

CURRICULUM VITAE

Hubert de Bruin

1. PERSONAL DETAILS

Citizenship: Canadian

Home Address

22 Coventry Crt.
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Business Address

Department of Electrical and Computer Engineering
McMaster University
1280 Main Street West
Hamilton, ON
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(905) 525-9140, Ext. 24171

2. EDUCATION

1965-1969	Undergraduate in Electrical Engineering Department, McMaster University, Hamilton, Ontario.
1969	B. Eng. Electrical Engineering McMaster University
1969-1975	Graduate student in Electrical Engineering Department, McMaster University
1971	M. Eng. Electrical Engineering McMaster University Thesis: "Use of low-order models for near-optimal control of higher-order systems"
1976	Ph.D. Electrical Engineering McMaster University Thesis: "Aspects of Analysis and Processing of Electro-Myographic Signals"
1976-1979	MRC Fellow, Department of Medicine, McMaster University

3. PRESENT STATUS

- Associate Professor, Department of Electrical and Computer Engineering, McMaster University
- Graduate Faculty, Health Sciences Graduate Programme, McMaster University

4. MEMBERSHIP OF PROFESSIONAL SOCIETIES

- Registered Member, Professional Engineers of the Province of Ontario
- Member, Institute of Electrical and Electronics Engineers, Inc. (Group on Engineering in Medicine and Biology).
- Member, Canadian Medical and Biological Engineering Society

5. EMPLOYMENT HISTORY

- 1975 - 1976 Research Engineer in the Biomedical Engineering Department, Chedoke-McMaster Hospitals Chedoke Division, Hamilton, Ontario
- 1976 - 1979 Member of the Biomedical Engineering Department, Chedoke Division. Was engaged in training and research in the areas of bioengineering and rehabilitation medicine.
- 1979 - 1988 Assistant Professor, Department of Medicine, McMaster University, Hamilton, Ontario.
- 1979 - 1984 Manager of the locomotion laboratory and the computer facility in the Biomedical Engineering Department at Chedoke Hospital Division, Chedoke-McMaster Hospitals.
- 1984 - 1986 Director of Biomedical Engineering Chedoke Hospital Division, Chedoke-McMaster Hospitals.
- 1986 - 1995 Director of Biomedical Engineering, Chedoke-McMaster Hospitals. This department was responsible for the technological assessment and modification of aids for disabled adults and children in the region. As well, it is responsible for the maintenance and compliance with standards of the clinical equipment in both Chedoke and MUMC Divisions, and the development of new diagnostic and therapeutic equipment.
- 1988 - 2001 Associate Professor, Department of Medicine, McMaster University.
(Continuing appointment without annual review since 1984)
Associate Member, Department of Electrical and Computer Engineering, McMaster University (since 1979)
- 1995 - 2001 Rehabilitation Engineering/Research Coordinator, Hamilton Health Sciences, Hamilton, Ontario.
Member, Dept. of Physical Medicine and Rehabilitation, Hamilton Health Sciences.
- 2001 – present Associate Professor, Department of Electrical and Computer Engineering, McMaster University

Consultation

CME Telemetrix, Waterloo, Ontario (Advantage Medical Systems)
Magnos Technologies Inc, Guelph, Ontario
Hamilton Health Sciences, Hamilton, Ontario

6. SCHOLARLY AND PROFESSIONAL ACTIVITIES

- Scientific Committee 29th Int. Cong. On Electrocardiography and 4th Int. Conf. On Bioelectromagnetism, July 2002, Montreal
- Scientific Session Chairman for Annual Canadian Medical and Biological Engineering Society Conferences and IEEE Biomedical Engineering World Congresses as well as Student Paper Competition Judge.
- Chairman, Scientific Program, 25th Canadian Medical and Biological Engineering Conference, London, Ontario, June 24 - 26, 1999
- Member, Academic Council, Redeemer University College, Ancaster (1986-1992)
- Canadian Medical and Biological Engineering Society representative to the National Professional Associations Committee of the Canadian Rehabilitation Council for the Disabled 1982 to 1986.
- Member of the Organizing Committee and the Scientific Program Committee for the 1983 Canadian Congress of Rehabilitation.

- Member of Advisory Committee for the IXth Congress of the International Society of Biomechanics, Waterloo.
- Biomedical Engineering representative to OUCHR Rehabilitation Study Group (1987 - 1988).
- External Grant Reviewer for CIHR, NHRDP, and NSERC.
- Reviewer for Physiotherapy Foundation, Hospital for Sick Children Foundation, B.C Health Care Research Foundation
- Journal Referee for IEEE Transactions in Biomedical Engineering, Rehabilitation Engineering, Medical and Biological Engineering & Computing, Annals of Biomedical Engineering

Honours

J. V. Basmajian Award for Rehabilitation Research (2001)

7. CURRENT AREAS OF INTEREST

- Application and analysis of electric and magnetic fields in biological tissue
- Quantitative diagnostic electromyography including computer-aided pattern recognition.
- Study of human locomotion and movement - specifically clinical assessment of movement disorders.
- Clinical recording and analysis of electrogastrogram
- Development and use of outcome measures in Rehabilitation Medicine
- Computer applications to medicine and medical instrumentation.

