

DOMINIQUE M. DURAND
Curriculum Vitae
8/8/2012

PERSONAL

Born: Monbazillac, Dordogne, France, October 1951
United States Citizen

EDUCATION

- 1971: Diplome Universitaire d'Etudes Superieures
Universite Paul Sabatier
Toulouse, France
- 1974: Diplome d'Ingenieur Electronique
Ecole Nationale Supérieure d'Electronique, d'Electrotechnique
d'Informatique et d'Hydraulique, Toulouse, France
- 1975: Master's Degree in Biomedical Engineering
Case Western Reserve University
Cleveland, U.S.A.
- 1982: Doctorate in Philosophy
Department of Electrical Engineering
Institute of Biomedical Engineering
University of Toronto
Toronto, Canada

Doctoral Thesis:

Alcohol-Induced Brain Damage: Morphology and Physiology in the
Hippocampus in-vitro. Advisor: Dr. P. Carlen

EXPERIENCE

2006 to present

E.L. Lindseth Professor of Biomedical Engineering

1995 to present

Professor
Department of Biomedical Engineering
Department of Neurosciences (secondary appointment)
Case Western Reserve Engineering
Cleveland, USA

Staff, Neurology Department
Cleveland Clinic, Cleveland

2000 to present

Director, Neural Engineering Center
CWRU

2002 to present:

Editor in chief: Journal of Neural Engineering

1987 - 1995

Associate Professor
Department of Biomedical Engineering
Department of Neurosciences (secondary appointment)
Case Western Reserve Engineering
Cleveland, USA

1983-87

Assistant Professor
Department of Biomedical Engineering
Case Western Reserve University
Cleveland, USA

1979-82

Graduate Student in Biomedical Engineering
University of Toronto
Toronto, Canada

1978-82

Scientist
Neurology Program
Addiction Research Foundation
Toronto, Canada

Research Associate
Playfair Neuroscience Unit
Toronto Western Hospital
Toronto, Canada

1976-78

Biomedical Engineer
Human Responses Laboratory
Addiction Research Foundation
Toronto, Canada

1975-76

Clinical Engineer
Centre Hospitalier Universitaire de Laval
Quebec, Canada

HONORS and AWARDS

- Scholarship from the French Ministry of Foreign Affairs, Paris, 1974
- Scholarship from the British Council, London, 1974

- Junior Scientist Travel Award from the First Congress of the International Society for Biomedical Research on Alcoholism, Munich, 1982
- Young Investigator Award, Whitaker Foundation, 1983
- National Science Foundation Presidential Young Investigator Award, Cleveland, 1985
- Whitaker Young Investigator Award, 1986
- Carl F. Wittke Award for Distinguished Undergraduate Teaching, Case Western Reserve University, Cleveland, 1991
- “Visiting Professor for a Week”, Institute of Biomedical Engineering, University of Toronto, 1993
- John S. Diekhoff Award for Outstanding Graduate Teaching, Case Western Reserve University, Cleveland, 1994
- Fellow of the American Institute for Medical and Biomedical Engineering, 1998
- Editor-in-chief and founder, Journal of Neural Engineering, 2003
- Fellow of the Institute of Physics, 2004
- Research Leadership Award, Case School of Engineering, 2005
- Mortar Board “Top Prof” of the year, Case Western Reserve University, 2006
- John S. Diekhoff graduate teaching award, Honorable Mention, 2006
- E.L. Lindseth Endowed Chair, Biomedical Engineering, Case Western Reserve University, 2006
- IEEE, Senior Member, 2006
- IEEE Fellow, 2010
- Elected North American Representative to the IEEE-EMBS, 2010
- Eminent Scientist of the year, International Research Promotion Council, 2010
- Nominated for Diekhoff Mentoring Award, 2011
- Graduate teaching award, School of Engineering, 2012
- Innovation Research Award, School of Engineering, 2012

ARTICLES IN REFEREED JOURNALS

1. Katona P.G., Durand D., Stern K.: Microprocessor-controlled memory for cardio-pulmonary monitoring of high risk infants. **IEEE Transactions on Biomedical Engineering**, **24**: 536-538, 1977
2. Zilm D., Durand D., Kaplan H.: A microprocessor-controlled clinical tremometer. **Behavior Research Methods and Instrumentation**, **10**: 177-181, 1978
3. Kaplan H., Durand D.: A shared-memory approach to microprocessor program development. **Behavior Research Methods and Instrumentation** **11**: 311-313, 1979
4. Carlen P.L., Durand D: Modeling the postsynaptic location and magnitude of tonic conductance changes resulting from neurotransmitters or drugs. **Neuroscience**, **6**: 839-846, 1981
5. Durand D., Corrigan W., Kujtan P., Carlen P.L.: Effect of low-dose ethanol on CA1 hippocampal neurons in-vitro. **Canadian Journal of Physiology and Pharmacology**, **59**: 972-984, 1981

6. Carlen P.L., Gurevich N., Durand D.: Low-dose ethanol augments calcium-mediated mechanisms measured intracellularly in hippocampal neurons. **Science** **215**, 306-309, 1982
7. Durand D., Carlen P.L., Gurevich N., Ho A., Kunov H.: Measurement of the passive electrotonic parameters of granule cells in the rat hippocampus using HRP staining and short current pulses. **Journal of Neurophysiology**, **50**: 1080-1096, 1983
8. Durand D., Carlen P.L.: Decreased neuronal inhibition after long-term administration of ethanol in-vitro. **Science** **224**, 1349-1361, 1984
9. Durand D, Carlen PL: Impairment of long-term potentiation in rat hippocampus following chronic ethanol treatment. **Brain Research**, **308**, 325-332, 1984
10. Durand D.: The shunt cable model for nerve cells. **Biophysical Journal**, **46**: 645-653, 1984
11. Durand D., Carlen PL: Electrotonic parameters of neurons following chronic ethanol treatment. **Journal of Neurophysiology**, **54**: 807-817, 1985
12. Durand D.: Electrical stimulation can inhibit synchronized neuronal activity. **Brain Research**, 382: 139-144, 1986
13. DiMarco T.F., Altose M.D., Cropp A. and Durand D: Activation of Respiration Intercostal Muscles by Electrical Stimulation. **American Reviews of Respiration Disease**, 136:1385-1390, 1987.
14. D. Durand, J.A. Saint-Cyr, N. Gurevich and P.L.Carlen: Ethanol-induced dendritic alterations in hippocampal granule cells. **Brain Research**, **477**, 373-377, 1989
15. Lefkowitz M., Durand D., Smith G. and Silver G.: The electrical properties of axons within the Probst neuromas of accallosal animals and callosi that have reformed upon glial-coated polymer implants. **Experimental Neurology**, 113, 306-314, 1991
16. Ferguson, A.S. and D. Durand: "Magnetic Fields of Current Monopoles in Special Volume Conductors". **IEEE Transactions on Magnetism**, 27:758-767, 1991
17. Yuen G. and D. Durand: Reconstruction of hippocampal granule cell electrophysiology by computer simulation, **Neuroscience**, 41:411-424, 1991
18. Kayyali H. and D. Durand: Effects of applied currents in epileptiform bursts in-vitro. **Exp. Neurol.** 113, 249-254, 1991
19. Nakagawa M. and D. Durand: Suppression of Spontaneous Epileptiform Activity with Applied Currents, **Brain Research**, 567:241-247, 1991
10. Yuen, G. M, Patil and D. Durand: Effects of Ethanol on the excitability of hippocampal granule cells. **Brain Research**, 563:325-320, 1991.

