

# Curriculum Vitæ of Vincent Hayward

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## Contents

Education . . . . .	1
Employment History . . . . .	1
Awards and Distinctions . . . . .	2
<b>Research</b>	<b>3</b>
Research Contributions . . . . .	3
Articles in Journals . . . . .	3
Chapters In Books . . . . .	6
Refereed Papers in Conference Proceedings . . . . .	7
Patents . . . . .	13
Recent Invited Lectures . . . . .	14
Technical Reports . . . . .	16
Mention in the press . . . . .	17
Research Grants and Contracts . . . . .	18
Current . . . . .	18
Completed . . . . .	18
<b>Teaching</b>	<b>20</b>
Courses Taught . . . . .	20
Université Pierre et Marie Curie . . . . .	20
McGill University . . . . .	21
Université Paris XI . . . . .	21
Purdue University . . . . .	21
Supervision . . . . .	21
Université Pierre et Marie Curie . . . . .	21
McGill University . . . . .	22
<b>Services to the University and the Profession</b>	<b>25</b>
Departmental, Faculty and University Committees . . . . .	25
University Level at UPMC . . . . .	25
University Level at McGill . . . . .	25
Faculty Level at McGill . . . . .	25
Departmental Level at McGill . . . . .	25
Professional Activities . . . . .	26
Editorship . . . . .	26
Private Advisor . . . . .	26
Appointments with Agencies . . . . .	26
Societies . . . . .	27
Start-Up Companies . . . . .	27
Ad Hoc Referee Appointments for Journals and Conferences . . . . .	27
Grant Application Refereeing . . . . .	29
Program Committee Work . . . . .	29
Organization of Activities . . . . .	30

## Vincent Hayward

Professeur, 1<sup>re</sup> classe, Section 61  
Institut des Systèmes Intelligents et Robotique  
Université Pierre et Marie Curie, Paris 6  
4 place Jussieu, 75005 Paris, France  
Tél: 33 (0)1 44 27 51 87 – Fax: 33 (0)1 44 27 51 45  
Email: [vincent.hayward@isir.upmc.fr](mailto:vincent.hayward@isir.upmc.fr)  
URL: <http://people.isir.upmc.fr/hayward>  
French and Canadian citizen

## Education

- 1978–1981 Thèse de Docteur Ingénieur, Université de Paris XI at Orsay, France  
“Langages d’analyse de programmes assemblés pour différentes machines et applications de ces langages” (Languages to analyze assembled programs for several machines and applications)  
Supervisor: Dr. A. Osorio
- 1978 Diplôme d’études approfondies, Université de Nantes (Qualifying exams)  
Project title: “Exploitation d’une base de donnée en vue de l’identification”(Database for process identification)  
Supervisor: Prof. R. Mezecev
- 1975–1978 Diplôme d’Ingénieur, Ecole Centrale de Nantes (then ENSM), Nantes, France  
National Engineering School. General mechanical engineering education, specialization in Systems and Control
- 1972–1975 Classes Préparatoires aux Grandes Ecoles, Lycée J. B. Say, Paris, France (College level studies prior to competitive entrance examinations to National Engineering Schools)
- 1966–1972 Etudes secondaires, Lycée Florent Schmitt, Saint Cloud, France (High School)
- 1960–1966 Ecole primaire, Saint Cloud, France

## Employment

- 2011– *Professeur*, Institut des Systèmes Intelligents et Robotique, Université Pierre et Marie Curie
- 2008–2011 *Professeur* (associé), Institut des Systèmes Intelligents et Robotique, Université Pierre et Marie Curie  
Chaire internationale d’haptique de l’UPMC  
Teaching graduate courses in haptics and control systems  
Research in design and applications of haptic devices, robotics, control
- 2006–2011 *Professor* (on leave 2008–11), Dept. of Electrical Engineering, McGill University, Montréal, QC Canada  
Teaching undergraduate and graduate courses in computer engineering and control systems  
Research in design and applications of haptic devices, robotics, control  
Duties in departmental, faculty, and university affairs
- 2006–2007 *Professeur Invité*, Université Pierre et Marie Curie
- 2001–2004 *Director*, Center for Intelligent Machines, McGill University, Montréal, Qc Canada  
Overseeing of the Center scientific orientation, operation, and representation
- 2003–2010 *Membre*, Centre de Recherche Interdisciplinaire en Réadaptation du Montréal Métropolitain (CRIR)
- 2002– *Associate member*, Center of Interdisciplinary Research in Music Media and Technology (CIRMMT)
- 2000–2009 *Scientist*, part-time employee of Immersion Corporation
- 1994–2006 *Associate Professor*, Department of Electrical and Computer Engineering, McGill University, Montréal, Qc Canada
- 1989–1994 *Assistant Professor*, Department of Electrical Engineering, McGill University, Montréal, Qc Canada
- 1985–1989 *Adjunct Professor*, Department of Electrical Engineering, McGill University Montréal, Qc Canada  
Research in the area of robotics, and teaching a graduate course
- 1985– *Member*, Center for Intelligent Machines, McGill University, Montréal, Qc Canada
- 1985–1986 *Visiting Scientist*, Pulp and Paper Research Institute of Canada Evaluation of advanced manufacturing techniques for application in the pulp and paper industry

- 1983–1985 *Attaché* then *Chargé de Recherche* at the Centre National de la Recherche Scientifique (CNRS) Laboratoire d'Informatique et de Mécanique pour les Sciences de l'Ingénieur (LIMSI), Orsay, France  
Research in manufacturing and robotics
- 1984 *Consultant*, Hewlett Packard Laboratories, Manufacturing Research Center, Palo Alto, California, USA  
Research in robot programming
- 1982–1983 *Visiting Assistant Professor*, Purdue University, School of Electrical Engineering, West Lafayette, Indiana, USA  
Research in robot control and teaching at the undergraduate level
- 1981–1982 *Visiting Scholar*, Purdue University, School of Electrical Engineering, West Lafayette, Indiana, USA  
Research in the area of robot programming
- 1978–1981 *Graduate Research Assistant*, Laboratoire d'Informatique et de Mécanique pour les Sciences de l'Ingénieur (LIMSI)
- 1977 *Research Assistant*, Institut de Recherche en Automatique et Informatique (IRIA), Domaine de Voluceau  
Research in performance measurement of mainframe computers

## Awards and Distinctions

- 2013 Distinguished Lecture Series, Department of Computing Science, University of British Columbia, Canada
- 2012 Plenary Speaker 2012 IEEE Int. Conf. on Multisensor Fusion and Information Integration, Hamburg, Germany
- 2012 Lecturer, Series 'Robotique, les fondations d'une discipline', Collège de France, Paris
- 2010 Keynote speaker, Haptic Audio Interaction Design 2010, Copenhagen, Denmark
- 2010 Plenary Speaker, 32nd Annual Int. Conf. of the IEEE Eng. in Med. and Bio. Society, Buenos Aires, Argentina
- 2010 Invited Keynote Speaker, Joint European Meeting, EuroVR-EVE, Orsay, France
- 2010 Best Paper Award, Eurohaptics, Amsterdam, the Netherlands
- 2010 Top Reviewer for the Journal of Neuroscience Methods in 2009
- 2009 Lectio Magistralis, University of Verona, Verona, Italy
- 2008 Fellow of the IEEE
- 2007 Lecturer, The Cutting Edge: Royal Society Lectures in Science, McGill University
- 2007 Best Paper Award (applications), World Haptics 2007, Salt Lake City, Utah, USA
- 2006 Keynote Speaker, 8th International IFAC Symposium on Robot Control, SYROCO 2006, Bologna, Italy
- 2006 Best Demonstration Award, Eurohaptics 2006, Paris
- 2006 Opening Lecture, 2nd Enactive Workshop, Montréal, Canada
- 2006 Invited Lecture, Journées ROBEA, CNRS, Paris, France
- 2006 Best Paper Award, ACM CHI'06 Conference, Montréal, Canada
- 2006 Best Paper Award, 14th Symposium on Haptic Interfaces For Virtual Environ. & Teleop. Syst., Arlington, USA
- 2005 Keynote Lecture, Dutch-Belgium Haptics Society, Brussels, Belgium
- 2004 Keynote Speaker, Eurohaptics, Munich, Germany
- 2003 Outstanding Reviewer for Automatica, Journal of the International Federation of Automatic Control
- 2002 The E. (Ben) & Mary Hochhausen Award for Res. in Adaptive Technology For Blind and Visually Impaired Persons
- 2001 Plenary Speaker, Workshop On Advances In Interactive Multimodal Telepresencesystems, Munich, Germany
- 2001 Opening Lecture, IEEE ICMA Conference, Osaka, Japan
- 2000 Distinguished Lecture Series, Department of Computing Science, University of Alberta, Canada
- 1995 Best Demonstration Award, 1995 IRIS-PREARN Conference, Ottawa, Canada
- 1994 Best Paper Award: 8th Canadian Astronautics and Space Institute Annual Conference
- 1991 NASA Space Act Tech Brief Award (as a result of work on robot programming for JPL)

## Research

### Research Contributions (trainees underlined)

#### Articles in Journals

- j75 Hayward, V., Terekhov, A. V., Wong, S.-C., Geborek, P, Bengtsson, F., Jörntell, H. 2014. Spatio-Temporal Skin Strain Distributions Evoke Low Variability Spike Responses In Cuneate Neurons. *Journal of the Royal Society Interface*, 11(93):20131015.
- j74 Platkiewicz, J., Hayward, V. 2014. Perception-Action Dissociation Generalizes to the Size-Inertia Illusion. *Journal of Neurophysiology*, DOI: 10.1152/jn.00557.2013
- j73 Hudin, C., Lozada, J., Hayward V. 2014. Spatial, Temporal, and Thermal Contributions To Focusing Contrast By Time Reversal in a Cavity. *Journal of Sound and Vibration*, 333(6):1818–1832.
- j72 Klöcker, A., Wiertlewski, M., Théate, V., Hayward, V., Thonnard, J.-L. 2013. Physical Factors Influencing Pleasant Touch During Tactile Exploration. *PLoS ONE*, 8(11):e79085.
- j71 Castaños, F., Gromov, D., Hayward, V., Michalska, H. 2013. Implicit And Explicit Representations Of Continuous-Time Port-Hamiltonian Systems. *Systems & Control Letters*, 62(4):324–330.
- j70 Adams, M., Johnson, S., Lefèvre, Ph., Lévesque, V., Hayward, V., André, T., Thonnard, J.-L. 2013. Finger Pad Friction And Its Role In Grip And Touch. *Journal of the Royal Society Interface*, 10(80):20120467.
- j69 Frissen, I., Ziat, M., Campion, G., Hayward, V. and Guastavino, C. 2012. Auditory-Haptic and Haptic-Haptic Temporal Order Judgements During Passive and Active Arm Movements, *Acta Psychologica*, 141:140–148
- j68 Delhaye, B., Hayward, V., Lefèvre, Ph., and Thonnard, J.-L. 2012. Texture-Induced Vibrations In The Forearm During Tactile Exploration. *Frontiers in Behavioral Neuroscience*, 6(7):1–10
- j67 M. Wiertlewski, V. Hayward. 2012. Mechanical Behavior of the Fingertip in the Range of Frequencies and Displacements Relevant to Touch, *Journal of Biomechanics*, 45(11):1869–1874
- j66 Giordano, B. L., Visell, Y., Yao, H.-Y., Hayward, V., Cooperstock, J., and McAdams, S. 2012. Identification Of Ground Materials In Auditory, Kinesthetic, Haptic And Audiohaptic Conditions. *Journal of the Acoustical Society of America*, 131(5):4002–4012
- j65 Wiertlewski, M., Hayward, V. 2012. Transducer For Mechanical Impedance Testing Over a Wide Frequency Range Through Active Feedback. *Review of Scientific Instruments*, 83(2):025001
- j64 Mohand-Ousaid, A., Millet, G., Régnier, S., Haliyo, S., and Hayward, V., 2012. Haptic Interface Transparency Achieved Through Viscous Coupling. *International Journal of Robotics Research*, 31(3):319–329
- j63 Wiertlewski, M., Hayward, V. 2011. Les Interfaces Tactiles, *Biofutur*, 30(326):38–40
- j62 Fasiello, I., Hayward, V. 2011. Un Sens Trompeur, *Biofutur*, 30(326):42–43
- j61 Terekhov, A. V., Hayward, V. 2011. Minimal Adhesion Surfaces In Tangentially Loaded Digital Contacts. *Journal of Biomechanics*, 44(13):2508–2510
- j60 Hayward, V. 2011. Is There a 'Plenhaptic' Function? *Philosophical Transactions of the Royal Society B*, 366:3115–3122
- j59 Gosline, A. H. C., Hayward, V., Michalska, H. 2011. Ineluctability of Oscillations in Systems With Digital Implementation of Derivative Feedback. *Automatica*, 47(11):2444–2450
- j58 André, T., Lévesque, V., Hayward, V., Lefèvre, P., and Thonnard, J.-L. 2011. Effect Of Skin Hydration On The Dynamics Of Fingertip Gripping Contact. *Journal of the Royal Society Interface*, 8(64):1574–1583
- j57 Wiertlewski, M., Lozada, J., Hayward, V. 2011. The Spatial Spectrum Of Tangential Skin Displacement Can Encode Tactual Texture. *IEEE Transactions on Robotics*, 27(3):461–472
- j56 Ziat, M., Hayward, V., Chapman, C. E., Ernst, M. O., and Lenay, C. 2010. Tactile Suppression of Displacement, *Experimental Brain Research*, 206(3):299–310
- j55 Yao, H.-Y. and Hayward V. 2010. Design and Analysis of A Recoil-Type Vibrotactile Transducer. *Journal of the Acoustical Society of America*. 128(2):619–627
- j54 Smith, A. M., Basile, G., Theriault-Groom, J., Fortier-Poisson, P., Campion, G., Hayward, V. 2010. Roughness of simulated surfaces examined with a haptic tool; effects of spatial period, friction, and resistance amplitude. *Experimental Brain Research*, 202(1):33–43
- j53 Wang, Q., Hayward, V. 2010. Biomechanically Optimized Distributed Tactile Transducer Based on Lateral Skin Deformation. *International Journal of Robotics Research*, 29(4):323-335