8. COURSES TAUGHT

Department of Electrical and Computer Engineering, McMaster University

- EE 4UA3/Biomedical Electronics Instrumentation (every year from 1979 to present).
1999/2000 designated EE 4EL3 (63 students 2002/2003)
- EE 2CI4/Introduction to Electrical Engineering (2001- 2002)
- EE 4OI4/ Engineering Design (2001/2002)
- COE 4OI4 Engineering Design (2002/2003)
- EE 727/Graduate Course on Biomedical Signal Processing (on demand).
- EE 4JA4 designated EE4JO3 /Supervision of Bachelors' theses from 1982 to present (completed 87, current - 1)
- EE 4HJ1 - Seminar on Electrical Safety

Faculty of Health Sciences, McMaster University

- Tutor, Unit IV, MD Programme (1989/1990 to 1991/1992, 1995/1996 to 2000/2001)
This is the major teaching role in the MD program
- Resident Teaching Rounds to:
P.M.R. - Quantitative Gait Analysis, Principles of Medical Instrumentation, as applied to Electromyography
Orthopaedic Surgery - Quantitative Assessment of Gait

Anaesthesiology - Principles of Instrumentation in Anaesthesia (every year, part of core program)

9. SUPERVISORSHIPS (to Jul 04)

- Master: completed -15; in progress -4; inactive - 3. (ECE)
- Doctoral: completed - 4; in progress -1; inactive – 1 (ECE)
- Post-Doctoral: completed - 1.
- Additional Ph.D. Supervisory Committees: completed - 8; in progress - 1
- Ph.D. comprehensive examination committees in Electrical and Computer Engineering - 11; in Medical Sciences - 3.
- Additional Master's thesis examining committees - 17
- Additional Ph.D. examining committees, ECE and Medical Sciences -17

10. RESEARCH FUNDING: 1996 - 2004

"EMG and Evoked Potential Signal Processing Analysis Strategies", from NSERC (Natural Sciences and Engineering Research Council)

1993 - 1997	\$17,000 per annum
1997 - 1998	\$16,000 per annum
1998 - 1999	\$18,000 per annum
1999 - 2001	\$20,790 per annum

"Signal Processing and Stimulation Strategies in Neurophysiology", from NSERC

2001 – 2005	\$37,950 per annum
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Co- investigator in a number of research projects in outcome measures in Rehabilitation Medicine funded by the Hospital Foundation, Hamilton Health Sciences

11. LIFETIME PUBLICATIONS

Life-time Summary

Chapters in Books -----	3
Papers in Refereed Journals -----	20
Papers in Refereed Conf. Proceedings -----	37
Abstracts and/or Papers Read -----	45
Others -----	5

* first author is a graduate student

A PEER REVIEWED

CONTRIBUTIONS TO BOOKS

- A.J. McComas, H. de Bruin and C. Quartly, 'Non-transmitting Synapses in Human Neuromuscular Disorders', **Restorative Neurology** Vol. 5, Ed. A. Wernig, Elsevier Science Publishers BV, 1991, Chapt. 24, pp 223-229.

JOURNAL ARTICLES

- N.K. Sinha and H. de Bruin, 'Near Optimal Control of High-Order Systems Using Low-Order Models', **Int. J. Control**, Vol. 17, 1973, 257-262.
- H. de Bruin, D. Russell, J. Latter, and J.T.S. Sadler, 'Angle-Angle Diagrams in the Monitoring and Quantification of the Gait of Children with Cerebral Palsy', **American Journal of Physical Medicine**, Vol. 61, 1982, pp 176-192.
- B. Clarke, C. Gowland, M.E. Brandstater and H. de Bruin, 'A Re-evaluation of the Brunnstrom Assessment of Motor Recovery of the Lower Limb', **Physiotherapy Canada**, Vol. 35, 1983, pp 207-211.
- M.E. Brandstater, H. de Bruin, C. Gowland and B.M. Clarke, 'Analysis of Temporal Variables of Hemiplegic Gait', **Archives of Physical Medicine and Rehabilitation**, Vol. 64, 1983, pp 583-587.
- M.E. Towell, J. Johnson, G.P. Madhavan, and H. de Bruin, 'Heart Rate and PO₂ in the Fetal Lamb', **Advances in Experimental Medicine and Biology**, Vol 180, 1984, pp 489-498.
- * G. Madhavan, H. de Bruin, A.R.M. Upton, and M.E. Jernigan, 'Classification of BSAEP by Syntactic Methods', **EEG and Clinical Neurophysiology**, Vol. 65, 1986, pp 289-296.
- R.P. Harper, H. de Bruin and I. Burcea, 'Lateral Pterygoid Muscle Activity in Mandibular Retrognathism and Response to Mandibular Advancement Surgery', **American Journal of Orthodontics**, Vol. 91, 1987, pp 70-76. (Selected for publication in **Yearbook of Dentistry**, Yearbook Medical Publishers).
- * D. Stashuk and H. de Bruin, 'Automatic Decomposition of Selective Needle Detected Myoelectric Signals', **IEEE Trans. Biomed. Eng.**, Vol. 35, 1988, pp. 1-10.
- * G. Madhavan and H. de Bruin, 'Crosstalk Resistant Adaptive Noise Cancellation', **Annals of Biomedical Engineering**, Vol. 18, 1990, pp 56-67.
- * C. Hershler, A.R.M. Upton, H. de Bruin, I Burcea, R.N.King, and C. Zoghaib, 'Effects of Chronic Cerebellar Stimulation (CCS) Setting on the Gait and Speech of a Spastic Cerebral Palsy Adult', **Pacing and Electrophysiology** 12(5), 1989, pp 861-869.
- * V. Galea, H. de Bruin, R. Cavasin and A.J. McComas, 'The Numbers and Relative Sizes of Motor Units Estimated by Computer', **Muscle and Nerve**, Vol. 14, 1991, pp 1123-1130.
- * G. Madhavan and H. de Bruin, 'Weighted Exact Least Squares Lattice Algorithm for Adaptive Noise Cancellation', **Canadian Journal of Electrical and Computer Engineering**, Vol. 17, 1992, pp 29-33.
- C. Gowland, H. de Bruin, J.V. Basmajian, N. Plews, I. Burcea, 'Agonist and Antagonist Activity During Voluntary Upper - Limb Movement in Stroke', **Physical Therapy**, Vol. 72, 1992, pp 624 - 633.
- A. J. McComas, V. Galea and H. de Bruin, 'Motor Unit Populations in Healthy and Diseased Muscles', **Physical Therapy** Vol. 73, 1993, pp 868 - 877
- * F.S. Cayabyab, H. de Bruin, M. Jimenez and E.E. Daniel, 'Ca²⁺ Role in Myogenic and Neurogenic Activities of Canine Ileum Circular Muscle', **Am. J. of Physiol. (Gastrointest. and Liver Physiol.)**, Vol. 271, 1996, pp G1053 - G1066
- R.P. Harper, H. de Bruin and I. Burcea, 'Muscle Activity during Mandibular Movements in Normal Subjects and Mandibular Retrognathism', **J. of Oral and Maxillofacial Surgery**, Vol. 55, 1997, pp 225 - 233
- * F.S. Cayabyab, M. Jimenez, P. Vergara, H. de Bruin and E.E. Daniel, 'Influence of Nitric Oxide and Vasoactive Intestinal Peptide on the Spontaneous and Triggered Electrical and Mechanical Activities of the Canine Ileum', **Cdn. J. of Physiol. and Pharmacol.**, Vol. 75, 1997, pp 383 - 397