21. Ferguson A.S. and D. Durand: A theory of the magnetic field from current monopoles. **J. of Applied Physics**, 77, 3107-3113, 1992
22. Durand D., A.S. Ferguson, T. Dalbasti: Effect of Surface Boundary on Neuronal Magnetic Stimulation. **IEEE Transactions on Biomedical Engineering**, 39: 58- 64, 1992
23. Ali Hassan W., G. M. Saidel and D. Durand. Estimation of Electrotonic Parameters of Neurons using an Inverse Fourier Transform Technique. **IEEE Transactions on Biomedical Engineering**, 39:493-501, 1992
24. Warman E, W. M. Grill and D. Durand, Modelling the effect of electric fields on nerve fibers: determination of excitation threshold, **IEEE Transactions on Biomedical Engineering**, 39:1244-1254, 1992
25. Nagarajan S. and D. Durand: Effects of induced electric fields on finite neuronal structures: a simulation study, **IEEE Transactions on Biomedical Engineering**, 40, 1175-1188, 1993.
26. Tawfik B. and D. Durand: Non-Linear Parameter estimation by linear association: application to a 5-parameter passive neuron model. **IEEE Transactions on Biomedical Engineering**, 41:461-469, 1994.
27. Warman E.N., Durand D.M. and Yuen G.L.F. Reconstruction of Hippocampal CA1 pyramidal cell electrophysiology by computer simulation. **J. of Neurophysiology**, 71:2033-2045, 1994
28. Durand D.M. and W.N. Warman. Desynchronization of neuronal activity by extracellular current pulses in the hippocampus in-vitro. **J. Physiology (London)**, 480.3:527-537,1994
29. Nagarajan, S. and D.M. Durand., Roth B.J. and Wijisesinghe R.S. Magnetic stimulation of axons in a nerve bundle: effects of current redistribution in the bundle, **Annals of Biomedical Engineering**, 23, 116-126, 1995
30. Nagarajan, S. and D.M.D. Durand. Analysis of Magnetic stimulation of a concentric axon in a nerve bundle. **IEEE Transactions on Biomedical Engineering**, 42:926-933, 1995
31. Nagarajan, S. and D.M. Durand. A generalized cable equation for magnetic stimulation. **IEEE Transactions on Biomedical Engineering**, 43:304-312, 1996
32. Lin J.C. and D.M. Durand. Weighted linear associative memory approach to non-linear parameter estimation. **Journal of Optimization Theory and Applications**, 90:139-159, 1996
33. Nagarajan S. and D.M.D. Durand and K. Hsuing-Hsu: Mapping Location of excitation during magnetic stimulation: Effect of coil position. **Annals of Biomedical Engineering**, 25:112-125, 1997.

34. Durand D.M. and J.C. Lin: Theoretical Study of Magnetic Fields of Current monopoles in special volume conductors, **IEEE Transactions on Biomedical Engineering**, 44:177-187, 1997
35. Tyler D. and D.M. Durand: Slowly penetrating interfascicular electrode for electrical stimulation of nerves. **IEEE Transactions on Rehabilitation**, 5:51-61, 1997
36. Tawfik B. and Durand D.M.: Parameter estimation by reduced order linear associative memory. (ROLAM), **IEEE Transactions on Biomedical Engineering**, 44:297-305: 1997
37. Sahin M., Haxhiu M., Durand D.M. The spiral Nerve Cuff for recording respiratory output. **J. of Applied Physiology**, 83:317-322, 1997
38. Lin J.C. and D.M. Durand Non-linear parameter estimation by weighted linear associative memory with non-zero interception. **IEEE Transactions on Systems, Man and Cybernetics**, 27:692-702, 1997
39. Lyubkin M., D.M. Durand, M.A. Haxhiu. Short episodes of hypoxia inhibit the generation of LTP and disrupt pre-existing levels of synaptic potentiation, **J. of Neurophysiology**, 78:2475-2482, 1997
40. Carburaru R. and Durand D.M. Axonal stimulation under MRI magnetic field z-gradients, **Magnetic resonance in Medicine**, 38:750-758, 1997
41. Lin J. and Durand D.M. Magnetic Field of current monopoles in prolate and oblate spheroid volume conductors. **IEEE Transactions in Magnetics**, 34, 2177-2184, 1998
42. Klemic K.G., Durand D.M and S. W. Jones. Activation kinetics of the delayed rectifier potassium current of bullfrog sympathetic neurons. **J. Neurophys.** 79:2345-2357, 1998
43. Sahin M., and Durand D.M. Improved nerve cuff electrode recordings with subthreshold anodic currents, **IEEE Transactions on Biomedical Engineering**, 45:1044-1050, 1998
44. P.J. Maccabee, S.S. Nagarajan, V.E. Amassian, D.M. Durand, R.Q. Cracco, A.Z. Szabo, A. Ahad, K.S. Lai and L.P Eberle. Influence of pulse sequency, polarity and amplitude in magnetic stimulation of human and porcine peruipheral nerve., **J. of Physiology (London)**, 513.2: 571-585, 1998
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46. C.A Bertrand, D.M. Durand. G. Saidel, C. Laboissee and U. Hopfer A system for dynamic measurement of membrane capacitance in epithelial monolayers, **Biophysical Journal**, 75:2743-2756, 1999
47. H. Qi, D. J. Tyler and D.M. Durand Neurofuzzy adaptive controlling of selective stimulation for FES: a case study, **IEEE Transactions on Rehabilitation Engineering**, 7:183-192, 1999

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51. J.W. Shuai, and D.M. Durand: Phase Synchronization of two coupled chaotic neurons, **Physics Letters A.**, 264:289-297,1999
52. F. Cuocco and D.M. Durand: Measurement of external pressures generated by nerve cuff electrodes, **IEEE Transactions on Rehabilitation Engineering**, 8: 35-41, 2000
53. K.H. Hsu and D.M. Durand: Prediction of neural excitation during magnetic stimulation using passive cable models, **IEEE transactions on Biomedical Engineering**, 47:463-471, 2000
54. J.W. Shuai and D.M. Durand: Strange non-chaotic attractors in-low frequency quasi-periodically driven systems, **International Journal of Bifurcation and Chaos** 10: 2269-2276, 2000
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57. R. Ghai, M. Bikson and D.M. Durand Effects of applied electric fields on low calcium epileptiform activity in the CA1 region rat hippocampal slices". **J. of Neurophysiology**, 84:274-280, 2000
58. J Perez-Orive and DM Durand: Modelling study of peripheral nerve recording selectivity, 8:320-329, **IEEE Transactions on Rehabilitation Engineering**, 2000
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60. A. Q. Choi, J. Cavanaugh and DM Durand: Selectivity of multiple contact nerve electrode: a simulation analysis, **IEEE transactions on BME**, 48:165-172, 2001