- j52 Smith, A. M., Chapman, C. E., Donati, F., Fortier-Poisson, P. and Hayward, V. 2009. Perception of simulated local shapes using active and passive touch. *Journal of Neurophysiology*, 102:3519–3529
- j51 Konkle, T., Wang, Q., Hayward, V., and Moore, C. I. 2009. Motion after-effects transfer between touch and vision, *Current Biology*, 19(9):745–750.
- j50 Gosline, A. H. and Hayward, V. 2009. Dual-Channel Haptic Synthesis of Viscoelastic Tissue Properties Using Programmable Eddy Current Brakes. *International Journal of Robotics Research*, 28(10):1387–1399.
- j49 Campion, G. and Hayward, V. 2009. Fast Calibration Of Haptic Texture Synthesis Algorithms. *IEEE Transactions on Haptics*, 2(2):85–93
- j48 Wijntjes, M. W. A., Sato, A., Hayward, V. Kappers, A. M. L. 2009. Local Surface Orientation Dominates During Haptic Curvature Discrimination. *IEEE Transactions on Haptics*, 2(2):94–102
- j47 Hayward, V. Armstrong, B. S., Altpeter, F., and Dupont, P. E. 2009. Discrete-Time Elasto-Plastic Friction Estimation. *IEEE Transactions on Control Systems Technology*, 17(3):688–696
- j46 Petit, G., Dufresne, A., Lévesque, V., Hayward, V. 2008. Exploration multimodale d'images pour des utilisateurs ayant une déficience visuelle. *Sciences et Technologies pour le Handicap*, 2(2):175–186
- j45 Gosline, A. H., Hayward, V. 2008. Eddy Current Brakes for Haptic Interfaces: Design, Identification, and Control. *IEEE/ASME Transactions on Mechatronics*, 13(6):669–677
- j44 Carter, O., Konkle, T., Wang, Q., Hayward, V., Moore, C. I. 2008. Tactile Rivalry Demonstrated with an Ambiguous Apparent-Motion Quartet. *Current Biology*, 18(14):1050–1054
- j43 Campion, G., Hayward, V. 2008. On The Synthesis of Haptic Textures. *IEEE Transactions on Robotics*, 24(3):527–536
- j42 MacLean, K. E. and Hayward, V. 2008. Do It Yourself Haptics, Part-II. *IEEE Robotics and Automation Magazine*, 15(1):104–114
- j41 Wang, Q., Hayward, V. 2008. Tactile Synthesis and Perceptual Inverse Problems Seen from the View Point of Contact Mechanics. *ACM Transactions on Applied Perception*, 5(2):1–19
- j40 Hayward, V. 2008. A Brief Taxonomy of Tactile Illusions And Demonstrations That Can Be Done In a Hardware Store. *Brain Research Bulletin*, 75:742–752
- j39 Hayward, V. et K. E. MacLean, V. 2007. Do It Yourself Haptics, Part-I. *IEEE Robotics and Automation Magazine*, 14(4):88–104
- j38 Janabi-Sharifi, F., V. Hayward, V., Wang, Q. Y. 2007. Design and implementation of a graphic-haptic display system. *Displays*, 28:118–128
- j37 Pasquero, J., Luk, J., Lévesque, V., Wang, Q., MacLean, K., Hayward, V. 2007. Haptically Enabled Handheld Information Display with Distributed Tactile Transducer. *IEEE Transactions on Multimedia*, 9(4):746–753
- j36 Wang, Q., Hayward, V. 2007. In Vivo Biomechanics of the Fingerpad Skin Under Local Tangential Traction. *Journal of Biomechanics*. 40(4):851–860
- j35 Yi, D., Hayward, V. 2006. Depth Discrimination with 2D Haptics During Static Viewing of 3D Angiograms. *Haptics-e*, 8(3)
- j34 Yao, H.-Y., Hayward, V. Ellis, R.E. 2005. A Tactile Enhancement Instrument for Minimally Invasive Surgery. *Computer Aided Surgery*, 10(4): 233–239
- j33 Cruz-Hernandez, J. M., Hayward. 2005. Position Stability of Phase Control for the Preisach Hysteresis Model. *Transactions of the CSME*, 29(2):129–142
- j32 Dostmohamed, H., Hayward, V. 2005. Trajectory of Contact Region On the Fingerpad Gives the Illusion of Haptic Shape. *Experimental Brain Research*, 164(3):387–394
- j31 Levesque, V., Pasquero, J., Hayward, V. and Legault. M. 2005. Display of Virtual Braille Dots by Lateral Skin Deformation: Feasibility Study. *ACM Transactions on Applied Perception*. 2(2):132–149
- j30 Mahvash, M., Hayward V. 2005. High Fidelity Passive Force Reflecting Virtual Environments. *IEEE Transactions on Robotics and Automation*. 21(1):38–46
- j29 Mahvash, M., Hayward V. 2004. High Fidelity Haptic Synthesis of Contact with Deformable Bodies. *IEEE Computer Graphics and Applications*, 24(2):48–55
- j28 Sidobre, D., Hayward V. 2004. Measurement of the Behavior of Mechanical Junctions From the Micrometer to the Subnanometer Scale: The Friction Force Scanner. *Measurement Science & Technology*, 15(2):451–459.
- j27 Hayward, V., Astley, O. R., Cruz-Hernandez, M., Grant, D., Robles de la Torre, G. 2004. Haptic Interfaces and Devices. *Sensor Review*. 24(1):16–29.

- j26 Greenish, S., Hayward, V., Chial, V., Okamura, A., Steffen, T. 2002. Measurement, Analysis and Display of Haptic Signals During Surgical Cutting. *Presence: Teleoperators and Virtual Environments*, MIT Press. Vol. 6(11):626–651
- j25 Yi, D., Hayward, V. 2002. Skeletonization of Volumetric Angiograms for Display. *Computer Methods in Biomechanics and Biomedical Engineering*. 5(5):329–341
- j24 Dupont, P., Hayward, V., Armstrong, B., Altpeter, F. 2002. Single State Elasto-Plastic Friction Models. *IEEE Transactions on Automatic Control*. 47(5):787–792
- j23 Cruz-Hernandez, J. M., Hayward V. 2001. Phase Control Approach to Hysteresis Reduction. *IEEE Transactions on Control Systems Technology*, 9(1):17–26
- j22 Robles De La Torre, G., Hayward, V. 2001. Force Can Overcome Object Geometry in the Perception of Shape Through Active Touch. *Nature*. 412:445–448
- j21 Lloyd, J. E., Hayward, V. 2001. Singularity Robust Trajectory Generation. *International Journal of Robotics Research*, 20(1):38–56
- j20 Mahvash, M., Hayward, V. 2001. Haptic Rendering of Cutting: a Fracture Mechanics Approach. *Haptics-e*, 2(3)
- j19 Dong, C. J., Swindale, N. V., Zakarauskas, P, Hayward, V., Cynader, M., 2000. The Auditory Motion After-Effect: Its Tuning And Its Specificity In The Spatial And Frequency domains. *Perception & Psychophysics*, 62(5):1099–1111
- j18 Janabi-Sharifi, F., Hayward, V., Chen, C.-S. J. 2000. Discrete-time Adaptive Windowing for Velocity Estimation. *IEEE Transactions on Control Systems Technology*, 8(6):1003–1009
- j17 Hayward, V., Cruz-Hernandez, J. M. 1998. Parameter Sensitivity Analysis for Design and Control of Force Transmissions. *ASME Journal of Dynamic Systems Measurement and Control*, 120(2):241–249
- j16 Grant, D., Hayward, V. 1997. Variable Structure Control of Shape Memory Alloy Actuators. *IEEE Systems and Control Magazine*, 17(3):80–88
- j15 Kurtz, R., Hayward, V. 1995. Dexterity Measures for Mechanisms with Unilateral Constraints: the N+1 Case. *Journal of Advanced Robotics*. 9(5):561–577
- j14 Hayward, V. Aubry, S., Foisy, A., Ghallab, Y. 1995. Collision Prediction Among Many Moving Objects. *International Journal of Robotics Research*. 14(2):129–143
- j13 Hayward, V., Nilakantan, A., Daneshmend, L. K. 1994. Trajectory Generation and Control for Automatic Manipulation. *Robotica*, Cambridge University Press, 12:115–125
- j12 Lloyd, E. J., Hayward, V. 1993. Trajectory Generation for Dynamic, Sensor-driven Environments. *International Journal of Robotics Research*, MIT Press, (12)4:380–394
- j11 Boyer, M., Daneshmend, L. K., and Hayward, V., 1993. Using \*this method\* to Plan and Execute Tasks in clos, *ACM-SIGPLAN, Lisp Pointers*, 3:3–12
- j10 Hayward, V., Nemri, C., Chen, X., Duplat, B. 1993. Kinematic Decoupling in Mechanisms and Application to a Passive Hand Controller. *Journal of Robotics Systems*, 10(5):767–790
- j09 Lloyd, J. E., Hayward, V. 1993. Real-Time Trajectory Generation in Multi-RCCL. *Journal of Robotics Systems*, 10(3):369–390
- j08 Izaguirre, A., Hashimoto, M., Paul, R. P., Hayward, V. 1992. A New Computational Structure for Real-time Dynamics. *International Journal of Robotics Research*, 11(4):346–362
- j07 Hayward, V. 1992. Physical Modeling Applies to Physiology Too. Commentary in *Behavior and Brain Sciences*, 15(2):342–343
- j06 Kurtz, R., Hayward, V. 1992. Multi-goal Optimization of a Parallel Mechanism with Actuator Redundancy. *IEEE Transactions on Robotics and Automation*. RA-8(5):633–651
- j05 Hayward, V., Kurtz, R. 1992. Modeling of a Parallel Wrist Mechanism with Actuator Redundancy. *International Journal of Laboratory Robotics and Automation*, 4(2):69–76
- j04 Nilakantan, A., Hayward, V. 1989. The Synchronization of Multiple Manipulators in Kali. *Robotics and Autonomous Systems*, 5:345–358
- j03 Lloyd, E. J., Hayward, V. 1988. Kinematics of Common Industrial Robots. *Robotics*, 4:69–191
- j02 Hayward, V., Paul, R. P. 1987. Robot Manipulator Control Under Unix: RCCL a Robot Control 'C' Library. *International Journal of Robotics Research*, 5(4):94–111
- j01 Hayward, V., Osorio, A. 1983. A system to automatically analyse assembled programs from machine descriptions. *IEEE Transactions on Software Engineering*, SE-9(2):210–213.