- * R.B. Szlavik and H. de Bruin, 'The Effect of Stimulus Current Pulse Width on Nerve Fiber Size Recruitment Patterns' **Medical Engineering and Physics**, Vol. 21, 1999, pp 507 - 515
- * R.B. Szlavik and H. de Bruin, 'The Effect of Anisotropy on the Potential Distribution in Biological Tissue and its Impact on Nerve Excitation Simulations' **IEEE Trans. Biomed. Eng.**, Vol. 47, 2000, pp 1202 - 1210
- * N. Al-Mutawaly, H. de Bruin and G. Hasey, 'The Effects of Pulse Configuration on Magnetic Stimulation', **J. Clin Neurophysiol.**, Vol. 20(5), 2003, pp 361 - 370

JOURNAL ABSTRACTS

- S.N. Banerjee, H. de Bruin, M. Milner, C. Mohammed and J.A. Wallace, 'Computerized Records of Above-Knee Amputee-Gait - Influence of Alignment Changes', Presented at the **40th Ann. Assembly of the Am. Academy of Phys. Med. and Rehab.**, New Orleans, November 1978. Abstract in **Archives of Phys. Med. and Rehab.**, Vol. 59, 1978, pp 527.
- J.T.S. Sadler, H. de Bruin, J. Latter, R.F. Martin, D.J. Russell, 'The Application of Hip-Knee Angle Diagrams to the Monitoring of Gait in Children with Cerebral Palsy', presented at the **Ann. Mtg. of the Cdn. Orthopaedic Assoc.**, Montreal, 1979; Abstract in **Journal of Bone & Joint Surgery, Orthopaedic Transactions**, Vol. 3, No.3, Fall 1979, pp 377.
- R. Blumenstein, L. Swanson, C. Gowland, H. de Bruin, J.V. Basmajian, 'An Electromyographic Study of the Upper Extremity of Normal and Hemiplegic Patients', Presented at the **93rd Session of the Am. Association of Anatomists**, Omaha, Nebraska, April 1980. Abstract in **Anat. Rec.** Vol.192: 21A, 1980.
- R. Blumenstein, L. Swanson, C. Gowland, H. de Bruin, J.V. Basmajian, 'An Electromyographic Study of the Shoulder Region in Hemiplegic (Stroke) Patients', Presented at **94th Ann. Mtg. of the Am. Assoc. of Anatomists**, New Orleans, April 1981. Abstract in **Anat. Record**, Vol. 199: 29A, 1981.
- J.R.A. Rigg, G.F. Shein, H. de Bruin, and L.D. Pengelly, 'Effect of Curare on Static Force, EMG and Muscle Length Inter-relationships in Man', Presented at **6th Ann. Mtg. of the Fed. of Am. Societies for Experimental Biology**, Atlanta, April 1981. Abstract in **Fed. Proc.** Vol. 40: 3, 1981.
- J.R.A. Rigg, D. Stashuk, G.F. Shein, H. de Bruin, and L.D. Pengelly, 'Electromyographic Changes During Sustained Isometric Isoforce Contractions Before and After Induction of Steady-state Submaximal Neuromuscular Block in Man', Presented at the **76th Ann. Mtg. of the Am. Thoracic Society**, Detroit, May 1981, Abstract in **Am. Rev. of Respiratory Disease** Vol. 123: 4 pp 173, 1981.
- * D. Stashuk, H. de Bruin and M.E. Brandstater, 'Automatic Analysis of Motor Unit Activity', Presented at **31st Ann. Mtg. of AAEE**, Kansas City, Sept. 1984. Abstract in **Muscle and Nerve**, Vol. 7, 1984, pp 560.
- M.E. Brandstater, H. de Bruin and J. Perry, 'Quantitative Analysis of Channel Cross-talk during Multiple Level EMG Recordings', presented at **31st Ann. Mtg. of AAEE**, Kansas City, Sept. 1984. Abstract in **Muscle and Nerve**, Vol. 7, 1984, pp 561-562.
- * L.C. Torsher, H. de Bruin, P. Fuller, C.A. Woolever, 'A System for Collection and Analysis of Home Recorded Uterine Activity', **Proc. of 65th IEEE Ann. Conf. of EMBS**, 1984, pp 312-315. Abstract in **IEEE Trans. on Biomed. Engg.**, BME-31, 1984, pp 569.
- M.E. Brandstater, H. de Bruin, D. McLaughlin, C. Gowland, N. Plews, and I. Burcea, 'Knee Angle Measurement: Validity and Reliability Study of Three Measurement Systems', presented at **61st Ann. Session Cong. of Rehab. Med.**, Boston, October 1984. Abstract in **Archives of Physical Medicine and Rehabilitation**, Vol. 65, 1984, pp 641.
- * D.Russell, C. Gowland, A. Healing, H. de Bruin, J. Trotter and I. Burcea, 'Effects of Inhibitive Casting on Function in Cerebral Palsy', **Physiotherapy Canada** 38 (3, Suppl); 1986 pp 3.