61. J. Lian, J.W. Shuai and D.M. Durand Non-linear dynamic properties of low calcium induced epileptiform activity, **Brain Research** 890: 246-254, 2001
62. R. Carbutaru and D.M. Durand Toroidal coil for transcutaneous magnetic stimulation of nerves, 48:434-442, **IEEE Transactions on Biomedical Engineering**, 2001
63. L. Yobas, M. Huff, F. Lisy and DM Durand: A novel bulk-micromachined electrostatic microvalve with a curved-compliant structure applicable for a pneumatic tactile display", **J of Microelectromechanical systems**, 10: 187-196, 2001
64. P. J.Hahn and D.M. Durand: Bistability in Neural Dynamics and the effects of increased extracellular potassium : **J. Comput Neurosci** 11(1):5-18, 2001
65. JW Shuai, J. Lian, PJ Hahn and DM. Durand, Positive Lyapunov exponents calculated from time-series of strange nonchaotic attractors, **Phys Rev E**.64(2-2):026220., 2001
66. W.C. Stacey and D.M. Durand. Synaptic noise improves the detection of sub-threshold signals in the hippocampus, *J Neurophysiol.*, 86(3):1104-12, 2001. **Ranked #1 in The 50 Most-Frequently-Read Contents in J. Neurophysiol. during September 2001. Highlighted in Nature Neuroscience Reviews: Nature Reviews Neuroscience 2, 756 (2001)**
67. KH Hsu and DM Durand A 3D differential coil design for localized magnetic stimulation. **IEEE Transactions on Biomedical Engineering**, 48:1162-1168, 2001
68. J. Lian, Bikson M., Shuai J and Durand DM Propagation of non-synaptic epileptiform activity across a lesion in rat hippocampal slices. **J Physiol.**:537(Pt 1):191-9, 2001. **Top 10 most frequently downloaded Research Papers in The Journal of Physiology (all categories) during January, February, March, 2006**
69. M. Bikson, SC Baraban, D.M Durand: Conditions sufficient for non-synaptic epileptogenesis in the CA1 region of hippocampal slices. **J. Neurophysiology.**, 2002 87: 62, 2002
70. Tyler DJ and Durand DM. Functionally Selective Peripheral Nerve electrode: Stimulation with a flat interface nerve electrode **IEEE Transactions on Neural Systems and Rehabilitation**;10(4):294-303, 2002.
71. W Stacey and DM Durand Noise and coupling affect signal detection and bursting in a simulated physiological neural network. **J. of Neurophysiology**, 88(5):2598-611, 2002
72. J. Lian, M. Bikson, C. Sciortino, WC Stacey and DM Durand: Local Suppression of epileptiform activity by electrical stimulation: an in-vitro study. **Journal of Physiology (Lond)**, 1;547:427-34, 2003
73. D. Leventhal and DM Durand: Subfascicular stimulation selectivity with the flat nerve electrode, **Annals of Biomedical Engineering**, 6: 643-652, 2003

74. J. Shuai, M. Bikson, P. Hahn, J Lian and DM Durand: Ionic mechanisms underlying spontaneous CA1 neuronal firing in C^{2+} -free solutions, **Biophysical Journal**, 84:2099-2111, 2003
75. JW Shuai and DM Durand: Strange non-chaotic attractors in neural networks, **International Journal of Bifurcation and Chaos**, 13:251-260, 2003
76. L. Yobas, DM Durand, GG Skebe, FJ Lisy, MA Huff: A Novel Integrable Microvalve for Refreshable Braille Display System, **J of Microelectromechanical Systems**, 12: 252-263, 2003
77. KH Hsu, SS Nagarajan and DM Durand: Analysis of the efficiency of magnetic stimulation **IEEE Trans. Biomed. Eng.** 50(11):1276-85, 2003
78. Feng Z and DM Durand: Low calcium epileptiform activity in the hippocampus in-vivo. **J. of Neurophysiology**, 4:2253-2260, 2003
79. Tyler DJ and Durand DM: Chronic response of the rat sciatic nerve to the flat interface nerve electrode, **Annals of Biomedical Engineering**, 31:633:642, 2003
80. Z Lertmanorat and DM Durand: A novel array for diameter dependant control of axonal excitability, **IEEE Transactions on Biomedical Engineering**, 51:1242-50.2004
81. P. Yoo and DM Durand: Selective stimulation of the hypoglossal nerve using a multi-contact cuff electrode, **Annals of Biomedical Engineering**, 32:511-519, 2004
82. J. Lian, J.W. Shuai and D.M. Durand: Control of Phase Synchronization of Neuronal Activity in the Rat Hippocampus, **Journal of Neural Engineering**, 1: 46 – 54, 2004
83. D. Leventhal and DM Durand: Chronic Measurement of the Stimulation Selectivity of the Flat Interface Nerve Electrode, **IEEE Transactions on Biomedical Engineering**, 51(9):1649-58, 2004
84. Z. Feng and D. Durand: Suppression of Excitatory Synaptic Transmission Can Facilitate Low-Calcium Epileptiform Activity in the Hippocampus in-vivo, **Brain Research**, 24; 1030(1):57-65, 2004
85. Z Lertmanorat and DM Durand: Extracellular voltage profile for reversing the recruitment order of peripheral nerve stimulation: a simulation study, **J. of Neural Engineering**, 1: 202-211, 2004
86. Z. Feng and DM Durand: Decrease in Synaptic Transmission Can Reverse the Propagation Direction of Epileptiform Activity in Hippocampus in vivo. **J. Neurophysiology**, 93:1158-1164, 2005

87. A. Kumar, Y. Han, L.F. Dell'Osso, D.M. Durand and R.J Leigh: Directional asymmetry during combined saccade-vergence movements, **J. Neurophysiology**, 93:2797-2808, 2005
88. P.B. Yoo and D.M. Durand: Selective recording of the canine hypoglossal nerve using a multi-contact flat interface nerve electrode, **IEEE Transactions on Biomedical Engineering**, 52(8):1461-9, 2005
89. P.B. Yoo and D.M. Durand: Effects of Selective Hypoglossal Nerve Stimulation on Canine Upper Airway Mechanics, **Journal of Applied Physiology**, 99(3):937-43, 2005
90. Z. Feng and D.M. Durand: Propagation of low-calcium non-synaptic induced epileptiform activity to the contralateral hippocampus in-vivo, **Brain Research**, 1055 (1-2):25-35, 2005
91. Huang J., Sahin M. and DM Durand, Dilation of the oropharynx via selective stimulation of the hypoglossal nerve, **Journal of Neural Engineering**, 2 (2005) 73–80, 2005
92. Z. Lertmanorat and D.M. Durand: Electrode array for reversing the recruitment order of peripheral nerve stimulation: Experimental studies, **Annals of Biomedical Engineering**, Jan;34(1):152-60, 2006
93. E.H. Park and D.M. Durand: Role of Potassium Lateral Diffusion in Non-synaptic Epilepsy: A Computational Study, **Journal of Theoretical Biology**, 238: 666-682, 2006
94. Z. Feng and DM Durand Effects of Potassium Concentration on Firing Patterns of Low-Calcium Epileptiform Activity in Anesthetized Rat Hippocampus --- Inducing Persistent Spike Activity, 47(4):727-36, **Epilepsia**, 2006
95. D.E. Leventhal and DM Durand: Chronic histological effects of the flat interface nerve electrode, 3:102-113, **Journal of Neural Engineering**, 2006
96. A. Jensen and DM Durand: Suppression of axonal conduction by sinusoidal stimulation in rat Hippocampus, **Journal of Neural Engineering**, 4, 1-16, 2007
97. W. Tesfayesus and D.M. Durand Blind Source Separation of Peripheral Nerve Recordings. **Journal of Neural Engineering**, 4(3):S157-67, 2007.
98. DM Durand N. Tian and K Kile: Scn2a Sodium Channel Mutation Results in Hyperexcitability in the Hippocampus in vitro. **Epilepsia**, 49:488-499, 2008
99. EH Park and DM Durand Diffusive coupling and network periodicity: a computational study, **Biophysical Journal**, 9:1126:1137, 2008
100. HJ Park and DM Durand Motion Control of Musculoskeletal Systems with Redundancy, **Biological Cybernetics**, Biol Cybern. (6):503-16, 2008