## Chapters In Books

- c21 Xinjilefu, Hayward, V., and Michalska, H. 2010. Hybrid Stabilizing Control for the Spatial Double Inverted Pendulum. In *Int. Symposium on Brain, Body and Machine*, Angeles, J., Boulet, B., Clark, J. J., Kovacs, J. and Siddiqi, K. (Eds.), pp. 201–215.
- c20 Hayward, V. 2008. Haptic Shape Cues, Invariants, Priors, and Interface Design. In *Human Haptic Perception - Basics and Applications*, M. Grunwald (Ed.), Birkhauser Verlag. pp. 381–392
- c21 Hayward, V. 2007. Physically-Based Haptic Synthesis, In *Haptic Rendering: Foundations, Algorithms and Applications*, T. M. A. Otaduy and M. Lin (Eds), Wellesley, MA: A K Peters, Ltd., 297–309
- c19 Dostmohamed, H. and Hayward, 2005. V. Contact Location Trajectory on the Fingertip as a Sufficient Requisite for Illusory Perception of Haptic Shape and Effect of Multiple Contacts. in *Multi-point Interaction with Real and Virtual Objects*, F. Barbagli, D. Prattichizzo and K. Salisbury (Eds.), Springer Tracts in Advanced Robotics Volume 18, pp.189–198
- c18 Mahvash, M., Hayward, V. 2003. Haptic Simulation of a Tool In Contact With a Nonlinear Deformable Body. In *IS4TM: International Symposium on Surgery Simulation and Soft Tissue Modelling*, Lecture Notes in Computer Science (LNCS 2673), N. Ayache and H. Delingette (Eds), Springer Verlag, New York, pp. 311–320
- c17 Hayward, V., Yi, D. 2003. Change of Height: An Approach to the Haptic Display of Shape and Texture Without Surface Normal. In *Experimental Robotics VIII*, Springer Tracts in Advanced Robotics 5, Springer Verlag, New York. pp. 570–579
- c16 Hayward, V. 2001. Haptics: A Key to Fast Paced Interactivity. In *Human Friendly Mechatronics. Selected Papers, the International Conference on Machine Automation*, Osaka, Japan, Takano, M., Arai E., Arai T., Elsevier Science. [\(Plenary Talk, New Technologies Foundation Lecture\)](#)
- c15 Rovan, B., Hayward, V. 2000. Typology of Tactile Sounds and Their Synthesis in Gesture Driven Computer Music Performance. In *Trends in Gestural Control of Music*. Wanderley, M., Battier, M., (Eds). Editions IRCAM: Paris. pp. 297–320
- c14 Hayward, V., Armstrong, B. 2000. A New Computational Model of Friction Applied to Haptic Rendering. In *Experimental Robotics VI*, Peter Corke and James Trevelyan (Eds), Lecture Notes in Control and Information Sciences, Vol. 250, Springer-Verlag, pp. 403–412
- c13 Hayward, V. Gregorio, P. Astley, O. Greenish, S. Doyon, M. Lessard, L. McDougall, J. Sinclair, I. Boelen, S. Chen, X. Demers, J.-P. Poulin, J. Benguigui, I. Almey, N. Makuc, B. Zhang, X. 1998. Freedom-7: a High Fidelity Feven Axis Haptic Device with Application to Surgical Training. In *Experimental Robotics V*, Casals, A., de Almeida, A. T. (Eds.), Lecture Notes in Control and Information Science 232, pp. 445–456
- c12 Hayward, V., Cruz-Hernandez, M. J. 1997. Parameter Sensitivity Analysis for Design and Control of Tendon Transmissions. In *Experimental Robotics IV*, Khatib, O., Salisbury, J. K. (Eds.) Lecture Notes in Control and Information Sciences 223. pp. 241–252.
- c11 Hayward, V., Astley, O. R. 1996. Performance Measures for Haptic Interfaces. In *Robotics Research: The 7th International Symposium*, Giralt, G., Hirzinger, G., (Eds.), Springer Verlag. pp. 195–207.
- c10 Hayward, V., Lanvin, G., Ramstein, C. 1994. Design and Multi-Objective Optimization of a Linkage for a Haptic Interface. In *Advances in Robot Kinematics*. J. Lenarcic and B. Ravani (Eds.). Kluwer Academic. pp. 352–359
- c09 Hayward, V. 1994. Design of Hydraulic Robot Shoulder Based on Combinatorial Mechanism. In *Experimental Robotics 3*, Yoshikaswa, T., Myiazaki, F (Eds.), Lecture Notes in Control and Information Sciences 200. Springer Verlag. pp. 297–310
- c08 Foisy, A., Hayward, V 1994. A Safe Swept Volume Method for Collision Detection. In *Robotics Research, the Sixth International Symposium*. International Foundation for Rob. Res.. Cambridge, MA. pp. 62–68
- c07 Boulet, B., Daneshmend, L. K., Hayward, V., Nemri, C. 1993. System Identification and Modelling of a High Performance Hydraulic Actuator. *Experimental Robotics 2*, Chatila, R., Hirzinger, G. (Eds.), Lecture Notes in Control and Information Sciences, Springer Verlag
- c06 Hayward V. 1993. Borrowing Some Design Ideas from Biological Manipulators to Design an Artificial One. In *Robots and Biological Systems*, NATO Series, P. Dario, P. Aebisher, and G. Sandini, (Eds.), Springer Verlag. pp. 135–148
- c05 Hayward V. 1990. An Analysis of Redundant Manipulators from Several View-Points. In *Robots with Redundancy: Design, Sensing and Control*, NATO Series, A. Bejczy (Ed.), Springer Verlag, (17 pages)
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- p18 Hayward, V., Hayati, S. 1988. Kali: An Environment for the Programming and Control of Cooperative Manipulators. Proceedings of the *American Control Conference*. 473–478.
- p17 Nilakantan, A., Hayward V. 1988. Synchronizing multiple manipulators. Proceedings of the *Robotics and Manufacturing, Recent Trends in Research, Education, Applications*. ASME Press. pp. 381–389.
- p16 Daneshmend, L., Hayward, V. 1988. Adaptation in the control of multiple coordinated manipulators. Proceedings of the *Robotics and Manufacturing, Recent Trends in Research, Education, and Applications*. ASME Press. pp. 219–226.
- p15 Aubry, A., Hayward, V., 1987. Recursive decomposition of free-space from boundary points. Proceedings of the *Workshop on Spatial Reasoning and Multi-Sensor Fusion*. A. Kak. Su-shing Chen (Eds.) Morgan Kaufman. pp. 128–138.
- p14 Hayward, V., Hayati, S. 1987. Design Principles of a Cooperative Robot Controller. Proceedings of the *Space Station Automation III, Advances in Intelligent Robotics Systems*, SPIE. pp. 135–140.
- p13 Hayward, V., Aubry, S. 1987. On describing a robotic scene. Proceedings of the *Intelligent Robots and Computer Vision: Sixth in a Series, Advances in Intelligent Robotics Systems*, SPIE. pp. 525–532.
- p12 Izaguirre, A., Hashimoto, M., Paul, R. P., Hayward, V. 1987. A new computational structure for real-time dynamics. Proceedings of the *IEEE International Workshop on Robotics Trends, Technology and Applications*.
- p11 Aubry, S., Hayward, V. 1987. Tetrahedral Recursive Decomposition of Free Space From Boundary Points. Pro-

ceedings of the *SIAM Conference On Applied Geometry*.

- p10 Aubry, S., Hayward, V. 1987. Range Image Analysis Using Level Curves. Proceedings of the *Scandinavian Conference on Image Analysis*.
- p09 Hayward, V., Aubry, A., Jasiukajc, Z. 1987. The Use of 3D Sensing Techniques for On-line Collision-Free Path Planning. Proceedings of the *Jet Propulsion Laboratory/NASA workshop on Space Robotics*. pp. 119–124.
- p08 Lee, J. S., Hayati, S., Hayward, V., Lloyd, J. E., 1986. Implementation of Robot Control C Library on the Micro Vax II. Proceedings of the *Advances in Intelligent Robotics Systems, SPIE's Cambridge Symposium on Optical and Optoelectronic Engineering*.
- p07 Hayward, V., 1986. A Fast Collision Detection Scheme by Recursive Decomposition of a Manipulator Workspace. *IEEE International Third Conference on Robotics*. pp. 1044–1049.
- p06 Hayward, V., Paul, R. P., 1984. Robot Control and Computer Languages. Proceedings of the *Fifth CISM-IFTOMM Symposium on Theory and Practice of Robot Manipulators*.
- p05 Hayward, V., Paul, R. P., 1984. Introduction to RCCL: A Robot Control 'C' Library. Proceedings of the *First IEEE Int Conference on Robotics*. pp. 293–298.
- p04 Hayward, V., Paul, R. P., 1983. Robot Manipulator Control Under Unix. Proceedings of the *Thirteenth International Symposium on Industrial Robots*.
- p03 Paul, R. P., Luh, J. Y. S., Hayward, V., and Nof, S. Y. 1983. Advanced Industrial Robot Control Systems. Proceedings of the *NSF Tenth Conference on Production Research and Technology*.
- p02 Hayward, V., 1982. A system to Automatically Analyze Assembled Programs from Machine Descriptions. Proceedings of the *IFAC Symposium on Computer Aided Design of Multivariable Technological Systems*.
- p01 Hayward, V., Osorio, A., 1981. Automatic Retrieval of Semantic Actions Performed by Machine Code Sequences. Proceedings of the *ACM Computer Science Conference*.

## Patents

- q24 Canadian Patent No. 2,520,942, Issued 19 March 2013. Tactile Amplification Instrument and Method of Use. H.-Y. Yao, V. Hayward, R. D. Ellis.
- q23 French patent application, 1255286, filed on June 6, 2012, Interface De Stimulation Tactile Par Retournement Temporel, C. Hudin, V. Hayward, J. Lozada, M. Wiertelwski.
- q22 PCT patent application, PCT/EP2012/046420, filed on April 11, 2012, Enceinte destinée à être agencée dans un objet de la vie quotidienne soumis à un effort, V. Hayward A. Berrezag
- q21 PCT patent application, WO2012/004214, Published January 12, 2012. System For Simulating A Contact With A Surface By Tactile Stimulation, M. Wiertelwski, V. Hayward, J. Lozada.
- q20 French patent application 1255286 filed on June 6 2012. Interface De Stimulation Tactile Par Retournement Temporel. C. Hudin, V. Hayward, J. Lozada, M. Wiertelwski
- q19 PCT patent application, WO/2012/040703, Published March 29 2012. White cane with integrated electronic travel aid and using 3D TOF Sensor. R. Gassert, Y. Kim, T. Oggier, M. Riesch, Deshler, C. Prott, S. Schneller, V. Hayward
- q18 PCT patent application PCT/EP2011/061184. Published January 12 2012. System For Simulating A Contact With A Surface By Tactile Stimulation. M. Wiertelwski, V. Hayward, J. Lozada
- q17 French patent application 1153095 filed on April 9 2011. Enceinte destinée à être agencée dans un objet de la vie quotidienne soumis à un effort. V. Hayward, A. Berrezag
- q16 French patent application 1161874 filed on January 19 2011. Actionneur vibrotactile linéaire miniature. V. Hayward, A. Berrezag, G. Dietz
- q15 US patent application 8,016,818 granted September 13, 2011 Tactile Amplification Instrument and Method of Use. R. E. Ellis, V. Hayward and H.-Y. Yao
- q14 PCT patent application PCT/EP10/52970 filed March 2010. Device For Quickly Generating A Torque On An Extended Dynamic Range With Low Inertia. G. Millet, V. Hayward, S. Haliyo, S. Régnier
- q13 US patent 8,095,706 Granted January 12 2012. Systems And Methods For The Analysis Of Mechanical Properties Of Materials. S. Sprigle, L. Kong, Q. Wang, V. Hayward, J. Caspall
- q12 US patent application filed May 27, 2004. Method and Apparatus For Synthesizing Virtual Interaction Between Rigid and Deformable Bodies. V. Hayward and M. Mahvash, abandoned
- q11 US patent 7,567,243 granted July 29, 2009. System and method for low power haptic feedback, V. Hayward

- q10 US patent 7,369,115 granted May 6, 2008. Haptic devices having multiple operational modes including at least one resonant mode. M. Cruz-Hernandez, D. Grant and V. Hayward
- q09 US patent 7,336,266 granted February 26, 2008. Haptic pads for use with user-interface devices. V. Hayward, R. Alarcon and L. B. Rosenberg
- q08 US patent 7,077,015 granted July 18, 2006. Method and Apparatus To Record and Reproduce Tactile Sensations. V. Hayward, J. Pasquero, V. Levesque
- q08 EPO patent WO2004109488 granted December 16, 2004, System And Method For Low Power Haptic Feedback, V. Hayward
- q07 US patent 6,693,516 granted February 17, 2004. Electro-Mechanical Transducer Suitable For Tactile Display and Article Conveyance. V. Hayward
- q06 US patent 6,781,569 granted August 24, 2004. Hand Controller. P. Gregorio, V. Hayward, C. Ramstein
- q05 US patent 6,445,284 granted September 3, 2002. Electro-mechanical transducer suitable for tactile display and article conveyance. M. Cruz-Hernandez, V. Hayward
- q04 US patent 6,020,967 granted February 1, 2000. Differential Optical Displacement Sensor. P. Gregorio, D. Grant, V. Hayward
- q03 US patent 6,116,844 granted September 12, 2000. Mechanism for placing and orienting articles, V. Hayward
- q02 US patent 5,727,391 granted April 17, 1998, Deformable Structural Arrangement, V. Hayward and D. Grant
- q01 US patent 5,847,528 granted December 8, 1998, Mechanism for Control of Position and Orientation in Three Dimensions, R. Hui, V. Hayward, P. Gregorio, and others

### Recent Invited Lectures

- 03/14 What role for the distinction between the senses? Institute of Philosophy, University of London, London, UK
- 02/14 Robotics Institute, Carnegie Mellon, University, Pittsburgh, PA, USA
- 02/14 Electrical and Computer Engineering, Drexel University, Philadelphia, PA, USA
- 02/14 Neuroscience and Robotics Lab at Northwestern University, Evanston, IL, USA
- 02/14 Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Boston, MA, USA
- 02/14 Department of Biomedical Engineering, Columbia University, New York, NY, USA
- 11/13 IRIT, Université Paul Sabatier, Toulouse, France
- 11/13 Workshop on "Bio-inspired sensing for robotics", Inst. des Sciences du Mouvement E.-J. Marey, Marseille, France
- 11/13 School of Mechanical Engineering, Beihang University, Beijing, China
- 10/13 Journées Nationales de la Recherche en Robotique, Annecy, France
- 10/13 Exploratorium: Exploring Your Senses, Bloomsbury Festival 2013, London, UK
- 07/13 Interaction architecture, Apple Inc., Cupertino, CA, USA
- 07/13 Early Touch: From Neural Coding to Haptic Space Geometry, CNS\*2013, Paris, France
- 07/13 Virtual Prototyping Summer School, Politecnico di Milano, Italy
- 06/13 12th Dutch Belgian Haptic Network Meeting, Katholieke Universiteit Leuven, Belgium
- 05/13 Conference on The World Inside The Brain, School of Psychology, University of Birmingham, UK
- 05/13 Workshop on Hand synergies — how to tame the complexity of grasping, IEEE ICRA 2013, Karlsruhe, Germany
- 01/13 Institute of Philosophy, University of London's School of Advanced Study, London, UK
- 01/13 Service de Psychiatrie de l'enfant et de l'adolescent, CHU Pitié-Salpêtrière, Paris, France
- 01/13 Integrative, Multisensory, Perception, Action and Cognition Team, INSERM (ImpAct), Lyon, France
- 11/12 Department of Cognitive Neuroscience & Cognitive Interaction Technology, Bielefeld Universität, Germany
- 10/12 Nokia Research Center, Espoo, Finland
- 09/12 Department of Computer Science, University of Bristol, UK
- 07/12 2012 Virtual Prototyping Summer School, Politecnico di Milano, Milan, Italy
- 06/12 Multisensory Integration Meeting, University of Birmingham, UK
- 06/12 ETH Summer School on Soft Robotics, Zurich, Switzerland
- 05/12 2nd Workshop on Robotics and Neuroscience, University of Siena, Italy
- 05/12 Next Generation Multimedia Research & Development Workshop, New York University Abu Dhabi Institute, UAE
- 03/12 Laboratoire Interfaces Sensorielles, Commissariat à l'Energie Atomique, Fontenay-aux-roses, France
- 03/12 Center for Intelligent Machines, McGill University, Montréal, Canada
- 02/12 Journée d'étude PraTIC: Jouabilité, interactivité et cognition, l'école de l'image des Gobelins, Paris, France
- 12/11 Department of Bioengineering, Imperial College London, UK
- 11/11 Symposium on State of the Art and Future of Haptics, Nagoya Institute of Technology, Japan