- * R. Cavasin, H. de Bruin, A.J. McComas, 'An Automated Motor Unit Counting System', presented at **35th Ann. Mtg. of AAEE**, San Diego, Oct. 1988. Abstract in **Muscle and Nerve**, Vol. 11, 1988, pp 957.
- H. de Bruin, A.J. McComas, V. Galea, 'Automated Motor Unit Counting in Proximal Muscles', presented at **35th Ann. Mtg. of AAEE**, Washington, Sept. 1989. Abstract in **Muscle and Nerve**, Vol. 12, 1989, pp 779.
- * J.C. Smerek and H. de Bruin, 'Decomposition of Multichannel EMG', presented at **5th Int. Conf. on Computerized and Quantitative EMG**, 1993, Hamilton, Canada. Abstract in **Cdn. J. of Neurological Sciences**, Vol. 20, No. 4, 1993, pp 354.
- * D. Eleveld and H. de Bruin, 'Motor Unit Estimates Through Accelerometry', presented at **5th Int. Conf. on Computerized and Quantitative EMG**, 1993, Hamilton, Canada. Abstract in **Cdn. J. of Neurological Sciences**, Vol. 20, No.4, 1993 pp 355.
- * F.S. Cayabyab, H. de Bruin and E.E. Daniel, 'NO and NANC Inhibitory Mediation in the Canine Ileum', **Cdn. J. of Physiol. and Pharmacol**, Vol. 72, 1994, pp 234.
- * F.S. Cayabyab, I. Berezin, H. de Bruin and E.E. Daniel, 'Electrical Coupling of Interstitial Cells of Cajal (ICC) to Smooth Muscle of Canine Ileum', presented at **XV Int. Symposium on Gastrointestinal Motility**, 1995, Rome, Italy. Abstract in **Neurogastroenterology and Motility**, 1995
- * F.S. Cayabyab, H. de Bruin, M. Jimenez and E. E. Daniel, "Ca²⁺ and Canine Ileal Slow Waves, Contractions and IJPs' presented at **XV Int. Symposium on Gastrointestinal Motility**, 1995, Rome, Italy. Abstract in **Neurogastroenterology and Motility**, 1995
- * F.S. Cayabyab, H. de Bruin, M. Jimenez and E.E. Daniel, 'Differential Ca²⁺ Sensitivity of two Pacemaking Networks in the Canine Ileum', presented at **Am. Gastroenter. Assoc. Mtg.**, 1995, San Diego, USA. Abstract in **Gastroenterology** Vol 108, 1995, A579.
- A.J. McComas, V. Galea and H. de Bruin, 'Human Soleus Motor Unit Population', **Muscle and Nerve** 24: 1428, presented at 2001 AAEM Ann. Scientific Mtg., Albuquerque, NM, Oct 2001.

