- 2004** Reviewer, Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems.
- 2003** Session chairman. "Open Source in Haptics Research". Eurohaptics, Trinity College, Dublin, Ireland.

PROFESSIONAL ORGANIZATIONS

- 2007** Member, New York Academy of Sciences. Membership granted in appreciation of an invited lecture.
- 2003-Present** Founder and organizer, International Society for Haptics. The first body of its kind in the field, the Society brings together researchers from all over the world for online lectures and discussion.
- 2000-Present** Founder and moderator of Haptics-L, the international electronic mailing list for the haptics community. Haptics-L facilitates e-mail communication between 1000+ researchers and general public interested in haptics. The members of Haptics-L come from leading universities, research institutions and corporations in twenty-seven countries.

SKILLS IN COMPUTER SYSTEMS AND ENGINEERING

Eighteen years of experience in computer system analysis, design and implementation.

Extensive experience in computer simulation, signal processing, numerical analysis, system dynamics, statistics.

High-level languages: C, MATLAB.

Real-time programming of PC and Linux platforms using C. This includes in-depth knowledge of operating systems, computer hardware architecture and real-time data acquisition systems.

Programming of haptic interfaces: PenCAT/Pro (Immersion Corp., Canada), PHANToM (SensAble Tech, USA).

Experience in massively parallel supercomputing (MASPAR/2).

MEDIA

2007 The Economist's Staff. "How touching. Computing: 'Haptic' technology is gradually bringing the neglected sense of touch into the digital realm". The Economist, Technology Quarterly, March 8th.

2006 Graham-Rowe, D. "The Cutting Edge of Haptics. Touch-based interfaces get to the point". MIT Technology Review, online Top Stories (August 25).

2004 Rizzo A. Cybersightings. Cyberpsychology and Behavior 7(1), p. 128.

2001 Robles-De-La-Torre G & Hayward V. "La force au bout des doigts". Pour la Science (French edition of Scientific American). Invited paper, October issue, p. 15.

2001 Friscolanti M. "Fingers decipher by force, not topology". The National Post (Canada), Science and Technology section, August 1st.

2001 Stein R, Gugliotta G. and Kaufman M. "Making sense of feeling". The Washington Post, Science Notebook section, July 30th, p. A07.

2001 Webber J. Nature's press release. July 26th.