09/11 50th anniversary of the Institute of Automatic Control Engineering, Technical University of Munich, Germany

07/11 Workshop on Multimodal and Sensorimotor Bionics Inst. for Adv. Study, Technical University of Munich, Germany

06/11 Workshop on Vibrotactile Haptics for Touch Screens, World Haptics Conference 2011, Istanbul, Turkey

06/11 Workshop on Haptics in Surgical Robotics, World Haptics Conference 2011, Istanbul, Turkey

06/11 Institute for Infocomm Research, A\*Star, Singapore

05/11 DeViNT 2011: Neuvième journée Déficiants Visuels et Nouvelles Technologies, Polytech'Nice – Sophia, France

04/11 INM - Leibniz-Institut für Neue Materialien, Saarbrücken, Germany

04/11 Advanced Robotics Group, Italian Institute of Technology, Genova, Italy

03/11 Laboratory of Cognitive Neuroscience, Brain Mind Institute, Ecole Polyt. Fédérale de Lausanne, Switzerland

02/11 Theo Murphy Meeting on Active Touch Sensing, Kavli Royal Society International Center, Buckinghamshire, UK

01/11 Institute for Robotics and Cognitive Systems, Department of Computer Science, Universität zu Lübeck, Germany

01/11 European Master on Advanced Robotics (EMARO), Ecole Centrale de Nantes, France

12/10 Department of Psychology, University of Sheffield, UK

11/10 Institut de Recherche en Communications et Cybernétique de Nantes, IRCCyN, France

10/10 Colloquium Polaris, Institut National de Recherche en Automatique et Informatique, INRIA Lille, France

10/10 Int. Symposium "Scientific Computing for the Cognitive Sciences", IWH, University of Heidelberg, Germany

09/10 2010 Virtual Prototyping Summer School, Politecnico di Milano, Milan, Italy

04/10 Laval Virtual, Recent Advances In Haptic Interaction, Laval, France

03/10 Institute for Neuroinformatics, University of Zürich (UZH), Switzerland

01/10 Computer Vision Laboratory, Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland

11/09 Laboratoire des Systèmes Robotiques, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

11/09 Institute of Robotics & Intelligent Systems, Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland

09/09 Laboratoire d'acoustique musicale (LAM), Paris, France

07/09 2009 Virtual Prototyping summer school, Politecnico di Milano, Milan, Italy

04/09 Unité de Réadaptation et de Médecine Physique, Université Catholique de Louvain, Brussels, Belgium

11/07 School of Physical and Occupational Therapy, Research Seminar Series, McGill University

10/07 Département d'Informatique, Université du Québec à Montréal

10/07 Mcgovern Institute for Brain Research at MIT

07/07 Institute of Robotics and Mechatronics, German Aerospace Center DLR, Wessling, Germany

07/07 Laboratoire d'Automatique et d'Analyse des Systèmes, LAAS, Toulouse, France

07/07 Touch Workshop, Department of Psychology, The University of Edinburgh, UK

04/07 Department of Neuromotor Physiology, IRCCS Fondazione Santa Lucia, Rome, Italy

04/07 Laboratoire de Physiologie de la Perception et de l'Action, Collège de France, Paris, France

03/07 Behavioural Brain Sciences Centre, School of Psychology, University of Birmingham, UK

03/07 Sonic Arts Research Center, Queen's University Belfast, Belfast, Ireland

03/07 Department Physics of Man Helmholtz Institute, Utrecht University, The Netherlands

03/07 Laboratoire « Psychologie et Neurocognition » Université Pierre Mendès France, Grenoble, France

03/07 Max Plank Institute for Biological Cybernetics, Tübingen, Germany

01/07 Institut de Recherche en Communications et en Cybernétique de Nantes, Nantes, France

12/06 Delft Biorobotics Laboratory, University of Delft, The Netherlands

12/06 Department of Electrical Engineering, University of Twente, The Netherlands

11/06 Mechanical Engineering and Materials Science, Rice University, Houston, Texas, USA

11/06 Tactile Research Group meeting. Annual Psychonomic Society Annual Meeting, Houston, Texas, USA

10/06 COSTECH - Connaissance, Organisation et Systèmes Techniques, Univ. de Technologie de Compiègne, France

10/06 Séminaire Romand de 3ième cycle d'Informatique, Université de Genève, Suisse

09/06 Robotics and Systems Laboratory, University of Siena, Italy

07/06 Workshop on Perception-based Haptic Rendering, Eurohaptics 2006, Paris, France

05/06 Guest Lecture. Experimental Haptics CS277. Stanford University

04/06 Montréal Chapter of ACM SIGGRAPH, Canada

03/06 Département d'Informatique, Université du Québec à Montréal, Canada

03/06 Guest Lecture. Human Computer Interaction Course, ECE Department, McGill University, Canada

10/05 Music Department, Brown University, USA

10/05 Société des Arts Technologiques, Montréal, Canada

10/05 Department of Mechanical Engineering, Concordia, University, Montreal, Canada

08/05 Department of Computer Science, University of British Columbia, Vancouver, Canada

03/05 Centre de Recherche en Neurosciences, Université Catholique de Louvain, Brussels, Belgium

12/04 Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland, Mechatronics Seminars



03/04 The University of British Columbia, Department of Surgery, Grand Rounds, Canada  
 03/04 Journée Scientifique Internationale IRCICA, "Stimulateurs tactiles : Technologie et Usages"  
 02/03 Visualization and Perceptualization Center, Purdue University, USA  
 01/03 2003 Canadian Undergraduate Technology Conference, Toronto, Canada  
 11/02 Institut Nazareth & Louis-Braille, Longueuil, Qc, Canada  
 10/02 Colloque IMSI, Sherbrooke University, Canada  
 09/02 Science Talks, Marianopolis College, Montréal, Qc, Canada  
 07/02 Scuola Superiore di Studi Universari e di Perfezionamento Sant'Anna Pisa, Italy (short course)  
 05/02 Center for Computer Research in Music and Acoustics (CCRMA) Stanford University, USA  
 05/02 Defense R&D Canada-Toronto, Canada  
 04/02 Workshop on Multimodal Interactions in Perception. J. K. O'Regan and J. Clark, Paris, France  
 02/02 Guest Lecture - Music Technology, McGill University, Canada  
 02/02 Université Laval, Québec, Canada  
 06/01 Institute for Mathematics and Application Workshop: Haptics, Virtual Reality, and HCI, USA  
 03/01 Max-Planck Inst. Tuebingen, Germany  
 09/98 IRCAM, Paris, France  
 03/98 INRIA Rhones-Alpes, Grenoble, France  
 02/98 Ecole des Mines de Paris, February, 1998  
 01/98 ARTS Lab., Scuola S. S. Anna, Pisa, Italy  
 12/97 Human and Machine Haptics ONR workshop, Asilomar, CA, USA

### Technical Reports

- r22 Hayward, V., Levesque, V., Pasquéro, J. 2003 (December). Afficheur Braille Par Étirement Latéral, Phase I, INLB, Visuaide Inc., CRIR and CNIB.
- r21 Cruz-Hernandez, J. M., Hayward, V., Antoniu, E. 1998 (October). Hysteresis Model for the Altair Deformable Mirror, National Research Council Contract LP034-8-4117.
- r20 Hayward, V. 1996 (March). Design and Integration of DSM Force-Reflecting Mechanisms, Phase II Design of Prototype for Shuttle Experiment. Vol. I and II. (Interim), Contract 9F028-5-51128/01-XSD.
- r19 Hayward, V. 1996 (March). Phase IV- Design and Integration og DSM Force-Reflecting Mechanisms. Vol. I and II. Contract 9F028-4-3199/01-XSD. March 1996.
- r18 Hayward, V. 1994 (November). Development and Construction of a Miniature Hand Controller With Force and Tactile Feedback Capability. Vol. I and II. Contract 9F028-3-1476/01-XSD, November 1994.
- r17 Reynier, F., Hayward, V. 1992 (July) Final Report on the Feasibility Study for the Development of a Miniature Hand-Controller with Force and Tactile Feedback Capability. Canadian Space Agency, Space Research and Technology. Contract No. 9F009-1-1441/01-SR
- r16 Reynier, F., Hayward, V. 1992 (July) Feasibility Study for the Development of a Miniature Hand-Controller with Force and Tactile Feedback Capability: Characterization of the Human Upper Extremities. Canadian Space Agency, Space Research and Technology, Contract No. 9F009-1-1441/01-SR
- r15 Foisy, A., Hayward, V. 1992 (July). Final Report for the Development of a Collision-Free Motion Planning Technique for MCPL, the MSS command and programming language. Spar Aerospace Ltd., Remote Manipulator Systems Division, Contract No. 09021TF.
- r14 Hayward, V. 1991 (December). Second International Symposium on Experimental Robotics Final Report. Canadian Space Agency Contract No. 990-645R.
- r13 Daneshmend, L. K., Boyer, M., Hayward, V. 1990 (April). Task analysis decomposition and planning of an operational scenario for MCPL: the Mobile Servicing Station (MSS) Command and Programming Language: The attached payload servicing function. Spar Aerospace Limited.
- r12 Foisy, A., Hayward, V. Daneshmend, L.K. 1989 (December). Final Report on Advanced Collision-Free Motion Planning Methods for MCPL, the MSS Command and Programming Language. Spar Aerospace Limited.
- r11 Hayward, V. 1989 (November). Final Report on the First International Symposium on Experimental Robotics. National Research Council, Space Division.
- r10 Hayward, V. Daneshmend, L., Foisy, A., Demers, L.-P. 1988 (May). Final report on the technology development for the MSS command and programming language. Spar Aerospace Limited.
- r09 Hayward, V., Hayati, S. 1988 (Mars). Kali: An environment for the programming and control of cooperative manipulators. McGill Research Center for Intelligent Machines Technical Report, CIM-88-8, McGill University, Montréal,

- Canada. Also Jet Propulsion Laboratory Report.
- r08 Hayward, V., Daneshmend, L., Nilakantan, A. 1988 (Mars). Model based trajectory planning using preview. Jet Propulsion Laboratory Report.
- r07 Nilakantan, A., Hayward, V. 1988 (Mars). Synchronizing multiple manipulators. Jet Propulsion Laboratory Report.
- r06 Topper, A., Hayward, V. 1987 (July). Porting RCCL to a multiprocessor environment: requirements specification for hardware and real-time software. Jet Propulsion Laboratory Technical Report.
- r05 Hayward, V., Lloyd, J. E. 1986 (October). RCCL users's guide. McGill Research Center for Intelligent Machines Technical Report, CIM-86-4, McGill University, Montréal, Canada.
- r04 Hayward, V. 1983 (October). Introduction to RCCL: A robot control 'C' library. Purdue University Technical Report, TR-EE 83-43.
- r03 Hayward, V. 1983 (October). RCCL version 1.0 and related software source code. Purdue University Technical Report, TR-EE 83-47.
- r02 Hayward, V. 1983 (October). RCCL version 1.0 user's manual. Purdue University Technical Report, TR-EE 83-46.
- r01 Hayward, V. 1983 (October). Robot Real-Time Control User's Manual. Purdue University Technical Report, TR-EE 83-42.

### **Mention in the press (21st century only)**

- 29/06/12 尝试一下！让你的触感产生错觉的七种方法 — China Daily
- 26/04/10 Putting the touch into touchscreens — The New Scientist
- 03/03/10 Touch Screens that Touch Back — MIT Tech Review
- 29/04/09 The touch of technology — McGill Reporter
- 12/04/09 How You Feel The World Impacts How You See It — Science Daily
- 11/03/09 Seven ways to fool your sense of touch — The New Scientist
- 26/10/08 Canadian researchers developing "touch vision" — The Toronto Star
- 25/10/08 Pinching display lets you feel the data — The New Scientist
- 28/10/08 Searching the frontiers of science — The Star
- 21/10/08 Touch Illusions — The Museum of Hoaxes
- 16/01/08 That freaky feeling — Science Squirrel Society China
- 14/02/08 Illusions of Touch: Some things to try on your valentine... — Scienceblogs.com
- 19/07/08 Perception: Scientists create touch illusion — A Level Psychology Resources
- 04/09/08 Execs predict next Google-like tech — CNET.com
- 04/09/08 The next Google — Nature, Vol 455
- 30/04/04 Sci Tech Radio Canada International
- 14/07/07 Touch me, feel me — The Guardian
- 09/01/07 Virtual Braille opens employment doors for visually impaired — IT World Canada
- 08/03/07 How touching — The Economist
- 25/08/06 The Cutting Edge of Haptics — MIT Technological Reviewers
- 14/07/06 Gadgets get the feel of the tactile world — The New Scientist
- 13/06/06 Sensor Has Human Touch, Discovery News
- 01/05/03 CBC Radio Interview
- 19/04/03 Workplace breakthroughs for the blind — The Toronto Star
- 06/03/03 Braille for computers — McGill Reporter
- 12/01/02 Sensational Devices — The Globe and Mail
- 30/06/01 Science Notebook — Washington Post
- 01/06/01 Fingers decipher by force, not topology — The National Post
- 26/07/01 Brain: Touchy Feely In A Virtual Hole — Alpha Galileo
- 04/10/01 La force au bout des doigts — Pour la Science
- 10/03/01 Feel it in your fingers — The New Scientist

## Research Grants and Contracts

### Current

- 2013–17 *Wearable Haptics for Humans and Robots* (WEARHAP), Technological Development Project, Integrated Project (IP), 7th Framework Programme, D. Prattichizzo (Coordinator), M. O. Ernst, S. Hirche, E. P. Scilingo, M. Bergamasco, A. Argyros, M. A. Otaduy, N. Tsagarakis, V. Hayward, B. B. Edin (PIs), 147,394 €/year of 1,925,000 €/year in total.
- 2013–17 *Virtual Prototyping of Tactile Displays* (PROTOTOUCH), Marie-Curie Action: Initial Training Networks (ITN), 7th Framework Programme, M. Adams (Coordinator), J.-L. Thonnard, J. Wessberg, J. Peric, R. Tomaz, J. Schmidhuber, V. Hayward, B. Lemaire-Semail, C. Chapaz, U. Groz (PIs), 1,014,726 €/year
- 2011–12 *Studying ageing-related effects on temporal neural coding of haptic perception: Experimental investigation in humans through an emerging technology for non-invasive electrophysiological recordings*. Subvention Emergence-UPMC. A. Arleo, V. Hayward (co-PIs). 83,000 €
- 2010–15 *Computational Theory of Haptic Perception* (PATCH), 7th Framework Programme, European Research Council Advanced Grant, V. Hayward (PI), M. Wexler (co-PI). 495,000 €/year.
- 2009–13 *The Hand Embodied (the)*, Technological Development Project, Integrated Project (IP), 7th Framework Programme, A. Bicchi (Coordinator), M. Santello, A. Albu Schaeffer, P. van der Smagt, K. Kyriakopoulos, D. Prattichizzo, S. Rossi, A.M.L. Kappers, V. Hayward, M. O. Ernst, H. Jörntell, (PIs). 156,612 €/year of 1,793,923 €/year in total.