PEER REVIEWED CONFERENCE PROCEEDINGS

- N.K. Sinha and H. de Bruin, 'Application of Low-Order Models for Near-Optimal Control of High-Order Systems', **Proc. 5th Hawaii Int. Conf. on System Sciences**, 1972, Honolulu, pp 258-260.
- H. de Bruin, and E. Della Torre, 'Real-Time Simulation EMG Signals', **Proc. Sixth Ann. Conf. on Modelling and Simulation**, 1975, Pittsburgh, pp 363-367.
- H. de Bruin, and E. Della Torre, 'Derivation of Control Information from Electromyograph Patterns', **Digest of the 11th Int. Conf. on Medical and Biological Engineering**, 1976, Ottawa, pp 364-365.
- H. de Bruin, M. Milner and T. Wallace, 'A System for Clinical Analysis of Kinesiological Aspects of Gait', **Digest of the 7th Cdn. Medical and Biological Engineering Conf.** 1978, Vancouver, pp 139-140.
- * D. Stashuk and H. de Bruin, 'Homomorphic Processing of Surface EMG Signals', **Digest of the 9th Cdn. Medical and Biological Engineering Conf.** 1982, Fredericton, N.B. pp 97-98(student prize winning paper).
- * G. Madhavan, H. de Bruin, A.R.M. Upton and M.E. Jernigan, 'Syntactic Pattern Recognition of Brain Stem Auditory Evoked Potentials', **Proc. of the 1983 IEEE Int. Conf. on Systems, Man and Cybernetics**, 1983, Bombay and New Delhi, pp 637-640.
- * D. Stashuk and H. de Bruin, 'Automatic Identification and Storage of Motor Unit Action Potentials', **Proc. of 10th Cdn. Medical and Biological Engineering Conf.**, 1984, Ottawa, pp 27-28.
- H. de Bruin, I. Burcea, and R.P. Harper, 'A Minicomputer Based Selspot and EMG System for Studying Mandibular Movement', **Proc. of 10th Cdn. Medical and Biological Engineering Conf.**, 1984, Ottawa, pp 112-113.

- * G.P. Madhavan, H. de Bruin and A.R.M. Upton, 'Evoked Potential Processing and Pattern Recognition', **Proc. of 6th IEEE Ann.Conf. of EMBS**, 1984, Los Angeles, pp 699-702.
- H. de Bruin, M.E. Brandstater, I. Burcea, N. Plews, and C. Gowland, 'The Reliability and Validity of Knee Joint Angle Measurement by Electrogoniometric and Electro-Optical Systems', **Proc. of the 2nd Int. Conf. of Rehabilitation Engineering**, 1984, Ottawa, pp 501-502.
- * C. Hershler, A.R.M. Upton, H. de Bruin, I. Burcea, R.N. King, and C. Zoghaib, 'Functional Electrical Stimulation (FES) of the Central Nervous System: Effects of Chronic Cerebellar Stimulation (CCS) on the Gait and Speech of a Spastic Cerebral Palsy(CP) Adult', **J. of the Int. Fed. for Med. and Biol. Eng.** Vol. 23, Supp. Part 1, Espoo, Finland, Aug., 1985, pp 414-415.
- * G. Madhavan, H. de Bruin and A.R.M. Upton, 'Improvements to Adaptive Noise Cancellation', **Proc. of 8th IEEE Ann. Conf. of EMBS**, 1986, Dallas and Fort Worth, pp 482-486.
- * R.C. Scott and H. de Bruin, 'Adaptive Noise Cancellation of Brainstem Auditory Potentials using Systolic Arrays', **Proc. of 13th Cdn. Medical and Biological Engineering Conf.**, 1987, Halifax, N.S., pp 155-156. (student prize winning paper).
- * G. Jasechko and H. de Bruin, 'An Automated System for Estimating the Number of Motor Units', **Proc. of 13th Cdn. Medical and Biological Engineering Conf.**, 1987, Halifax, N.S., pp 149-150.
- * J.C. Smerek and H. de Bruin, 'A Multichannel Single-Fibre EMG Recording System', **Proc. of 15th Cdn. Medical and Biological Engineering Conf.**, 1989, Toronto, pp 89-90.
- * C.D. Bachynski and H. de Bruin, 'An Investigation of EMG Crosstalk using Correlation and Coherence Techniques', **Proc. of 15th Cdn. Medical and Biological Engineering Conf.**, 1989, Toronto, pp 129-130.
- * J.C. Smerek and H. de Bruin, 'Multiresolution Decomposition of Needle EMG', **Proc. of 13th Ann. Int. Conf. of IEEE Engineering in Medicine and Biology Soc.**, 1991, Orlando, pp 479-480.
- * J.C. Smerek, N.P. Nantel, H. de Bruin and L.D. Pengelly, 'Rate Coding and Recruitment Model of Skeletal Muscle', **Proc. of 13th Ann. Int. Conf. of IEEE Engineering in Medicine and Biology Soc.** 1991, Orlando, pp 2311-2312.
- * M. Barrientos, H. de Bruin, B.L. Bardakjian and J.D. Huizinga, 'Criteria to Select Kernel Functions for Positive Time-Frequency Distributions of Theoretical Time-Varying Signals', **Proc. of IEEE-SP Int. Symposium on Time-Frequency and Time-Scale Analysis**, October 1994, Philadelphia, pp 209 - 210.
- * R.B. Szlavik and H. de Bruin, 'Pulsed Transient Tissue Conductivity Measurement', **Proc. of 18th Ann. Int. Conf. of IEEE Engineering in Medicine and Biology Soc.**, October 1996, Amsterdam, ISBN 90-9010005-9(CD-ROM): 3 pages
- * R.B. Szlavik and H. de Bruin, 'SPICE Compatible Equivalent Circuit Models of Skeletal Muscle Tissue', **Proc. of 18th Ann. Int. Conf. of IEEE Engineering in Medicine and Biology Soc.**, October 1996, Amsterdam, ISBN 90-9010005-9(CD-ROM): 3 pages
- * J.C.R. DeGruchy, H. de Bruin, L. Wang and G. Tougas, 'Recording and Analyzing Gastric Electrical Activity', **Proc. of 23rd Cdn. Medical and Biological Engineering Conf.**, May 1997, Toronto, pp 106 - 107.
- * R.B. Szlavik and H. de Bruin, 'Simulating the Distribution of Axon Size in Nerves', **Proc. of 23rd Cdn. Medical and Biological Engineering Conf.**, May 1997, Toronto, pp 168 - 169.
- * R.B. Szlavik and H. de Bruin, 'Optimal Stimulus Electrode Dipole Orientation', **Proc. of 25th Cdn. Medical and Biological Engineering Conf.**, June 1999, London, ON, pp 112 - 113.
- * N. Al-Mutawaly and H. de Bruin, 'A Coil Design for Magnetic Nerve Stimulation: 3-Dimensional Analysis', **Proc. of 25th Cdn. Medical and Biological Engineering Conf.**, June 1999, London, ON, pp 64 - 65.