101. AV Caparso, JM Mansour and DM Durand: A nerve cuff electrode for controlled reshaping of nerve geometry. *J. of Biomaterial Applications*, **J Biomater Appl.** 2009 Sep;24(3):247-73.
102. K. **Wang**, CC Liu and DM Durand Characterization of Sputtered Iridium Oxide Electrodes on Liquid Crystal Polymer for Electrical Stimulation of Neural Tissue;56(1):6-14, **IEEE Transactions on Biomedical Engineering**, 2009
103. Z. **Lertmanorat**, F. W Montague and D.M. Durand A Flat Interface Nerve Electrode With Integrated Multiplexer, **IEEE Transactions on Neural Systems and Rehabilitation**, 17(2):176-82, 2009
104. A. **Jensen** and DM Durand High Frequency Stimulation can Stimulation Block Axonal Conduction, **Experimental Neurology**, 220:57-70, 2009
105. B. **Wodlinger** and DM Durand Localization and recovery of peripheral nerve sources with beamforming algorithms. *IEEE Neural Systems and Rehabilitation*, (5):461-8.2009
106. **Kile** KB, Tian N, and Durand DM. Low frequency deep brain stimulation decreases seizure activity in a mutation model of epilepsy. **Epilepsia**, 51:9, 1745-1753, 2010
107. H. Mino and Durand DM. Enhancement of Information Transmission of Sub-threshold Signals Applied to Distal Positions of Dendritic Trees in Hippocampal CA1 Neuron Models with Stochastic Resonance, **Biological Cybernetics**, 103:227-26. 2010
108. A. **Jahangiri** and DM Durand Phase Resetting Analysis of High Potassium Epileptiform Activity in CA3 Region of the Rat Hippocampus, **International Journal of Neural Systems**, 21:127-138, 2011
109. A.B. **Kibler** and Durand D.M., Dominique M PhD Orthogonal Wave Propagation of Epileptiform Activity in the Planar Mouse Hippocampus in-vitro. **Epilepsia**, 1590-1600, 29:2011.
- 110: **Kawaguchi M**, Mino H and Durand DM, Stochastic Resonance Can Enhance Information Transmission in Neural Networks **IEEE Transactions on Biomedical Engineering**, 58:1950-8, 2011
- 111: MZ Koubeissi, Rashid S, Casadesus; Xu K, PhD; Syed TU; Luders H. DM Durand, Transection of CA3 Does Not Affect Memory Performance in Rats Corresponding, **Epilepsy and Behavior**, 21:267-70. 2011
- 112: Calvetti D, **Wodlinger** B, Durand DM, Somersalo, E. Hierarchical beamformer and cross-talk reduction in electroneurography, **Journal of Neural Engineering**, 056002, 2011
- 113: **Wodlinger** B and Durand DM Selective Recovery of Fascicular Activity in Peripheral Nerves, **Journal of Neural Engineering**, 8:056005, 2011

- 114: **Tang, D** and DM Durand, A tunable support vector machine assembly classifier for epileptic seizure detection, In Press, **Expert Systems With Applications**, 2011
- 115: Rashid S, **Pho G, Czigler M**, Werz MA, Durand DM Low Frequency Stimulation of Hippocampal Commissures Reduces Seizures in Chronic Rat Model of Temporal Lobe Epilepsy, 53(1):147-56, *Epilepsia*, 2011, PMID: 22150779
- 116: **AB. Kibler**, BG. Jamieson, and DM. Durand High Aspect Ratio Microelectrode Array for Mapping Neural Activity in-vitro, *Journal of Neuroscience Methods*, 204(2):296-305, 2011, PMID: 22179041
- 117: **CC Chiang** C K. Lin , MS Ju and DM Durand, High-frequency stimulation can suppress globally seizures induced by 4-AP in the rat hippocampus: An acute in vivo study, In Press, **Brain Stimulation**, 2012
- 118: **Y. Tang** and DM. Durand, A novel electrical stimulation paradigm for the suppression of epileptiform activity in an in-vivo model of mesial temporal lobe status epilepticus. In Press, **International Journal of Neural Systems**, 2012

REVIEWS, BOOK CHAPTERS and EDITORIALS

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2. Carlen P.L., Blaxter T.J., Freedman E.B., Durand D.: Putative Capacitance Increase in Hippocampal CA1 Cells Following Ethanol Application. **Molecular Mechanisms of Anesthetics 3**, Eds. S.H. Roth and K.W. Miller, Plenum, pp.57-64, 1985.
3. Carlen P.L., Gurevich N., Durand D., Daires M.F., Blaxter T.J., Wu P.: **Research advances and new psychopharmacological treatments for alcoholism**. Eds. C.A. Naranjo and E.M. Sellers. Elsevier Science Publisher, pp 11-20, 1985.
4. Ferguson, A.S. and D. Durand. "Magnetic Fields of Current Monopoles". **Advances in Biomagnetism**, S.J. Williamson, pp 583-586, **Plenum Press, New York**, 1989
5. Durand D.M. Ictal patterns in experimental models of epilepsy. **J. of Clinical Neurophysiology**, 10:281-297,1993
6. Durand D.M.: Book Review: Electrical Properties of Mammalian Tissue: An Introduction. Northover, Chapman & Hall, 1992. **Annals of Biomedical Engineering**. 21: 1, 1993

7. Tyler D.J. and D.M. Durand: Interfascicular stimulation for selective activation of surface and deep axon populations. **IEEE Engineering in Medicine and Biology Magazine** **13:575-583**, 1994
8. Durand. D. M. Electrical stimulation of excitable tissue. **Handbook of Biomedical Engineering**. CRC Press, pp: 229-251, 1995
9. Durand D.M. and Tawfik B. Parameter estimation in the presence of biological and external interference. In “ **Concepts and techniques in Biological Measurements: Is the medium carrying the message?**” Editions de l’Ecole Polytechnique de Montreal, pp 55-66, 1997
10. Durand DM, Tawfik B and Lin J.C. Parameter estimation algorithms for the shunt cable model in “**From Ionic Channels to Neural Networks**”, Gordon & Breach Science Publisher, In Press, 1998
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14. Durand D.M.: Electric field effects in hyperexcitable neural tissue: a review. **Radiation Protection Dosimetry**:106(4):325-31, 2003
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16. Durand DM, Grill WM and R. Kirsch: Electrical Stimulation of the Neuromuscular System, in “Neural Engineering”, **Ed: B. He, Kluwer/Plenum Publishers**, 2005
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18. DM Durand, Neural Engineering: a new discipline for analyzing and interacting with the nervous system, **Methods of Information in Medicine**, 46: 142-147, 2007
19. DM Durand. What is Neural Engineering ? Editorial, **Journal of Neural Engineering**, **4**, 2007
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Buehrer KL, and Durand DM. *Scn2a Mutation in Q54 Mice Results in Spontaneous Activity In vitro*. ShowCASE, Case Western Reserve University, May 2005.