### Completed

- 2008–11 *Natural Interactive Walking*, Technological Development Project STREP, 7th Framework Programme, F. Fontana (Coordinator), J. Cooperstock, S. Serafin, A. Lécuyer, V. Hayward (PIs). 106,000 €/year of 391,000 €/year.
- 2007–11 *Physically and Perceptually Based Haptics*, Discovery Grant, Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, \$48,200/year.
- 2006–10 *The design of Multi-Modal Information Displays*. Collaborative Research and Development Grant. Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, J. J. Clark & K. E. MacLean, \$57,600/year plus industry contributions (\$36,225/year cash, \$40,000/year in-kind)
- 2006–09 *Informatisation du graphisme tactile à l'usage des personnes aveugles ou handicapées visuelles*. Group grant. Fonds québécois de la recherche sur la nature et les technologies (FQRNT), V. Hayward, A. Dufresne, N. Trudeau. \$42,000/year.
- 2006–08 *Sound and Interaction in the Design of Enactive Interfaces*. Special Research Opportunity - Research Project, Natural Sciences and Engineering Research Council of Canada (NSERC) M. Wanderley, V. Hayward, S. McAdams, Ph. Depalle, G. Scavone, and C. Guastavino, \$272,000. \$207,000
- 2005–08 *High Fidelity Surgical Simulation*. Collaborative Research and Development Grant. Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, \$51,000/year plus industry contributions (\$17,000/year cash; \$20,000/year in-kind).
- 2003–07 *High Fidelity Haptics*, Discovery Grant, Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, \$45,000/year.
- 2002–05 *Foundations of Haptic Interfaces for Virtual Environments and Communications*, Group Grant. IRIS-4, NCE (Institute for Robotics and Intelligent Systems, Canada's Network of Centers of Excellence). V. Hayward (Project Leader), K. E. MacLean, S. J. Lederman, D. K. Pai, S. E. Salcudean, \$204,000, \$202,000, \$192,000.
- 2002–05 *Reality-based Modeling and Simulation of Physical Systems in Virtual Environments*. Group Grant. IRIS-4, NCE. W. Heidrich (Project Leader), U. M. Ascher, V. Hayward, A. K. Mackworth, D. K. Pai, R. J. Woodham, \$200,000, \$200,000, \$200,000.
- 2002–05 *Intelligent Tools for Diagnosis and Intervention*, Group Grant. IRIS-4 NCE. S. E. Salcudean (Project leader), J. Dill, R. Ellis, V. Hayward, P. D. Lawrence, C. MacKenzie, J. McEwen, A. M. Parameswaran, S. Payandeh, T. M. Peters. \$300,000, \$300,000, \$300,000.
- 2002–03 *A Haptic Surgery Simulator (HASS) for Holmium Laser Enucleation of the Prostate*. Grant. IRIS-TGAP. V. Hayward, M. Mahvash, \$99,615 plus \$35,000 industry contributions.
- 2003–04 *The Braille Cell Revisited: Achieving an Order-of-Magnitude of Cost Reduction*. FRSQ/Centre de recherche interdisciplinaire en réadaptation (CRIR), \$10,000.

- 1999–03 *Advanced Human-Machine Interfaces*. Operating Grant, Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, \$38,000 then \$39,900/year.
- 1999 *Mass Producible Tactile Displays*. Grant. IRIS-TGAP. M. Cruz-Hernandez and V. Hayward, \$39,000 plus \$20,000 industry contributions.
- 1998 *Hysteresis model for Altair Deformable Mirror*. Research Contract, National Research Council, Herzberg Institute for Astrophysics. V. Hayward. \$2,400.
- 1998–02 *Haptic Interfaces for Virtual Environments and Communications*, Group Grant. IRIS-3, NCE. V. Hayward (Project Leader), D. K. Pai, S. J. Lederman, S. E. Salcudean, R. L. Klatzky (Principal Investigators), C. Ramstein, HTI (Industry Participant). \$163,000; \$140,000, \$133,000, \$121,000, plus industry contributions.
- 1998–02 *Intelligent Tools for Diagnosis, Surgery and Measurement of Resulting Patient Outcomes*. Group Grant. IRIS-3, NCE. S. E. Salcudean (Project Leader), J. Dill, R. Ellis, V. Hayward, P. D. Lawrence, C. MacKenzie, A. M. Parameswaran, S. Payandeh, T. M. Peters. J. McEwen (Industry Participant). \$369,000/year, plus industry contributions.
- 1998–02 *Reality-Based Modeling and Simulation of Physical Systems in Virtual Environments*. Group Grant. IRIS-3, NCE. D. K. Pai, (Project Leader), U. Ascher, V. Hayward., A. Mackworth, R. Woodham. \$171,000, \$164,000, \$129,000, \$126,000, plus industry contributions.
- 1996–98 *A Balanced Haptic Device for Computer/User Interaction*. Technology Partnership (TPP) Grant, NSERC, with MPB Technologies Inc., Montréal, Canada., V. Hayward, L. Lessard, \$224,000, plus \$367,000 plus industry contributions.
- 1995 *Development of Demonstration for Stylus Haptic Device*. Research Contract, MPB Technologies Inc., V. Hayward, \$8,500.
- 1995–99 *High Performance Robotic Devices*, Operating Grant, NSERC, V. Hayward, \$32,500/year.
- 1995 *Support System for Control System Design and Simulation*, Equipment Grant, NSERC, P. R. Bélanger, G. Zames, P. E. Caines, M. S. Verma, J. G. Owen, H. Michalska, L. Lin, \$42,000.
- 1995 *Test Station*, Equipment Loan Canadian Microelectronics, N. C. Rumin, G. R. Gao, J. Rajski, G. W. Roberts, T. H. Zsymanski, V. Hayward, M. D. Levine, D. V. Plant. \$125,913.
- 1994–98 *Haptic Interfaces for Teleoperation and Virtual Environments*. Group Grant. IRIS-2, NCE. V. Hayward, (Project Leader), R. Ellis, J. M. Hollerbach, L. Jones, S. Lederman, D. Pai, T. Salcudean, C. Ramstein, R. Hui, J. Ballantyne, M. Boyer (Industrial Collaborators). \$260,000; \$246,000; \$193,000; \$193,000. Plus industry contributions.
- 1994–98 SMART SENSING FOR COMPUTER VISION. Group Grant. IRIS-2, NCE. D. Poussart (Project Leader), S. Gagné, D. Gingras, V. Hayward, N. Benoit, X. Maldague, Y. Savaria, M. Tremblay. \$270,000; \$250,000; \$200,000; \$200,000. Plus industry contributions.
- 1995–96 *Design and construction of Force-Feedback Mechanisms for DSM*. Phase II and III. Research contract, Canadian Space Agency, V. Hayward, \$150,000.
- 1992–94 *Sensor Based Robots*. Operating Grant, Natural Sciences and Engineering Research Council of Canada (NSERC), V. Hayward, \$28,000 per year.
- 1992–94 *Conception, commande et réalisation expérimentale de robots manipulateurs à architecture parallèle et hybride*. Group Grant, FCAR (Fonds Formation des Chercheurs Aide à la Recherche), V. Hayward, L. K. Daneshmend, J. Angeles, C. Gosselin. \$41,000; \$35,000; \$35,000.
- 1989, 91, 93 *First, Second then Third International Symposium on Experimental Robotics*, Research Contract. CSA (Canadian Space Agency), V. Hayward. \$5,000; \$4,000; \$7,000.
- 1991, 92, 93 *Development of a Miniature Hand-Controller with Tactile Feedback Capability*, Phase I, II, and III Research Contracts, CSA. V. Hayward, \$49,000; \$79,000; and \$125,000.
- 1991 *Trajectory Planning and Obstacle Avoidance*, Research contract. International Submarine Engineering, Ltd., CSA STEAR Project #5, V. Hayward, L. K. Daneshmend. \$19,000.
- 1992–94 *Orienting Devices for Dynamic Vision Sensing*. Group Grant. IRIS-1, NCE, D. Poussart, C. Gosselin, V. Hayward, M. D. Levine. \$20,000; \$20,000.
- 1990–94 *Simulation, Control, and Planning in Robotics*. Group Grant. IRIS-1, NCE, P. R. Bélanger (Project Leader), J. Angeles, R. Patel, L. Daneshmend, V. Hayward, G. Zames, P. Caines, A. Malowany, \$245,000; \$1,067,475; \$1,266,983; \$537,300; \$507,500.
- 1990–94 *High Performance Manipulators: Design and Architecture*, Group Grant. IRIS-1, NCE, I. Hunter, (Project Leader), J. Angeles, J. Hollerbach, V. Hayward., G.R. Gao. \$370,700; \$370,700; \$281,700; 290,300; \$252,500.

- 1990–92 *Development of a Collision-Free Motion Planning Technique For MCPL, the MSS Command and Programming Language*. Research Contract, SPAR Aerospace Ltd., V. Hayward, A. Foisy, \$96,000.
- 1990 *Autonomous Robotics*, Research Contract, Thomson Systems, CSA STEAR Project #3, L. K. Daneshmend, V. Hayward, S.C. Cai, M. D. Levine, F. Ferrie, G.R. Gao, R. De Mori. 1990.
- 1989–91 *Conception, commande et réalisation expérimentale de robots manipulateurs à architecture parallèle*. Group Grant. FCAR. V. Hayward, L. K. Daneshmend, J. Angeles, \$37,000, \$25,000, and \$25,000.
- 1989–92 *Sensor Based Robots*. Operating Grant, NSERC, V. Hayward, \$18,000 per year.
- 1989–92 *Maintenance télérobotique des lignes haute tension*, CRIM collaborative project with Hydro-Québec, L. K. Daneshmend, V. Hayward, \$150,400.
- 1988 *Advanced Collision-Free Motion Planning Methods for MCPL, the MSS Command and Programming Language*. Research Contract, SPAR Aerospace Ltd., V. Hayward, L. K. Daneshmend, \$50,130.
- 1988 *Mobile Servicing Station (MSS) Task Analysis, Decomposition, and Planning, of an Operational Scenario for MCPL, the MSS Command and Programming Language: the Attached Payload Servicing Function*. Research Contract, SPAR Aerospace Ltd., L. K. Daneshmend, V. Hayward, \$56,998.
- 1988 *Porting RCCL Under the Harmony Operating System*, Research Contract, National Research Council of Canada, V. Hayward, L. K. Daneshmend, \$68,000.
- 1987 *Technology development for the MSS Command/Programming Language (MCPL)*. Research Contract, SPAR Aerospace Ltd., V. Hayward, L. Daneshmend, \$50,000.
- 1987–88 *Porting the Robot Control C Library to a Distributed Multiprocessor Computing System*. Research Contract, Jet Propulsion Laboratory (JPL), National Aeronautics and Space Administration (NASA), V. Hayward, L. Daneshmend. \$173,000, \$23,000.
- 1987–90 *Range Understanding for Robotics*. Strategic Grant, NSERC, M. D. Levine, A. S. Malowany, V. Hayward, S. W. Zucker, \$93,467 per year.
- 1987 *Robotic Rangefinder*. Equipment Grant, Natural Sciences and Engineering Research Council of Canada (NSERC) M. D. Levine, A. S. Malowany, V. Hayward, S. W. Zucker, \$136,467.
- 1986–88 *Sensor Based Robots: Implications For Control, Programming, and Off-line Programming*. Operating Grant, (NSERC), V. Hayward, \$15,400 per year.
- 1985–87 *Conception et commande des manipulateurs robotiques*. FCAR actions structurantes, Equipement, McGill Research Centre for Int. Machines. P. R. Bélanger and nine others.
- 1985–87 *McGill Research Center for Intelligent Machines*, Infrastructure Support Grant, P. R. Bélanger and eleven others.
- 1984 *Interface CAO-Robot*. Research Contract. Institut de Recherche en Construction Navale (IRCN), A. Osorio, V. Hayward.
- 1984 *Unix Workstation*, Equipment Loan from Hewlett Packard Laboratories, V. Hayward.
- 1983–84 *Advanced Industrial Robot Control Systems*, Research Grant, National Science Foundation, (NSF), R. P. Paul, J. Y. S. Luh, S. Y. Nof, V. Hayward.
- 1982–83 *VAX Computer*. Computer Integrated Design Manufacturing Automation Center, CIDMAC Program. Purdue University.
- 1982 *Post-doctoral Fellowship*. Automatique et Robotique Avancée (ARA), V. Hayward, 1982.
- 1979–81 *Optimization Dynamique de Ressources et Reprogrammation*, automatisations, Thème Robotique Industrielle, Action DGRST, A. Osorio, V. Hayward.