- * C. Orsi and H. de Bruin, ‘Measurement of Electrical and Contractile Properties of Motor Units using EMG and Accelerometry’, **Dig. of the 2000 World Congress on Medical Physics and Biomedical Engineering and Proc. of 22nd Ann. Int. Conf. of IEEE EMBS**, July 2000, Chicago (CD-ROM) 3 pages
- A. McComas, V. Galea and H. de Bruin, ‘Synaptic Connectivity between Human Ia Fibres and Soleus Motoneurons’, **Proc. XV Int. Congress of Clin. Neurophysiology**, Buenos Aires, Abstract in **Clin. Neurophysiol.** Vol 112 Suppl 1, S17, May 2001.
- * N. Al-Mutawaly, H. de Bruin and R. D. Findlay, “Magnetic Nerve Stimulation: Field Focality and Depth of Penetration”, **Proc. Of 23rd Ann. Int. Conf. of IEEE EMBS**, Istanbul, Oct 2001 (CD-ROM ISBN: 0-7803-7213-1) 4 pages
- * N. Al-Mutawaly and H. de Bruin, “Designing and Constructing a Magnetic Stimulator: Theoretical and Practical Considerations”, **Proc. of 23rd Ann. Int. Conf. of IEEE EMBS**, Istanbul, Oct 2001 (CD-ROM ISBN: 0-7803-7213-1) 4 pages
- * N. Al-Mutawaly and H. de Bruin, “Measuring the Induced Electrical Fields in 3-Dimensions when Applying Magnetic Stimulation to a Spherical Target”, presented at **29th Int. Cong. On Electrocardiography and 4th Int. Conf. On Bioelectromagnetism**, Montreal, **Int. J. of Bioelectromagnetism** Vol 4, No. 2, Special Issue on Electrocardiography and Neurophysiology 2002 pp 193-194
- * N. Al-Mutawaly, H. de Bruin and R.D. Findlay, “Magnetic Nerve Stimulation: A Comparison between Mono-Phasic and Bi-Phasic Waveforms”, presented at **29th Int. Cong. On Electrocardiography and 4th Int. Conf. On Bioelectromagnetism**, Montreal, **Int. J. of Bioelectromagnetism** Vol 4, No. 2, Special Issue on Electrocardiography and Neurophysiology 2002 pp 195-196
- * N. Al-Mutawaly and H. de Bruin, “The Effect of Pulse Configuration on the Compound Muscle Action Potentials (CMAPS) during Magnetic Stimulation”, **Proc. of 27th Cdn. Med. Biol. Engg. Conf.**, Ottawa, Nov 2002, 4 pages
- * N. Al-Mutawaly and H. de Bruin, “Design and Construction of an Electrical Nerve Stimulator”, **Proc. of 27th Cdn. Med. Biol. Engg. Conf.**, Ottawa, Nov 2002, 3 pages
- * A. Fakhr, M.J. Deen and H. de Bruin, “Low-Voltage, Low-Power and Low Phase Noise 2.4 GHz VCO for Medical Wireless Telemetry”, **Proc. of Cdn. Conf. Electr. And Comp. Engg.**, Niagara Falls, May 2004, 4 pages
- * K. Fernandes, H. de Bruin, K.D. Kumbhare and J. Cheng, “A Multi_channel Computer Controlled Electrical Stimulator for Rehabilitation with Chronic Obstructive Pulmonary Disease Patients”, **Proc. 17th Biennial Int. EURASIP Conf. Biosignal 2004**, Brno, Czech Republic, June 2004, pp 198-201.
- * W. Fu, H. de Bruin and A. McComas, “Modulation of the Ia Input: Motoneurone Output Relationship of Human Flexor Carpi Radialis during Muscle Contraction”, **Proc. 17th Biennial Int. EURASIP Conf. Biosignal 2004**, Brno, Czech Republic, June 2004, pp 367-370.
- * A.D. Mucci, Y. Zhu, H. de Bruin and J.D. Huizinga, “Characterization of a Chloride Channel in Interstitial Cells of Cajal: A potential Contributor to the GI Slow Wave”, **Proc. 17th Biennial Int. EURASIP Conf. Biosignal 2004**, Brno, Czech Republic, June 2004, pp 371-374 (prize for best student paper) .