Park EH and DM Durand: *Computational Study of Effect of Potassium Lateral Diffusion and Size of Extracellular Space on Neuronal Synchronization*, The 2nd International IEEE Engineering in Medicine and Biology Society (EMBS), Conference on Neural Engineering, Arlington, VA, USA, 2005

Park EH and DM Durand : *Generation and Propagation of Neuronal Activity in Damaged CA1 Pyramidal Cell Network: Computational Study*. Society for Neuroscience Abstracts, 2005

DM Durand: *Neural Interfacing with the peripheral nervous system*, 4th International Conference on emerging technologies in biomedical engineering, Istanbul, 2006

DM Durand *Neural interface for peripheral systems*, NSF Conference on Neural Interface Technology and Applications Workshop, Kunming China, 2006

DM Durand: *Selective Interface with the peripheral nervous system*. Neural Interface Workshop, Washington, 2006

DM Durand *Suppression of Neural Activity with high frequency stimulation*, 28th Annual International conference of the IEEE Engineering in Medicine and Biology Annual, New-York, 2006

M. Kawaguchi, H. Mino and DM Durand: *Information transmission in hippocampal CA1 neuron models in the presence of Poisson shot noise: the case of sub-threshold spike trains*, 28th Annual International conference of the IEEE Engineering in Medicine and Biology Annual, New-York, 2006

H. Mino, DM Durand and M. Kawaguchi: *Enhancement of information transmission with stochastic resonance in hippocampal neuron models*. 28th Annual International conference of the IEEE Engineering in Medicine and Biology Annual, New-York, 2006

HJ Park and DM Durand: Frequency sensitive motion control for a single joint arm model, 28th Annual International conference of the IEEE Engineering in Medicine and Biology Annual, New-York, 2006

W. Tesfayesus and DM Durand: Blind source separation of neural recording and control signals, 28th Annual International conference of the IEEE Engineering in Medicine and Biology Annual, New-York, 2006

DM Durand: *A neural prosthesis for the obstructive sleep apnea*, Biomedical Engineering society, Annual Fall Meeting, Chicago, 2006.

A Kibler and DM Durand: Penetrating microelectrode array for hippocampus recording, Biomedical Engineering society, Annual Fall Meeting, Chicago, 2006.

Buehrer KL, and Durand DM. *Electrophysiological Characterization of Seizure Prone Mice with a Sodium Channel Mutation*. St. Jude Children's Research Hospital, St. Jude's National Graduate Student Symposium, Memphis, TN, March 2006.

Jensen AL, and Durand DM. Suppression of Axonal Conduction with AC Stimulation. American Epilepsy Society Conference San Diego, CA. 2006.

Jensen AL, and Durand DM. Role of potassium in suppression of axonal conduction by sinusoidal stimulation in vitro. Society for Neuroscience Atlanta, GA. 2006.

Jensen AL, and Durand DM. Monophasic High Frequency Stimulation Does Not Drive Axonal Activity. Biomedical Engineering Society Conference, Chicago, IL. 2006.

Jensen AL, and Durand DM. Role of potassium in suppression of axonal conduction by sinusoidal stimulation in vitro. NIH Neural Prosthesis Workshop, Bethesda, MD. 2006

Kevin Wang, CC. Chiu and DM Durand Delamination Study of Sputtered Iridium Oxide Film on Liquid Crystal Polymer Substrate, ShowCase, Cleveland, 2007, **Award: Honorable Mention**

Kibler A, Durand DM, and Jamieson B: A transparent penetrating electrode array for in-vitro hippocampal recordings, 3rd International Neural Engineering Conference, Hawaii, 2007

Mino H and Durand DM: Enhancement of information transmission with stochastic resonance: influence of stimulating position in the hippocampus, 3rd International Neural Engineering Conference, Hawaii, 2007

Neural Engineering and Implants, International Symposium on Emerging Technologies in Biomedicine, Antalya, Turkey, 2007

Dominique M. Durand, W. Tesfayesus and P. B Yoo Peripheral Nerve Signals for Neural Control. International Conference in Robotics and Rehabilitation, Noordwijk, Holland, 2007

Kawaguchi, M, Mino H, Durand DM Enhancement of Information Transmission with Stochastic Resonance in Hippocampal CA1 Neuron Models: Effects of Noise Input Location, EMBS, Lyon, 2007

Durand, DM Recovery of Peripheral Nerve Signals through Blind Separation, EMBS Proceedings, Lyon, 2007

Durand, DM Flexible Electrode Technology for Peripheral Nerve Interfacing (I), EMBS Proceedings, Lyon, 2007

Durand DM: Frequency dependant Control of Neural Activity with electrical stimulation, EMBS Proceedings, Lyon, 2007

Wang K and Durand DM: An in-vitro study of sputtered iridium oxide on liquid crystal polymer: a flexible nerve electrode, BMES Proceedings, Los Angeles, 2007

Durand DM: Selective nerve interface with flexible electrode, BMES Proceedings, Los Angeles, 2007

Durand DM: Neural Engineering Education Program at CWRU, BMES Proceedings, Los Angeles, 2007

Park HJ and Durand DM: Novel control algorithm for ankle joint motion, BMES Proceedings, Los Angeles, 2007

Woodlinger B. and Durand DM, "Localization of Activity in Peripheral Nerves using antenna design techniques, Research Showcase, Cleveland 2008, **Winner, BME MS category.**

Durand DM. HJ Park and B Wodlinger, Localization and control of peripheral nerve activity, EMBS, Vancouver, 2008

Durand DM Diffusion coupling can generate neuronal oscillations, EMBS, Vancouver, 2008

Durand DM Recovery of fascicular activity from peripheral nerves. EMBS, Vancouver, 2008

B Wodlinger and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", ShowCase 2008, Cleveland OH.

B Wodlinger and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", 31st Annual Biomedical Graduate Student Symposium 2008, Cleveland OH.

B Wodlinger, D Calvetti, and DM Durand, "Localization of Neural Activity in Peripheral Nerves: A Modeling Study", BMES 2008, St. Louis MO

B Wodlinger and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", NIC 2008, Cleveland OH

Kibler, A, Durand D and Jamieson, B. Penetrating Microelectrode System for Rodent Hippocampus Recording, Neural Interfaces Conference, Cleveland, 2008

Kibler, A, Durand D and Jamieson, B. Penetrating Microelectrode System for Rodent Hippocampus Recording, Society for Neuroscience, Washington, 2008

HJ Park and DM Durand Motion control of ankle-subtalar joint systems using flat interface nerve electrode on the sciatic nerve, Meeting of the Biomedical Engineering Society (BMES), St. Louis, USA, 2008.

Kile KB, Tian N, and Durand DM. Effect of Low Frequency Deep Brain Stimulation on Transgenic Seizures. Neural Interfaces, Cleveland, Ohio, June 2008.

Kile KB, Tian N, and Durand DM. Deep Brain Stimulation for Seizure Therapy in a Transgenic Mouse Model of Temporal Lobe Epilepsy. ShowCase Research Day, CWRU, Cleveland, Ohio, April 2008.