## Teaching

### Courses Taught

#### Université Pierre et Marie Curie

- 2009–13 *Interfaces et réalité virtuelle* NSR20 (niveau M2+ROB5), enrollment: 22, 10, 15, 16 (cours = 30 heures)
- 2009–13 *Haptics for rehabilitation* NSR02 (Master International, 50%), enrollment: 14, 15, 18 (cours + TP = 18 + 4 heures).
- 2009–13 *Asservissements numériques*, (niveau ROB4) enrollment: 25, 22, 24, 22 (cours + TD + TP = 20 + 17 + 8 heures)

## McGill University

- 2006–08 *Sampled Data Control* ECSE-504 (graduate), enrollment: 8, 8, 12 (Winter).  
2004 *Haptics in Humans and Information Systems* (graduate colloquium 681), enrollment: 10.  
2007 *Haptics*, ECSE-628, enrollment: 8 (Fall).  
1992–97 *Computer Architecture and Organization* 304-425 (senior), 3 credits, enrollment: 50 (Fall 92), 70 (Fall 93),  
1999–08 85 (Fall 94), 85 (Fall 95), 112 (Fall 96), 100 (Winter 99), 100 (Fall 99), 49 (Winter 00) 85 (Fall 00), 55 (Winter 01),  
74 (Fall 01), 65 (Winter 02), 68 (Winter 03), 70 (Fall 03), 43 (Fall 04), 45 (Fall 05), 25 (Winter 08).  
96,97,99 *Computer Architecture Laboratory* 304-487 (senior), 3 credits, enrollment: 35 (Winter 96), 43 (Winter 97),  
2000–05 39 (Winter 99), 23 (Winter 00), 48 (Winter 01), 62 (Winter 02), 65 (Winter 03), 60 (Winter 04), 53 (Winter 05).  
1991–95 *Robotics and Control Laboratory* 304-493 (senior), 2 credits, enrollment: 5 (Winter 91), 8 (Winter 92), 12 (Winter 93), 20 (Winter 94) 8 (Winter 95).  
1990–91 *Introduction to Computer Engineering I* 304-221 (undergraduate) 3 credits, enrollment: 70 (Fall 90),  
96,98 70 (Winter 91), 83 (Fall 96), 150 (Fall 98), 141 (Fall 99).  
1991 *Introduction to Computer Engineering II* 304-222 (undergraduate), 3 credits, enrollment: 70 (Fall 91).  
1990–06 *Electrical Engineering Design Project*, 304-494 (senior), 3 credits, about 3 project/year since 1990.  
1986–93 *Artificial Intelligence*, 304-526 (graduate) 3 credits, enrollment 15 to 25.

## Université Paris XI

- 1984 *Conception des robots, modélisation, commande et programmation* (24 heures). Cours de DEA (Diplôme d'études approfondies), Enrollment: 15. Graduate course aimed at teaching the basics of robot design, kinematics, dynamics and control, and trajectory generation.

## Purdue University

- 1982 *Computer languages: C, APL*. Undergraduate courses, Enrollment: 120. Department of Electrical Engineering. Large class lecture aimed at teaching computer programming, algorithms and data structures.

## Supervision

### Université Pierre et Marie Curie

#### *In Progress*

- 2014– Wouter Bergmann Tiest, Post Doctoral Fellow  
2013– Séréna Bochereau, Ph.D.  
2013– Stephen Sinclair, Post Doctoral Fellow  
2013– Ramakanth Singal, Research Engineer  
2011– Bernard Javot, Ph.D. (part-time)  
2010– Amir Berrezag, Ph.D.

#### *Completed Post-Doctoral Supervision*

- 2011–13 Alexander Terekhov, Post Doctoral Fellow (PATCH), then, Assistant de Recherche Laboratoire Psychologie de la Perception, Université Paris Descartes/CNRS.  
2009–13 Irene Fasiello, Post Doctoral Fellow (PATCH), now Professeur, Intitut des Jeunes Aveugles, Paris  
2010–13 Jonathan Platkiewicz, then Fulbright Fellow at Cornell University, Ithaca, NY, USA, now Assistant de Recherche Brown University, Providence, RI, USA.  
2011–12 Yon Visell, Post Doctoral Fellow, *Sensorimotor effects*, (PATCH), now Assistant Professor at, Drexel University  
2011–12 Michaël Wiertelwski, Post Doctoral Fellow, *Haptically induced grasping reflex* (PATCH), now Post Doctoral Fellow, Northwestern University  
2009–10 Nizar Ouarti, Post Doctoral Fellow, *Haptically induced vection* (CNRS), Maitre de Conférences, UPMC

### *Completed Doctoral Supervision*

- 2011–14 Charles Hudin, Ph.D. *Focalisation par retournement temporel dans les plaques minces : Application à la stimulation tactile* (CEA), then Post Doctoral Fellow at Institut Langevin.
- 2009–13 Ildar Farkhatdinov, Ph.D.: *Modeling verticality estimation during locomotion*, now Post-Doctoral Fellow Imperial College London
- 2009–13 Abdenbi Mohand-Ousaid, Ph.D.: *Conception d'une chaîne de micro téléopération stable et transparente* (co-supervised with Pr S. Régnier) now Post-Doctoral Fellow Université Pierre et Marie Curie
- 2008–11 Michaël Wiertelowski, Ph.D.: *Reproduction of Tactual Textures: Transducers, Mechanics, and Signal Encoding* (co-supervised with Pr E. Pissaloux et J. Lozada), now Post-Doctoral Fellow Northwestern University
- 2006–11 Dung Viet Cai, Ph.D.: *Contribution à l'étude d'exosquelettes isostatiques pour la rééducation fonctionnelle, application à la conception d'orthèses pour le genou.* (co-supervised with Pr Ph. Bidaud et F. Gosselin)
- 2005–09 Guillaume Millet, Ph.D.: *Perception et interface haptique pour les nanosciences* (S. Régnier, principal supervisor), Post Doctoral Fellow at McGill University

### *Research Engineers Supervised*

- 2010–13 Rafał Pijewski, Research Engineer (THE), now, entrepreneur.
- 2010–13 Chao Sheng Wong, Research Engineer
- 2010–11 Gautier Long, Research Engineer
- 2009–10 Amir Berrezag, Research Engineer, Ph.D., Univ. P. et M. Curie
- 2008–09 George Dietz, Research Engineer, Graduate Student, McGill University

### *Completed Master's Supervision*

- 2012 Alister Fournet, *Conception d'une dalle tactile*
- 2011 Ryuta Ogazaki (University of Electro-communications), *multimodal perception*
- 2010 Michi Sato (University of Electro-communications), *multimodal device*
- 2010 Guillaume Malatray, *Conception d'une électronique de pilotage dalle tactile*
- 2010 Romain Mecaa, *Conception d'un stimulateur plantaire*
- 2010 Gautier Long, Master, *Interface haptique à haute performance*, Research Engineer, UPMC
- 2008 Amir Berrezag, Master, *Conception d'un modèle robotique de la station debout*, Research Engineer, UPMC

## **McGill University**

### *Completed Post-Doctoral Supervision*

- 2007–08 Mounia Ziat, Post Doctoral Fellow, *Haptic Perception* (NSERC-SRO), Assistant Professor Northern Michigan University.
- 1999–01 Gabriel Robles de la Torre, *Shape Perception By Touch*, (NSERC and IRIS-NCE), scientist, founded the International Society for Haptics, <http://www.isfh.org/>
- 1997–98 Farrokh J. Sharifi, *Velocity Estimation* (NSERC fellow), Professor at Ryerson University, Toronto
- 1997–98 Luc Joly. *Virtual Fixtures in Teleoperation* (Commissariat à l'Energie Atomique). Staubli Robotics
- 1992–94 Bertrand Duplat. *Hand Controller Design* (Electricite de France), Founder of Virtools SA
- 1991–92 Fabienne Reynier, *Hand Controller Design* (Canadian Space Agency)

### *Completed Doctoral Supervision*

- 2004–10 Hsin-Yun Yao, Ph.D. *A vibrotactile transducer and its applications in the study of perception* (NSERC, Immersion, committee: Prof. Ph. Depalle, Prof. M. Popovic). Entrepreneur.
- 2003–09 Vincent Levesque, Ph.D. *Virtual Display of Tactile Graphics and Braille by Lateral Skin Deformation* (NSERC, FQRNT, committee: Prof. A. Dufresne, Prof. J. Cooperstock). Post Doctoral Fellow, University of British Columbia.

- 2004–09 Gianni Campion, Ph.D. *The synthesis of three dimensional haptic textures, geometry, control, and psychophysics* (IRIS-NCE, NSERC, committee: Prof F. P. Ferrie, Prof A. M. Smith, Prof. P. Poulin), Post Doctoral Fellow, Boston University.
- 2004–09 Andrew H. Gosline, Ph.D. *Haptic Synthesis of Dynamically Deformable Materials*. (IRIS-NCE, NSERC, committee: Prof. D. Giannacopoulos, Prof R. Mongrain), Post Doctoral Fellow, McGill University
- 2003–08 Jérôme Pasquero, Ph.D. *Tactile display for mobile interaction*. (IRIS-NCE, NSERC, committee: Prof. J. Cooperstock, Prof. C. E. Chapman), scientist, Research In Motion Inc.
- 2003–07 Qi Wang, Ph.D. *A Biomechanically Optimized Tactile Transducer and Tactile Synthesis*. (IRIS-NCE, NSERC, committee: Prof. A. M. Smith, J. J. Clark). Assistant Professor Columbia University
- 1999–02 Mohsen Mahvash, Ph.D. *Haptic Rendering of Tool Contact And Cutting*. (IRIS-NCE, committee: Profs. B. Boulet and J. Clark), entrepreneur and Post Doctoral Fellow at John Hopkins University
- 1998–02 Dingrong Yi, Ph.D. *Computer Aided Display of 3D Angiograms, Using Graphics and Haptics* (IRIS-NCE, committee: Profs. K. Siddiqi and J. J. Clark), scientist, Sunnybrook and Women's College Health Science Center. Assistant Prof. Chinese University Hong Kong.
- 1995–01 Erick Dupuis, Ph.D. *A General Framework For the Manual Teleoperation of Kinematically Redundant Space-based Manipulators*. (committee: Profs. E. Papadopoulos, J. Angeles), scientist, Canadian Space Agency.
- 1996–00 Oliver R. Astley, Ph.D. *A Software Architecture For surgery Simulation Using Haptics*. (NSERC Fellowship and IRIS-NCE, committee: Profs. Cooperstock, Whitesides, scientist, GE Central Labs.
- 1994– Julie Payette, (Supervisory committee Profs. De-Mori , P. Kabal, M. Buehler) (Ms. Payette is an astronaut, withdrew from the program July 1996 due to space flight training)
- 1994–99 Danny Grant, Ph.D. *Accurate and Rapid Control of Shape Memory Alloy Actuators*. (IRIS-NCE, committee: Prof. Buehler, Prof. Galiana). V.P. Research, Immersion Corp.
- 1995–98 Juan Manuel Cruz-Hernández, Ph.D. *Reduction of Hysteresis: a Phase Control Approach*. (Mexican Gov., then NSERC, supervisory committee: Profs. Bélanger, Zames), scientist, Immersion Canada Inc.
- 1990–94 André Foisy, Ph.D. *Robust Collision Detection*, (Research Contract, SPAR Aerospace, supervisory committee: Profs. S. W. Zucker, L. K. Daneshmend), scientist, SoftImage.
- 1990–92 Louis-Phillippe Demers, Ph.D. *Autonomous Control of the Space Station Manipulator System*, (Research Contract, SPAR Aerospace), never completed, international artist
- 1989–94 John Lloyd, Ph.D. *Robot Trajectory Generation for Paths With Kinematic Singularities*. Dean's Honour List. (IRIS-NCE, Profs. S. W. Zucker and Professor L. K. Daneshmend), scientist, UBC
- 1990–94 Stéphane Aubry, Ph.D. *Three-Dimensional Model Construction From Multiple Sensor Viewpoints*. (FCAR, Profs. M. D. Levine, F. Ferrie, O. Elghindy), Algorithmica Inc.

#### *Completed Master's Supervision*

- 2008–10 Xinjelifu, X. M. Eng. Title not yet determined. (co-supervised with Prof H. Michalska)
- 2004–06 Gaurav Sood, M. Eng. *Simulation and Control of a Hip Actuated Robotic Model for the Study of Human Standing Posture*. Tembec Inc.
- 2003–05 Omar Ayoub, M. Eng. *Robotic Model of the Human Standing Posture*. Microsoft.
- 2002–05 Hanifa Dostmohamed. M.Eng. *Presentation of Shape Through Contact Location Trajectory*, now in medical school.
- 2003–05 Diana Garoway, M.Eng. *A Haptic Interface for Editing Space Curves with Application to Animation Authoring*. SoftImage.
- 2002–04 HsinYun Yao. M.Eng. *Touch Magnifying Instrument Applied to Minimally Invasive Surgery* (co-supervised with Prof. Ellis, Queen's), PhD Candidate.
- 2000–03 Vincent Levesque, M.Eng. *Measurement Of Skin Deformation Using Fingerprint Feature Tracking* (co-winner best demonstration award, IRIS-PREARN Conf. '02), PhD Candidate.
- 2000–03 Jérôme Pasquero, M.Eng. *STReSS: A Tactile Display Using Lateral Skin Stretch* (co-winner best demonstration award, IRIS-PREARN Conf. '02), PhD Candidate.
- 1997–99 Qing Yuan Wang, M. Eng. *Translation of Graphic to Haptic Boundary Representation*. (IRIS-NCE, co-supervised with Prof. F. Sharifi). Motorola Canada.
- 1996–98 Stephanie Greenish, M.Eng. *Acquisition and Analysis of Cutting Forces of Surgical Instruments for Haptic Simulation*. (NSERC TPP). Matrox.