JOURNAL ARTICLES ACCEPTED FOR PUBLICATION

JOURNAL ARTICLES SUBMITTED FOR PUBLICATION

- * N. Al-Mutawaly, H. de Bruin and R. D. Findlay, “Novel Coils for Magnetic Nerve Stimulation: Design Aspects and Computer Simulations”, to **Med and Biol. Engg.**, 2003.
- * N. Al-Mutawaly and H. de Bruin, “Magnetic Nerve Stimulation: Experimental Results of New Coils”, to **Med and Biol. Engg.**, 2003.
- H. de Bruin, V. Galea and A. J. McComas, “Variability in the Input-Output Relationship Between Ia Fibres and Motoneurons Innervating the Human Soleus Muscle”, to **Experimental Brain Research.**, 2004.
- *D. Maltais, M. Pierrynowski, V. Galea, H. de Bruin, N. Al-Mutawaly and O. Bar-Or, “Minute by Minute Differences in Co-activation during Treadmill Walking in Cerebral Palsy” to **Electromyography and Clinical Neurophysiology**, 2004
- *W. Fu, H. de Bruin and A. McComas, “Modulation of the Ia Input: Motoneurone Output Relationship of Human Flexor Carpi Radialis during Muscle Contraction”, to **J. Neurophysiology**, 2004

B NOT PEER REVIEWED

CONTRIBUTIONS TO BOOKS

- M. Milner, C. Hershler, H. de Bruin, R.S. Baker, A.R.M. Upton, and I.S. Cooper, 'Preliminary Investigation of Influence of Cerebellar Stimulation on Gait by Analyzing Angle-Angle Diagrams', **Cerebellar Stimulation in Man**, Chapt. 7, Ed. I.S. Cooper, Raven Press, 1978.
- H. de Bruin, 'Analysis of Movement: Measurement and Instrumentation', in **Understanding the Scientific Basis of Human Movement, 3rd Ed.**, Chapt 11, ed. B.A. Gowitzke and M. Milner, Williams and Wilkins, Baltimore, pp 309-348 1988

CONFERENCE PROCEEDINGS

- H. de Bruin, D.J. Russell, J. Latter and J.T.S. Sadler, 'Quantification of Cerebral Palsy Gait using Angle-Angle Diagrams', **Proc. of the Special Conf. of the Cdn. Society for Biomechanics - Human Locomotion I**, 1980, London, Ont. pp 62-63.
- H. de Bruin, M.E. Brandstater, C. Gowland and B.M. Clarke, 'A Study of Quantitative Variables in Hemiplegic Gait', **Proc. of the Special Conference of the Cdn. Society for Biomechanics - Human Locomotion I**, 1980, London, Ont pp 58-59.
- B. Clarke, C. Gowland, M.E. Brandstater, H. de Bruin, 'Brunnstrom Staging of Motor Recovery of the Leg - A Component of Gait Analysis in Stroke', **Proc. of the Special Conf. of the Cdn. Society for Biomechanics - Human Locomotion I**, 1980, London, Ont. pp 54-55.
- * E.M. Marsh, H. de Bruin, M.E. Brandstater, B.M. Clarke and C. Gowland, 'The Use of a Coherence Function in Processing EMG Gait Patterns', **Proc. of the Special Conf. of the Cdn. Society for Biomechanics - Human Locomotion I**, 1980, London, Ont. pp 18-19.
- A.J. McComas, H. de Bruin, R.W. Einhorn, V. Galea, 'Novel Electrophysiological Tests for Patients with Muscle Weakness', **Proc. of the 7th Biennial Conf. Motor Disturbances: Mechanisms and Implications for Therapy**, 1989, Cumberland College of H. Sc., Lidcombe, Australia, 6 pages.

12. PRESENTATIONS AT MEETINGS

INVITED

- H. de Bruin and M.E. Brandstater, 'Clinical and Quantitative Gait Analysis', Proc. of the **1st Cdn. Congress of Rehabilitation**, 1983, Ottawa
- H. de Bruin, 'Measurement of Physical Disability', invited discussant at **Priorities for Research in Childhood Physical Disability**, London, Ontario May 1988.
- H. de Bruin, 'Reduction in Disability - Advances in Technology', invited discussant at **Priorities for Research in Childhood Physical Disability**, London, Ontario, May 1988.
- H. de Bruin and A.J. McComas, 'Motor Unit Estimation: the MAMUCS Approach,' presented at **38th Annual Scientific Meeting of Am. Assoc. of Electrodiagnostic Medicine**, 1991, Vancouver.
- H. de Bruin, 'The McMaster Automated Motor Unit Estimation System', presented at **Int. Course on Single Fibre EMG and Other Special Techniques**, 1993, Hamilton, Canada.
- H. de Bruin, 'Decomposition of Needle Recorded Signals', presented at **Fifth Int. Conf. on Computerized and Quantitative EMG**, 1993, Hamilton, Canada.
- H. de Bruin, 'Industry and Academic Partnerships', invited discussant at **Women in Health Care Technology**, Hamilton, Ontario, 1995