Mohamad Z. Koubeissi¹, Dominique Durand², Saifur Rashid², Hans Lüders¹, and Robert Maciunas¹ *In vivo* Demonstration of Connectivity between Dorsal Hippocampal Commissure and Bilateral Mesial Temporal Structures, [Academy of Neurological Surgeons](#), 2009

B Wodlinger and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", ShowCase 2008, Cleveland OH

B Wodlinger, and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", 31st Annual Biomedical Graduate Student Symposium 2008, Cleveland OH

B Wodlinger, and DM Durand, "Localization of Activity in Peripheral Nerves Using Electromagnetic Reciprocity", Neural Interfaces Conference 2008, Cleveland OH

B Wodlinger, D Calvetti, and DM Durand, "Localization of Neural Activity in Peripheral Nerves: A Modeling Study", BMES 2008, St. Louis MO

DM Durand, HJ Park, and B Wodlinger, "Localization and control of activity in peripheral nerves", EMBC 2008, Vancouver BC, Canada

B Wodlinger and DM Durand, "Localization and Recovery of Peripheral Neural Sources with Beamforming Algorithms", IEEE TNSRE, vol. 17 no. 5, 2009

B Wodlinger, D Poerschke, D Schwam, and DM Durand, "A Laser-Patterned FINE Electrode with High Contact-Density", ShowCase 2009, Cleveland OH

B Wodlinger, and DM Durand, "Reconstructing Muscle Activity from Whole Nerve Recordings", 32nd Annual Biomedical Graduate Student Symposium 2009, Cleveland OH

B Wodlinger, and DM Durand, "In vivo Localization of Fascicular Activity", IEEE EMBC 2009

DM Durand, HJ Park and B Wodlinger, "Models of the Peripheral Nerves for Detection and Control of Neural Activity", IEEE EMBC 2009

Park H and Durand DM, "Motion Control of the Rabbit Ankle Joint Using a Flat Interface Nerve Electrode", *IEEE EMBS*, Minneapolis, Minnesota, pp. 6789-92, 2009.

Koubeissi, M. Z.1; Durand, D.2; Rashid, S.2; Syed, T.1; Maciunas, R.1; Lüders, IN VIVO CONNECTIVITY BETWEEN DORSAL HIPPOCAMPAL COMMISSURE AND BILATERAL MESIAL TEMPORAL STRUCTURES, American Epilepsy Society, 2009

Rashid S., Pho G, Werz MA, Durand DM "Control of Seizure with Low Frequency Stimulation";: American Epilepsy Society Conference, 2009, Boston

Frackman A, Boven L, Tian N, Durand DM, and Kile KB. *Fast Ripples in a SCN2A mutation model of epilepsy*. Society for Neuroscience 39th Annual Meeting, Chicago, IL, October 2009.

Tian, N., Kile K, Feng P., Strohl K, and Durand DM NREM sleep state promotes generalized tonic seizures through enhancing expression of interictal high frequency oscillation (HFO) in SJL/JXQ54C57BL/6 (Q54)transgenic mouse, Society of Neuroscience, 2009

Toprani, S, Najm, I, Durand, D. "Mechanisms of Hippocampal Seizure Suppression by Low Frequency Electrical Stimulation (LFS) of the Fimbria-Fornix-Hippocampal Commissures (FFHC) in Rats." American Neurological Association, Baltimore, 2009

Durand DM, Control of seizure activity by electrical stimulation: Effect of frequency, Invited presentation, Conf Proc IEEE Eng Med Biol Soc. 2009;1:2375.

Kawaguchi M, Mino H, Momose K, Durand DM. Stochastic resonance can enhance information transmission of supra-threshold neural signals. Conf Proc IEEE Eng Med Biol Soc.;1:6806-9, 2009

Sekine M, Mino H, Durand DM Noise induced oscillations in recurrent neural networks. Conf Proc IEEE Eng Med Biol Soc. 2009;1:1521-4.

Lermanorat Z and DM Durand: Implantable Multiplexing Systems for nerve cuff electrodes, 5th International Symposium in Electronic Design, test and applications. Ho-Chi Minh, Vietnam, 2010

Durand DM, Park HJ and Wodlinger B: Models of the peripheral nerves for detection and control of neural activity, IEEE-EMBS Minneapolis, 2009

Tang Y, Durand DM, "A SVM Assembly Classifier for Epileptic Seizure Detection A SVM Assembly Classifier for Epileptic Seizure Detection", 4th International Workshop on Seizure Prediction, Kansas City, 2009

Toprani, S., Najm, I., and Durand, D. , "Fiber tract stimulation for bilateral hippocampal seizure prevention," Society for Neuroscience, San Diego, CA at the San Diego Convention Center, 2010

B. Wodlinger, D. M. Durand, Peripheral Nerve Signal Recording and Processing for Artificial Limb Control, IEEE EMBS 2010, Buenos Aires, Argentina.

B. Wodlinger, Y. Al Dweiri, D. M. Durand, Realistic ENG from a Novel High-Density Flat Interface Nerve Electrode, Neural Interfaces Conference 2010, Long Beach, CA

B. Wodlinger, D. M. Durand, Mapping Neural Activity in Peripheral Nerves, ShowCase 2010, Cleveland OH

B. Wodlinger, D. M. Durand, Recovering Voluntary Muscle Intent with Nerve Cuff Electrodes, Biomedical Graduate Students Symposium 2010, Cleveland OH.

Won Vance Lemmon Award

*N. TIAN, K. STROHL, K. KILE, P. FENG, D. DURAND;

Relationship between different sleep states and generalized tonic seizure in a mesial temporal lobe epilepsy mouse model with sodium channel (scn2a) mutation, Society for Neuroscience Annual Conference, SanDiego, CAL, 2010

Durand, D. M.; Jensen A., MECHANISMS OF AXONAL SUPPRESSION BY HIGH FREQUENCY STIMULATIONAUTHORS, American Epilepsy Society, San Antonio, 2010, **Winner, Young Investigator Award**

Yuang Tang, Dominique M. Durand, A Tunable Support Vector Machine Assembly Classifier for Epileptic Seizure Detection, Society for Neuroscience Annual Conference, SanDiego, CAL, 2010

HJ Park, DM Durand Motion Control of Neuromuscular Skeletal Systems Using a Multi-contact Nerve Cuff Electrode, Neural Interface Conference, Long Beach, CA, 2010

Toprani, S., Najm, I., and Durand, D. 2010, "Mechanisms of hippocampal seizure prevention by low-frequency electrical stimulation," 9th Annual Department of Biophysics and Physiology Retreat, Cleveland, OH at One Cleveland Center.

Best Research Paper Award.

Toprani, S., Najm, I., and Durand, D. 2010, "Mechanisms of hippocampal seizure suppression by low frequency electrical stimulation," MSTP Winter Retreat, Cleveland, OH at the Wolstein Center.

Seungyup Lee, MS, JayakumarSahadevan, MD, Celeen Khrestian, BS, Dominique Durand, Ph.D and Albert Waldo, MD. High Density Mapping of the Moe Model of Atrial Fibrillation-Studies During Vagus Nerve Stimulation in the *invivo* Canine Heart. Heart Rhythm Society Conference, 2011

Yuang Tang*, Brian Wodlinger, Dominique Durand, An Algorithm for Source Signal Extraction from the Peripheral Nerve, EMBC conference proceedings, Boston, 2011

Yang Wang*, Sheela Toprani, Tina Vrabc, Dominique Durand, A mechanism to explain zero-delay bilateral seizure synchronization, EMBC conference proceedings, Boston, 2011

Brian Wodlinger, Dominique Durand, Recovery of neural activity from nerve cuff electrodes, EMBC conference proceedings, Boston, 2011

Minato Kawaguchi*, Hiroyuki Mino, Keiko Momose , Dominique Durand, Stochastic Resonance with a Mixture of Sub- and Supra-threshold Stimuli in a Population of Neuron Models, EMBC conference proceedings, Boston, 2011

Koubeissi MZ, Durand D, Kahriman E, Syed T, Miller J, and Lüders H. Low Frequency Electrical Stimulation of White Matter Tracts in Intractable Mesial Temporal Lobe Epilepsy. *Neurology* (in press)

RESEARCH SUPPORT

Previous funding

Research Initiation Grant Award, Case Western Reserve University,

\$2,000 for one year, starting 1-1-83

Principal Investigator: Dr. D. Durand

National Science Foundation Grant award: ECS-84-06861

"Electrical Stimulation of Central Neurons In-vitro"