- 1996–97 Matthew M. Roy, M.Eng. *Design and Fabrication of a Lightweight Robotic Manipulator*. (NSERC TPP, co-supervised with Prof. Lessard)
- 1996–97 John McDougall, M.Eng. *Design of a composite link for the Freedom-7 Haptic Hand Controller*. (NSERC TPP, co-supervised with Prof. Lessard).
- 1995–97 Xuemei Alexandra Lu, M.Eng. *Modelling and Design of High Strain Shape Memory Alloy Actuators*. (IRIS-NCE). Nortel.
- 1994–96 Alain Ouellet, M.Eng. *Control of an Instrumented Haptic Interface*. (Canadian Space Agency, co-supervised with Prof. M. Buehler), Scientist. CSA.
- 1995–96 Oliver Astley, M.Eng. *Autonomous Joint Calibration Using Adaptive Control*. Dean's Honour List, (NSERC Fellowship). Ph.D. Candidate, McGill.
- 1995–96 Pham Tam Loc, M.Eng. *Micro Network Protocol and Hardware Design for Distributed Data Acquisition*. (NCE-IRIS). Memotec Inc.
- 1994–95 Juan Manuel Cruz Hernández, M.Eng. *Modeling, Sensitivity analysis and control design for a tendon transmission*. (Mexican Gov.). Ph.D. Candidate, McGill.
- 1994–95 Jimmy Wang. M.Eng. *Modeling and Control of a Actuator Redundant Hydraulic Shoulder Joint*, (NCE-IRIS).
- 1992–94 Danny Grant, M.Eng. *Shape Memory Alloy Actuator with an Application to a Robotic Eye*. (NSERC). Ph.D. Candidate, McGill.
- 1992–94 Michel Doyon, M.Eng. *Decentralized Impedance Control*, (NSERC and IREQ). Scientist Canadian Space Agency.
- 1992–94 Mehron Vaezi, M.Eng. *Force Balancing in a Parallel Redundantly Actuated Mechanism*, (NCE-IRIS). Entrepreneur.
- 1991–93 Xianze Chen, M.Eng. *Six Degree of Freedom Tactile Stimulator for Psychometric Investigations*. (Space Agency Research Contract)
- 1990–92 Benoit Boulet, M.Eng. *Modeling and Control of a Robotic Joint with In-parallel Redundant Actuators*, Dean's Honour List. (NSERC), Prof. at McGill.
- 1989–91 Anthony Topper, M.Eng. *A Computing Architecture For a Multiple Robot Controller*, (FCAR).
- 1988–90 Ronald Kurtz, M.Eng. *Kinematics and Optimization of a Parallel Robotic Wrist Mechanism with Redundancy*, Dean's Honour List, (FCAR).
- 1986–87 Pierre Girouard, M.Eng. *Un système expert pour la gestion en temps réel des alarmes dans un réseau électrique* (FCAR). Entrepreneur.
- 1986–87 Jean Michel Arès, M.Eng. *A knowledge-based model and simulator for alarm and protection of power networks*. (FCAR). Entrepreneur.
- 1987–89 Ajit Nilakantan, M.Eng. *The Design and Implementation of an All Digital Shear Sensitive Tactile Sensor*. (NSERC). Co-Founder Cymmetry Systems Inc.

#### *Completed Honour's Theses*

- 2005 Yan Zhao, *Investigation of Human Adaptation in the Judgement of Applied Force*, graduate Student Northwestern University.
- 2002 Thimothée Doutriaux, *Design of Fluxgate Magnetometer*, graduate Student, MIT
- 2000 Eric Teodori, *FEM Analysis of Tactile Display*.
- 1997 Christine Desmarais, *Skin Stretch Tactile Display*, Rhodes Scholar at the University of Oxford, CAE Electronics Inc. 1997] Jason C. Chen, *Adaptive Velocity Estimation Techniques with Applications to Haptic Interfaces*, (Winner the Best Canadian IEEE Student Paper), entrepreneur
- 1997 Ming Hua Lim, *Direction Estimation Using Adaptive Windowing Techniques*
- 1993 Martin Becker, *Design and Kinematic Modeling of a Parallel Redundant Wrist*, Dipl. Ing. Thesis (Inst. Mechanics, TU Munich)
- 1993 François Mougnet, *Limit Cycles and Digital Control of a Hydraulic Actuator*, exchange student

#### *Research Engineers Supervised*

- 2002–03 Qi Wang. Ph.D. Candidate
- 1996–98 Michel Doyon. Scientist with the Canadian Space Agency

1998–99 Pedro Gregorio. Research Engineer (part time), now with Immersion Canada Inc.  
1994–95 Mathew Mather. Research Engineer (part time) with CITI, Immersion Canada Inc. then Officer with the Office of Technology Transfer, McGill University  
1993–95 Ducan Baird. Research Engineer now with Hymark Inc., Ottawa.  
1996–97 Jason Chen. Entrepreneur  
1995–96 Eric De Silva. Dassault Systèmes  
1991–93 Chaffye Nemri, V.P. Engineering. Discreet Logic

*Visitors from Industry and on Sabbatical*

2002–03 Dr. Ian Sinclair, MPB Technologies, Montréal.  
2000–01 Dr. Daniel Sidobre, LAAS CNRS, France.  
2001–04 Seigo Harashima, Ricoh Company (Japan)

## **Services to the University and the Profession**

### **Departmental, Faculty and University Committees**

#### **University Level at UPMC**

2013– Comité ERC-UPMC  
2013– Membre de la commission sur promotion de professeurs Groupe IX  
2012– Membre du comité “congrés pour recherches ou conversions thématiques”  
2012– Membre du Directoire de la Recherche de l’UPMC  
2011 Jury Émergence-UPMC 2011  
2010 Retour d’expérience : Starting et Advanced Grants Programme 2011

#### **University Level at McGill**

2005–08 Speaker, grantsmanship meetings  
2004–08 Beatty Memorial Lectures Committee  
1998–08 Pro-Dean (about twice a year in the past 4 years)  
1999–02 Academic Policy and Planning Committee  
1998–02 McGill NSERC/Major Postgraduate Fellowships Evaluation Committee  
1998–99 Groupe de Travail Conjoint Informatique — Génie informatique INFOGEN, Commission des Universités sur le Programmes (CUP)

#### **Faculty Level at McGill**

2004–05 Faculty Space Committee  
2001–04 Director, Centre for Intelligent Machines (CIM), an internationally recognized centre for the advancement of robotics, automation, artificial intelligence, computer vision, and systems and control theory with members of two faculties: Engineering and Science ( $\approx$  20 faculty, 100 students)  
1998–02 Dean’s Advisory Committee on Reappointment

#### **Departmental Level at McGill**

2007–08 Tenure Committee Dept. of Electrical and Computer Engineering  
2007–08 Promotion / Re-appointments Committee Dept. of Electrical and Computer Engineering  
2007–08 Graduate Student Financing Committee Dept. of Electrical and Computer Engineering  
2005–06 Appointments Committee Dept. of Electrical and Computer Engineering  
2005–06 Appointments Committee Dept. of Mechanical Engineering  
2005–06 ECE Issues Committee

- 2002–05 Chairman's Advisory Committee
- 1999–03 Committee on Information Technologies and Undergraduate Laboratory Equipment
- 1990–98 Graduate Program Committee. Department of Electrical Engineering.
- 1995–98 Merit Evaluation Committee (Elected)
- 1996–97 New Faculty Search Committee
- 1994–97 Teaching Assistant Coordinator
- 1991–92 Ad Hoc Search Committee for a Robotics Junior Position
- 1990 Coordinator for Electrical Engineering Open House Events

## Professional Activities

### Editorship

- 2010– Editorial Advisory Board Member, *Springer Series on Haptics and Touch Systems*
- 2007–11 Associate Editor, *IEEE Transactions on Haptics*
- 2007– Associate Editor, *ACM Transactions on Applied Perception*
- 1998– Member of Governing Board, *Haptics-e*
- 1994–98 Associate Editor, *IEEE Transactions on Robotics and Automation*

### Private Advisor

- 2012 Expert in litigation case, Rouse Legal, UK
- 2012 Expert in litigation case, Steptoe & Johnson LLP, Chicago, USA
- 2011 Immersion Corporation, California, USA
- 2011 Institute for Infocomm Research, A\*Star, Singapore
- 2011 Mesa Imaging AG, Switzerland
- 2006–07 Intuitive Surgical, Sunnyvale, California, USA
- 1999 Engineering design consultant, l'OEUF's entry to maquette exhibit for the 10th anniversary gala dinner of the Canadian Centre for Architecture CCA, Montréal
- 1998 Interval Research, Palo Alto, California, USA
- 1997 MPB Technologies Inc., Montréal, Québec, Canada
- 1994–95 Center for Information Technology Information, Montréal, Québec, Canada
- 1993 International Submarine Engineering, Vancouver, BC, Canada
- 1993 Aqua Vision Systems, Montréal, Québec, Canada
- 1992 Hydro-Québec, Varennes, Québec, Canada
- 1992 Scientific advisor to the Montreal based theater and dance company Carbone 14
- 1991 Electricité de France, Paris, France
- 1990–92 Member of the Board of Advisors, Robotics Abstracts, Bowker A&I Publishing
- 1987 Jet Propulsion Laboratory, Pasadena, California, USA
- 1987 Lord Corporation, Raleigh, South Carolina, USA
- 1986–88 RCA Advanced Technology Laboratories, New Jersey, USA
- 1986 UFA Associates, Massachusetts, USA

### Appointments with Agencies and Societies

- 2012– Member of the EuroHaptics Society PhD award committee
- 2013– Member of the IEEE Fellow Evaluation Committee, Robotics and Automation Society
- 2012–13 Member of the IEEE Fellow Nomination Committee, Robotics and Automation Society
- 2009–10 Member of the International Advisory Committee of the *Centre of Excellence for Information, Communication and Perception Engineering (CEICCP)*
- 2007–08 Grant selection panel member European Commission Program *Information Society and Media Directorate, Cognitive Systems and Robotics*

- 2005–08 Member of *Conseil Scientifique, Direction des recherches technologiques du Commissariat à l'énergie atomique (CEA)*, France
- 1994–05 Three time leader of national projects of the *Institute for Robotics and Intelligent Systems (IRIS a federal Network of Centres of Excellence)*: 02-05: Foundations of Haptic Interfaces for Virtual Environments and Communications; 98-02: Haptic Interfaces for Virtual Environments and Communications; 94-98: Haptic Interfaces for Teleoperation and Virtual Environments
- 2004–07 Member of NSERC Grant Selection Committee GS-21 (Interdisciplinary)
- 2003–08 Member of the College of Reviewers, Natural Sciences and Engineering Council of Canada (NSERC), Special Opportunity Program
- 2000–08 Member College of Reviewers, *Canada Research Chairs Program*
- 1999–02 Elected member *PRECARN-IRIS (NCE) Research Management Committee*.
- 1995, 00 Three times panel member of the Robotics Program, *National Science Foundation*, Washington DC, U.S.A.
- 1989–92 Member of Comité de Programme Nouveaux Chercheurs Fonds pour la *Formation de Chercheurs et l'Aide à la Recherche*
- 1997,93 Member of Comité de Programme Equipes de Recherche Fonds pour la *Formation de Chercheurs et l'Aide à la Recherche*
- 1992–95 Co-Chair of the *IEEE Robotics and Automation Society Technical Committee on Programming Environments in Robotics and Automation*
- 1991–96 Member of Constitution Committee of IFToMM, *International Federation of Theory of Machines and Mechanisms*
- 1990–93 Member of the *AIAA Technical Committee on Space Automation and Robotics (SARTC)*.
- 1989 Member of review committee the Mobile Robot for Health Care at the National Research Council of Canada, 1989

## Societies

- Eurohaptics Society
- Institute of Electrical and Electronic Engineers (IEEE), IEEE Robotics Society
- Former member of the Association for Computing Machinery (ACM)
- Former member of the American Institute of Aeronautics and Astronautics

## Start-Up Companies

- Co-founder and Honorary Director, Tactile Labs Inc., Montréal, Canada (2008)
- Co-founder of RealContact Inc. Montréal, Canada, (November 2002)
- Haptic Technologies Inc. was acquired by Immersion Corp, March 2000 (US\$ 7 MM) to become Immersion Canada Inc.
- Co-founder of Haptic Technologies Inc., Montréal, Canada, (May 1995)

## Ad Hoc Referee Appointments for Journals and Conferences

<i>ACM Transactions on Applied Perception</i>	1 (2008), 4 (2007), 1 (2006), 3 (2005), 2 (2004)
<i>ACM Transactions on Human-Computer Interaction</i>	1 (2004)
<i>ACM CHI Conference</i>	2 (2012), 1 (2011), 2 (2010)
<i>ACM Computing Surveys</i>	1 (1990)
<i>Advanced Robotics</i>	1 (2005)
<i>ASME J. of Biomechanical Engineering</i>	1 (2008), 1 (2006)
<i>ASME J. of Dynamics, Measurement and Control</i>	1 (2012), 1 (2005), 1 (2003), 3 (2002), 1 (1997)
<i>ASME J. Mech Design</i>	1 (2008), 1 (2007), 1 (2006), 3 (1994), 1 (1993)
<i>Attention, Perception and Psychophysics</i>	1 (2013), 1 (2010), 3 (2009), 1 (2008), 1 (2007)
<i>Automatica</i>	2 (2003)
<i>ASME J. of Computing and Inf. Sci. In Eng.</i>	1 (2008)
<i>Autonomous Robots</i>	1 (1996)
<i>Biological Cybernetics</i>	1 (2013)