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- S.N. Banerjee, H. de Bruin, M. Milner, C. Stewart and J.A. Wallace, 'Lower Limb Amputee Gait: Multifactorial Assessment Using Computer Generated Displays'. Presented at the **53rd Ann. Session of the Am. Congress of Rehabilitation**, San Diego, November 1976.
- H. de Bruin, M. Milner, J.A. Wallace and S.N. Banerjee, 'Chedoke Rehabilitation Centre Locomotion Program I- A Minicomputer Data Acquisition and Display System for Human Locomotor Studies', Presented at **ISPO 1977 World Congress**, New York, May 1977.
- M. Milner, M.E. Brandstater, H. deBruin, C. Gowland, J.A. Wallace and B. Clarke, 'Some Kinesiological and Electromyographic Aspects of Hemiplegic Gait', Presented at the **55th Annual Session of the Am. Congress of Rehabilitation Medicine**, New Orleans, November 1978.
- M.E. Brandstater, H. de Bruin, C. Gowland, B. Clarke, R. Blumenstein, and M. Milner, 'An Analysis of Timing Variables in Hemiplegic Gait', Presented at the **41st Ann. Assembly of the Am. Academy of Physical Medicine and Rehabilitation**, Honolulu, November 1979.
- H. de Bruin, E. Marsh, M.E. Brandstater, B. Clarke and C. Gowland, 'Electromyographic Analysis of Phasic Muscle Activity During Locomotion', Presented the **58th Ann. Session Am. Congress of Rehabilitation Medicine** San Diego, Nov.1981.
- R. Harper, H. de Bruin, and I. Burcea, 'Integration of Neuromuscular Activity and Mandibular Movement Using a Computer-Based Selspot and Electromyography System, Presented at the **8th Int. Conf. on Oral Surgery**, Berlin, June 1983.
- R. Harper, H. de Bruin and I. Burcea, 'Lateral Pterygoid Muscle Activity in Mandibular Retrognathism and Response to Mandibular Advancement,' presented at **Ann. Mtg. of Am. Assoc. of Oral and Maxillofac. Surgeons**, New York, Sept. 1984.
- R. P. Harper, H. de Bruin, I. Burcea, 'Selspot Integrated Electromyography Analysis of Dentofacial Deformity and Response to Orthognathic Surgery', presented **Ann. Mtg. of Am. Assoc. of Oral and Maxillofacial Surgeons**, San Francisco, Sept., 1989.

- * V. Galea, H. de Bruin and A.J. McComas, 'Automated Determination of Human Motor Unit Populations', presented at **Proceedings of the Physiological Society**, London, March 1991, pp 175.
- A. J. McComas, V. Galea and H. de Bruin, 'Automated Motor Unit Estimation in the Neuromuscular Clinic', presented at **EMG-CN-IX**, Jerusalem, June, 1992
- M. Decker, J. Bugaresti and H. de Bruin, 'Relationship Between Predicted and Actual FIM at Discharge in the Context of Resource Needs After Spinal-Cord Injury In-patient Rehabilitation', presented at **23rd Ann. Mtg. Of Am. Spinal Injury Assoc.**, Houston, March 1997.
- H. de Bruin, M. Decker and J. Bugaresti, 'Relationship Between Predicted and Actual FIM at Discharge in the Context of Resource Needs After Spinal-Cord Injury In-patient Rehabilitation', presented at **1997 Inter Urban Spinal Cord Mtg.**, Toronto, June 1997.
- M. Bayley, H. de Bruin, J. Park Dorsay, P. Haalboom, M. Decker and B. Ansley, 'A Comparison of Outcome Measures in Assessment of Handicap', presented at **1997 Inter Urban Spinal Cord Mtg.**, Toronto, June 1997.
- *D. Maltais, M. Pierrynowski, V. Galea, H. de Bruin, N. Al-Mutawaly and O. Bar-Or, "Minute by Minute Differences in Co-activation during Treadmill Walking in Cerebral Palsy", presented at Am. Coll. Sports Med. Ann. Mtg. Indianapolis, June 2004.

NOT PEER REVIEWED

- H. de Bruin, 'The Role of Bioengineering Students in Clinical Research', Presented at the **Cdn. Conf. on Engineering Education**, Toronto, May 1980.
- M.E. Brandstater, H. de Bruin, C. Gowland, B. Clarke and M. Milner, 'An Analysis of Temporal and Joint Angle Variables in Hemiplegic Gait', Presented at the **Royal Coll. Phys. Surg.**, June 1980.
- * D. Stashuk and H. de Bruin, 'A Procedure for the Automatic Extraction of Individual Motor Unit Rate Coding and Morphological Information', presented at **The Single Fibre EMG Symposium**, Toronto General Hospital, June 1985.
- * G. Madhavan, H. de Bruin and A.R.M. Upton, 'Automatic Recognition of Single Stimulus Evoked Potentials,' presented at **20th Cdn. Congress of Neurological Sciences**, Montreal, June 1985.
- M. Bayley, J. Park Dorsay, P. Haalboom, H. de Bruin, M. Decker and B. Sharp, ' Assessment of Handicap in Patients with Disability Who Have Received Rehabilitation', presented at **Measuring Outcomes in Clinical Neurosciences**, Hamilton, May 1996.
- H. de Bruin 'Duration of Stimulus Pulse and Recruitment of Motor Axons', presented at Annual Mtg. of Buffalo Hamilton Neuromuscular Society, Niagara-on-the-Lake, November 1998.
- A.J. McComas, H. de Bruin and A. Upton, 'An Input-Output Relationship for the H-reflex', presented at Uppsala, Sweden, June 2001

13. ADMINISTRATIVE RESPONSIBILITIES

Faculty of Engineering Committees and Department of Electrical and Computer Engineering Committees

August 10, 2004