\$137,000 for 2 years, starting August 1984

Principal Investigator: Dr. D. Durand

National Institute of Health Grant Award: 1-R01 AA06773-01

"Effects of Ethanol on Neuronal Integration in the Central Nervous System"

\$246,125 for 3 years, starting 7-1-85

Principal Investigator: Dr. D. Durand

National Science Foundation grant award: EET84-51104

Presidential Young Investigator Award (PYIA)

\$125,000 for 5 years starting 10-1-85

Principal Investigator: Dr. D. Durand

National Science Foundation (matching funds for PYIA) :EET84-51104

\$112,500 for 3 years starting 10-1-85

Principal Investigator: Dr. D. Durand

Whitaker Foundation

"Inhibition of Abnormal Electrical Activity with Electrical Stimulation"

\$131,100 for 3 years starting 1-1-86

Principal Investigator: Dr. D. Durand

National Science Foundation grant award: BNS 8809504

"Effects of Applied Electrical fields on Epileptiform Neuronal Activity"

\$279,000 for 3 years starting 8-1-86

Principal Investigator: Dr. D. Durand

National Institute of Health (NIAAA)

Effect of Ethanol on Neuronal Firing Threshold in-vitro.

\$332,000 for 3 years starting 8-1-88

Principal Investigator: Dr. D. Durand

Zuckerman Fund (CWRU, University Hospital)

NMDA-mediated effects of hypoxia on granule cells

\$5,000 for 1 year starting 1-1-92

Principal Investigator: D. Durand

National Science Foundation grant award:

Magnetic Stimulation of Neural tissue

\$220,000 for 3 years starting 7-1-91

Time 25%

Principal Investigator: D. Durand

National Science Foundation

Research Experience for Undergraduate students

\$20,000 for two years starting 3-1-92

Principal Investigator: D. Durand

National Science Foundation

Parameter Estimation of Neuronal Systems

\$172,614 for four years, Starting: 10-1-93

Time: 10%

Principal Investigator: D. M. Durand

National Institute of Health

Slowly Penetrating Interfascicular Nerve Electrode

\$760,579 for 5 years
Time: 25%, starting 8-1-94
Principal Investigator: D. M. Durand

National Institute of Health

Localization of Magnetic Fields for Magnetic Stimulation
\$834,612 for 5 years
Time: 25%
Starting: 8-1-94
Principal Investigator: Dr. D. M. Durand

National Science Foundation

Electric fields Interactions with Neural Tissue
\$224,021 for 4 years
Time: 10%
Starting: 9-1-94
Principal Investigator: D. M. Durand

National Science Foundation

Parameter Estimation of Neuronal Systems
US-Egypt Cooperative Research
\$29,260 for 4 years,
Starting: 1-15-95
Time: 10%
Principal Investigator: D. M. Durand

National Institute of Health

Spinal Cord Stimulation to produce cough
\$515,057 for three years
Principal Investigator: Dr. Tony Dimarco
Time 10%
Starting Oct. 1996

National Institute of Health

Development of a Neural Prosthesis for Obstructive Sleep Apnea
\$223,710 for 2 years
Principal Investigator: Dr. D. Durand
Time: 15%
Starting: 9-1-97

American Heart Association

Fellowship
One year Starting 8-12-98
\$2000

National Science Foundation

Neural Engineering Conference, October 11-14, 2000,
Seattle, Washington
\$10,000

National Science Foundation

Neural Engineering Conference; Cancun, Mexico;
September 17-21, 2003
\$10,000

National Institute of Health

Nerve reshaping for improved electrode selectivity
\$1.2 for five years
Principal Investigator; D.M. Durand
Time: 30%
Starting: 3/1/98 to 3/1/05

National Institute of Health

Expiratory muscle activation to produce cough
\$1,050,000 for five years
Principal Investigator: Antony Dimarco
Time 10%
Starting: 1/1/00

National Institute of Health

12/01/00-11/30/05 20%
Selective activation of tongue muscles in obstructive sleep apnea
Principal investigator: D.M. Durand
\$450,000

National Institute of Health

4/1/01-3-31-06 25%
Control of Abnormal Neuronal Activity
Principal investigator: D.M. Durand
\$1,033,606

Department of Education

9/1/01-9/1/04 10%
National Need Fellowship program in Neural Engineering
\$639,543

State of Ohio

7/1/2003_6/30/2007
Development of a neuroprosthesis for OSA

Ohio Neurostimulation and Neuromodulation Partnership
Principal Investigator: H. Peckham
\$290,000.

National Science Foundation

Neural Engineering Conference grant
\$10,000
Principal Investigator: D. Durand

National Institute of Health

Selective stimulation of thalamic neurons
\$1,900,000 for five years
Principal Investigator; W. Grill
Time: 5%
Starting: 1-1-01

National Institutes of Health

8/1/03 to 7/31/08 5%
Bioengineering Scaffolds
Principal Investigator: Ravi Bellamkonda
Sub-Contract to D. Durand: \$105K

National Institutes of Health

12/01/03 to 11/30/08 10%
Enhancing Neuroprosthesis performance with nerve cuff electrodes
Principal Investigator: Ron Triolo
\$1,128,525

State of Ohio

Innovation Incentive Fellowship
\$20,000 for one year
Principal Investigator
Starting: September, 2006

Department of Education

9/1/04-9/1/08 10%
National Need Fellowship program in Neural Engineering
\$639,543

Current funding

National Institute of Health

Nerve reshaping for improved electrode selectivity
[5R01NS032845-13](#) , Principal Investigator; D.M. Durand

3/1/05-2/28-11

Lindseth Endowed Chair

9/1/06- 8-31-2016

National Institutes of Health

Detection and control of non-synaptic epilepsy

[5R01NS060757-03](#) Principal Investigator : Dominique Durand

12/1/08 to 31/11/13

National Institutes of Health

[3R01NS060757-03S1](#) Principal Investigator: Dominique Durand

Detection and control of non-synaptic epilepsy: Optogenetics Supplement

12/1/10 to 31/11/11

National Institute of Health

Nerve reshaping for improved electrode selectivity

3R01NS032845-14S1: Principal Investigator; D.M. Durand

10-1-09 to 9-30-11 ARRA Supplement

COULTER Foundation

Control of Epilepsy by Electrical Stimulation.

April 2007 to March 2010

Principal Investigator: Dominique Durand

Department of Education:

Graduate Assistance in National Areas of Need (GAANN) Fellowship

Principal Investigator: Dominique Durand

4/1/2010 – 3/31/2014

National Institute of Health

Inspiratory muscle activation via high frequency stimulation

5R01NS064157-02: Principal Investigator: Dimarco, Antony

May 2009-April 2014

DARPA

Peripheral Interface with the Nervous System

1/2/2012-1/1/2015

Principal Investigator: D. M Durand

Fellowships and awards obtained by students/Post-Docs

Howard Hughes Fellowship

Mechanism of low frequency stimulation in –vitro

Medical Student at Cleveland Clinic

\$30,500, Sept 2007-Aug-2008

Recipient: Sheila Toprani

Preceptors: D. Durand and I Najm

Epilepsy Foundation

Phase resetting analysis in high potassium model

\$5,000 for 12 months, July 1, 1999-June 30, 2000

Recipient: Phil Hahn

Preceptor: Dr. Dominique Durand

Christopher Reeves Paralysis Foundation

Recording of motor signals from the spinal cord
\$50,000 5/15/1999 to 2/15/2002

Recipient: Mesut Sahin

Epilepsy Foundation

Health Sciences Fellowship, George W. Hofmann, Sr. Family Fund
“*Mechanisms of High Frequency Stimulation for the Control of Epilepsy*”
\$3,000 for 3 months, July 1, 2003-September 31, 2003