*Cerebral Cortex* 1 (2012)  
*Control Engineering Practice* 1 (2005)  
*Current Biology* 1 (2013)  
*Experimental Brain Research* 1 (2014), 1 (2012), 1 (2011), 1 (2010), 2 (2009), 2 (2007)  
*Haptics-e* 1 (2008), 1 (2003), 1 (2002), 1 (2001), 1 (2000)  
*IEEE Transactions on Automatic Control* 1 (2003)  
*IEEE Transactions on Automation Sci. and Eng.* 1 (2008)  
*IEEE T. on Aerospace and Electrical Systems* 1 (1994), 1 (1991)  
*IEEE T. on Control System Technology* 1 (2010), 2 (2008), 1 (2007), 2 (2003), 1 (1999)  
*IEEE Computer Magazine* 1 (1990)  
*IEEE Computer Graphics and Applications* 2 (2003)  
*IEEE T. on Computer Graphics and Visualization* 1 (2006), 1 (2005), 1 (2002), 1 (2001)  
*IEEE T. on Haptics* 2 (2014), 4 (2013), 5 (2010), 1 (2009)  
*IEEE/ASME T. on Mechatronics* 1 (2014), 1 (2013), 1 (2011), 1 (2010), 2 (2009), 5 (2008), 3 (2007),  
1 (2005), 1 (2003), 1 (2002), 1 (2000), 1 (1999)  
  
*IEEE T. on Neural Syst and Rehab. Eng.* 1 (2010), 1 (2007)  
*IEEE T. on Robotics [and Automation]* 1 (2010), 2 (2007), 4 (2006), 3 (2005),  
2 (2004), 3 (2003), 2 (2002), 1 (2001), 2 (1998), 2 (1997), 2 (1996),  
5 (1995), 4 (1994), 5 (1993), 5 (1992), 3 (1991), 2 (1990), 1 (1989)  
  
*IEEE T. on Speech and Audio Processing* 1 (2003)  
*IEEE T. on Pattern Analysis and Machine Intelligence* 2 (1990)  
*IEEE Trans. on Systems, Man, and Cybernetics* 1 (2006), 1 (2004), 1 (2003), 1 (2002), 1 (2001), 1 (1993), 1 (1991), 3 (1990)  
*IEEE T. on Biomedical Engineering* 1 (2010), 1 (2005)  
*IEEE T. on Ultras., Ferroelectrics, and Freq. Control* 1 (2008), 1 (2007)  
*IEEE T. on Visualization and Computer Graphics* 1 (2009)  
*International J. of Control* 1 (2007)  
*International J. Robotic Research* 1 (2013), 1 (2012), 1 (2009), 3 (2008), 1 (2007), 1 (2006), 1 (2004),  
1 (2003), 1 (1998), 2 (1997), 1 (1996), 2 (1995), 1 (1993)  
  
*J. Européen des Systèmes Automatisés* 1 (2003)  
*J. of the Acoustic Society of America* 1(2010), 1 (2009)  
*J. of Biomechanics* 1 (2009)  
*J. of Canadian Aeronautics and Space Institute* 1 (1994), 1 (1991)  
*J. of Computing & Information Science In Engineering* 1 (2008)  
*J. of Computer Science and Technology* 1 (2008)  
*J. of Experimental Biology* 1 (2009)  
*J. of Field Robotics* 1 (2013)  
*J. of Neurophysiology* 1 (2012)  
*J. of Neuroscience* 1 (2013)  
*J. of Neuroscience (Methods)* 1 (2014) 2 (2013), 3 (2009)  
*J. of Robotics Systems* 1 (1995), 1 (1994), 1 (1992), (1991), 1 (1990), (reviewer for the Journal itself)  
*J. of the Royal Society Interface* 1 (2012), 1 (2009)  
*J. of Systems and Control Engineering* 1 (2007)  
*J. of Urology* 1 (2011)  
*Mechanisms and Machine Theory* 1 (2001), 1 (2000), 1 (1994), 1 (1991)  
*Medical Image Analysis* 1 (2003)  
*Medical Engineering & Physics* 1 (2013), 1 (2010), 1 (2006)  
*Measurement Science and Technology* 1 (2007), 2 (2005)  
*Meas., Instr. and Sensor Handbook, CRC Press* 1 chapter (1996)  
*Multisensory Research* 1 (2014)  
*Pattern Recognition Letters* 1 (2009)  
*Perception* 1 (2012), 2 (2007)  
*PLoS ONE* 1 (2014), 1 (2011)  
*Presence* 1 (2008), 1 (2003), 1(2002)  
*Proceedings of the National Academy of Sciences* 1 (2012)  
*Revue canadienne de génie élect. et de génie infor.* 1 (2007)  
*Robotica* 1 (2008), 1 (2007), 1 (1998)  
*Quarterly Journal of Experimental Psychology* 1 (2013)

<i>Scientific Reports</i>	1 (2013)
<i>Sensors</i>	1 (2012)
<i>Sensors and Actuators A (Physical)</i>	1 (2000)
<i>SIGGRAPH</i>	1 (2006)
<i>Springer Verlag Publications</i>	1 book (2009), 1 chapter (2006), 1 book (1991)
<i>Springer Virtual Reality Journal</i>	1 (2005)
<i>Technique Et Science Informatiques</i>	1 (2008)
<i>T. on Industrial Electronics</i>	1 (2003)
<i>Virtual Reality</i>	1 (2006)

Review of numerous national and international conferences papers, 10-odd papers a year

### Grant Application Refereeing

Agence Nationale de la Recherche, France	1 (2013), 1 (2011), 2 (2009), 1 (2008), 4 (2007), 5 (2006), 1 (2005)
Belgium Research Council	1 (1997)
Canada Council for the Arts, Killam Program	1 (1999)
Canadian Foundation for Innovation	Site visit Committee (1999)
Canadian Institutes for Health Research	1 (2006), 1 (2002)
CSS Strategic Initiatives	1 (1991), 1 (1992)
CUNY Collaborative Incentive Res. Grant Program	1 (2006)
ETH Zurich Research Commission	1 (2012)
Fonds québécois de la recherche nature et technologies	1 (2004), 1(2003), 2 (1995), 1 (1994), 2 (1993)
Fonds national suisse de la recherche scientifique	1 (2004), 1 (1995)
Hasler Foundation, Switzerland	1 (2012)
Hong Kong Research Grant Council	1 (2004), 1 (1995)
Human Frontier Science Program	1 (2007)
Indo-US Science & Technology Forum (IUSSTF)	1 (2009)
Institut National de la Recherche en Informatique et Automatique	1 (2010)
Materials and Manufacturing Ontario	1 (2003)
Michael Smith Foundation for Health Research	1 (2001)
Ministry of Science and Techn., Republic of Slovenia	1 (1992)
National Research Foundation, Singapore	2 (2007)
National Science Foundation, USA	1 (2012) 1 (1997), 1 (1995), 2 (1992), 2 (1991), 1 (1990)
Natural Sciences and Engineering Council of Canada	1 (2012), 3 (2011), 2 (2010), 1 (2009), 2 (2008), 3 (2007), 2 (2006), 1 (2005), 3 (2004), 3 (2003), 5 (2002), 7 (2001), 4 (2000), 4 (1998), 4 (1997), 3 (1996), 4 (1995), 5 (1994), 4 (1993), 4 (1992), 3 (1991), 2 (1990), 2 (1989)
Netherlands Organisation for Scientific Research	1 (2009)
Netherlands ICT Research and Innovation Authority	1 (2010)
Research Foundation - Flanders	1 (2009), 1 (2008)
Swiss National Science Foundation	2 (2010)
Wellcome Trust	1 (2011)

### Program Committee Work

11	Program committee <i>WorldHaptics Conference</i>
11	Member of the <i>Virtual Reality International Conference (VRIC) 2011</i> reviewer committee
10	Scientific Committee of the <i>ASME 2011 World Conference on Innovative Virtual Reality</i>
10	Program Committee of <i>Eurohaptics</i>
05,07,09,	
08,10	Program Committe of the <i>IEEE International Symposium in Robot and Human Interactive Communication (Ro-Man)</i>
06,10	Area Chair 2006 <i>Robotics: Science and Systems Conference</i>

- 06,08,10 Program Committee of the 3rd, 4th, 5th *Symposium on Computational Models for Biomedical Simulation (ISBMS)*.
- 05,06,07,
- 08 Program Committee of the *Symposium on Haptic interfaces for virtual environment and teleoperator systems*
- 06 Program Committee of the *SICE-ICASE International Joint Conference*
- 06 Program Committee of the *IEEE Int. Workshop on Haptic Audio Visual Environments and Applications*
- 91,92,94,
- 95,97,99,
- 00,01,02,
- 03,05,06 Program Committee of the *IEEE International Conference on Robotics and Automation*
- 04,05,06 Program Committee of the *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
- 05 Program Committee of the *2nd International Conference on Enactive Interfaces ENACTIVE05*
- 05 Program Committee of the *First International Conference on Complex Medical Engineering (CME 05)*
- 04 Program Committee of the *5th International Conference on Machine Automation (ICMA04)*
- 04 Program Committee *Sixth International Conference on Multimodal Interfaces (ICMI'04)*
- 04 Program Committee *International Symposium on Non-visual & Multimodal Visualization*
- 04 Program Committee *Second International Symposium on Medical Simulation*
- 00 Program Co-Chair *International Symposium on Robotics ISR00*, Montréal
- 98 Program Vice-Chair (North-America) of *IEEE International Conference on Robotics and Automation*
- 94,97,09 Program Committee of the *IFAC Symposium on Robot Control*
- 93 Program Committee of the *International Joint Conference on Artificial Intelligence, IJCAI'93*
- 92,94,96 Scientific Committee of the 3rd, 4th, and 5th *International Workshop on Advances in Robot Kinematics*
- 91,93,97 Program Committee of the Fifth, Seventh and Eighth *International Conference on Advanced Robotics (ICAR)*
- 92 Program Committee, I-SAIRAS *Artificial Intelligence, Robotics and Automation in Space*
- 91 Program Committee ORIA-91, 4th Int. *Symposium on Offshore, Robotics and Artificial Intelligence*
- 91,92 Program Committee of the *IEEE/RSJ International Workshop on Intelligent Robots and Systems*
- 90 Program Committee of the *Fifth IEEE International Symposium on Intelligent Control*
- 90 Program Committee of the *Third International Symposium on Robotics and Manufacturing*

### Organization of Activities

- 2013 Co-organized with Jonathan Platkiewicz the first "Workshop on Early Touch" at the Computational Neuroscience Meeting, July 17, 2013, Université Paris Descartes, Paris, France. Speakers included Ehud Ahissar (Weizmann Institute of Science, Israel), Angelo Arleo (Université Pierre et Marie Curie, France), Sliman Bensmaia (University of Chicago, USA), Vincent Hayward (Université Pierre et Marie Curie, France), Jan Koenderink (Katholieke Universiteit Leuven, Belgium), Masashi Nakatani (Columbia University Medical Center, USA / Keio University, Japan), Tony Prescott (University of Sheffield, UK), Elie Wandersman (Université Pierre et Marie Curie, France), Junji Watanabe (NTT Communication Science Laboratories / Tokyo Institute of Technology, Japan).
- 2009 Co-edited with Kanav Kahol and Stephen Brewster a Special Issues on Ambient Haptic Systems in the *IEEE Transactions on Haptics* which appeared as the No. 3, Vol. 2. It attracted a large number of submissions among which six papers were included in the special issue and another six were accepted as regular articles.
- 2006 Co-organized, together with Prof. J. M. Hollerbach (Univ. of Utah) the *IEEE-RAS/IFRR School of Robotics Science on Haptic Interaction*. This was the third summer school offered through co-sponsorship by the IEEE Robotics and Automation Society (RAS) and the International Foundation of Robotics Research (IFRR). The school hosted 35 Ph.D/Post-doctoral students from across the world, specifically from Belgium, Canada, Italy, Japan, France, Germany, Greece, Mexico, the Netherlands, Spain, Switzerland, Turkey, the UK, and the USA who were instructed by ten internationally reknown professors from Europe, the USA, and Japan.
- 2006 Organized a colloquium, *Informatisation du graphisme tactile à l'usage des personnes aveugles ou handicapées visuelles*, Congrès de l'Association francophone pour le savoir, Montréal.
- 1989 Organized an invited paper session, *Biological Models in Robotics*. 12th Annual Conference of the IEEE Engineering in Medicine and Biology Society.
- 1989 Co-organized with Prof. O. Khatib the *First International Symposium on Experimental Robotics*, Montréal and

co-founded a successful series of symposia (In 1990, seven hundred copies of the proceedings of ISER-1 were sold), one meeting every two years: Montréal, Canada, 1989; Toulouse, France; 1991, Kyoto, Japan 1993; Stanford, 1995; Barcelona, Spain, 1997; Sidney, Australia, 1999; Hawai, USA, 2001; Sant'Angelo, Ischia, Italy, 2002; Singapour, 2004; Rio de Janeiro, 2006; Athens, 2008.

1989 Organized a workshop on Integration of AI and Robotics. *IEEE International Conference on Robotics and Automation*.

1988 Co-organized a workshop on Shared Autonomous and Teleoperated Manipulator Control. *IEEE International Conference on Robotics and Automation*.