Recipient: Alicia L. Jensen

Preceptor: Dr. Dominique Durand

Epilepsy Foundation

Pre-Doctoral Research Fellowship Program
“*Mechanisms of High Frequency Stimulation on Axonal Conduction and Potassium Kinetics for the Control of Epilepsy*”
\$20,000 for 12 months, July 1, 2004- June 31, 2005

Recipient: Alicia L. Jensen

Preceptor: Dr. Dominique Durand

National Institutes of Health (NINDS)

High Frequency Stimulation Control of Axonal Conduction
Kirschstein Pre-Doctoral Award

Recipient: Alicia Jensen

October 2006- September 2008

Innovation Incentive Fellowship (State of Ohio)

Control of epilepsy in mice with sodium channel mutation

Recipient: Kara Buehrer

\$20,000/year for two years, 2006-2008

Preceptor: Dominique Durand

Howard Hughes Medical Institute Fellowship

Recipient: Sheila Toprani

Mechanisms of Low Frequency Electrical Stimulation Suppression in Epilepsy

Preceptors: DM Durand and I. Najm

\$41,000 for one year, July 2007

Howard Hughes Medical Institute Fellowship

Recipient: Sheila Toprani

Mechanisms of Low Frequency Electrical Stimulation Suppression in Epilepsy

Preceptors: DM Durand and I. Najm

\$41,000 for one year, July 2008

Richard A Zdanis Research Fellowship award

Recipient: Alicia Jensen

Preceptor: DM Durand

\$5,000. for one year, 2007

PROFESSIONAL SERVICE

National Committees

Board Member; Department of Biomedical Engineering, Georgia Tech. University

IEEE_Medical Technology Committee
Grand Challenges in Neural Engineering Committee IEEE_EMBS
Advisory Board, Penn State Neural Engineering Center

Consulting

Guident
Cyberonics
Giner Inc., Boston, MA
BrainStim, Montreal, QU
Whitaker Foundation, Rosslynn. VA
Biomec, Cleveland, OH
Orbital Research, Cleveland, OH
NASA, Glenn, Cleveland, OH: *White Paper entitled: Physicochemical Processes in Biological Systems in Space*
Boston Consulting Group
Liptos Inc
Inspire Medical

Memberships

American Association for the Advancement of Science
Society for Neuroscience
Biomedical Engineering Society
Institute of Electrical and Electronics Engineers
American Institute for Medical and Biological Engineering

Reviewing Activities

Grant Proposals

NSF Panel on Biocomplexity, 2000
NIH Review panel, 1999
NIH grant review, SBIR, 1998
NSF grant review (Bioengineering, Physiology and Molecular Biology), 1999
NIH review panel (SBIR), 1989, 1995
Veteran's Administration
Whitaker Foundation
Medical Research Council of Canada, Neuroscience Panel (1990-1992)
Development and Leadership awards, Whitaker Foundation

Articles

Biophysical Journal
Brain Research
Canadian Journal of Physiology and Pharmacology
Experimental Neurology
IEEE Transactions in Biomedical Engineering
IEEE Transactions in Rehabilitation Engineering

Journal of Neurophysiology
Mathematical Bioscience
Science
J. Computational Biology
J. of Theoretical Biology
Annals of Biomedical Engineering
Biophysical Journal

Books

Cambridge University Press,
Chapman et al.
MIT Press

Site visits

Institut de Genie Biomedical, Montreal, Canada, 1993
Biomedical Modeling Center, University of Montreal, 1993
John Hopkins University, Dept of Biomedical Engineering, 1995
University of Washington, Dept of Biomedical Engineering, 1996
University of Virginia, Dept of Biomedical Engineering, 1998
Rice University, Dept of Biomedical Engineering, 1998
University of California, San Diego, Dept of Bio-Engineering, 1999
University of California (Berkeley), Dept of Bioengineering, 1999
Washington University, Dept of Biomedical Engineering, 1999
Georgia Institute of Technology, Dept of Biomedical Engineering, 2000
University of California, Riverside, Dept of Biomedical Engineering, 2000
University of Washington, Dept of Bioengineering, Seattle, 2000
University of Pennsylvania, Dept of Bioengineering, Philadelphia, 2000
University of California, Davis, Dept of Biomedical Engineering, 2001
University of Texas, Austin, Dept. of Biomedical Engineering, 2001
Boston University, Dept of Biomedical Engineering, 2001
University of California, San Diego, Dept of Bioengineering, 2001
University of California, Berkeley, Dept of Bioengineering 2001
Federal Drug Administration, External Review of CDRH, 2001
Rutgers University, Biomedical Engineering, 2002
University of California, San Diego, 2002
Site Visit, Advisory Board Neural Engineering Center, Penn State University, 2009

External Dissertation reviewer

Thesis advisor: Dr. Tyc-Dumont, INSERM, Marseille, France, 1989
Thesis Advisor: Dr. Thomas Sinkjaer, Center for Sensory Motor Interaction
Aalborg, Denmark, 2000
Thesis Adviser: Dr. Johannes Struijk, Center for Sensory Motor Interaction Alborg,
Denmark. 1999
Thesis Advisor: Dr. Thesis Adviser: Dr. Johannes Struijk, Center for Sensory Motor
Interaction Alborg, Denmark. 2005
Thesis Advisor: B. Bardakjian, Toronto, Canada, 2006

Thesis advisor: Yves Bertrand, Ecole Doctorale, Unviversite de Montpellier, Montpellier, 2008

University Board Memberships

Georgia Tech, Department of Biomedical Engineering
Pennsylvania State, Neural Engineering Center

Editorial Boards:

Journal of Integrative Neuroscience
Journal of Neural Engineering (Founding Editor and Editor in Chief)
Open Biomedical Engineering Journal
Frontiers of Neuroscience
Medical Devices: Evidence and Research
Brain Stimulation
Orthopedic Research and Reviews
Journal of Biotechnology and Biomaterials
Restorative Neurology and Neuroscience

INVITED LECTURES

- *Acute and chronic effects of ethanol, Winter Brain Research Conference, Keystone, 1983*
- *Measurement of neuronal electrotonic parameters, University of California, Irvine, 1984*
- *Finite difference modeling of neuronal activity, US-Canada Symposium on Electrophysiology, Niagara Falls, 1986*
- *Ethanol-induced changes in the morphology and electrophysiology of hippocampal cells, Congress of the International Society for Biomedical Research on Alcoholism, Kyoto, Japan, 1988.*
- *Induced Electric Fields by Magnetic Stimulation in Non-Homogeneous Conducting Media". IEEE, Engineering in Medicine and Biology Society Conference, Seattle, 1989*
- *Control of epileptic activity with electric stimulation. IEEE, Engineering in Medicine and Biology Society Conference, Seattle, 1989.*
- *Dendritic alteration induced by chronic ethanol in hippocampal granule cells, an HRP study. Congress of the International Society for Biomedical Research on Alcoholism, Toronto, 1990*
- *Reconstruction of the electrophysiology of granule and hippocampus CA1 cells on a computer. Playfair Neuroscience Neural Modelling Conference, Toronto, 1991*
- *Principles of magnetic stimulation, IEEE, Engineering in Medicine and Biology Society Conference, Paris, 1992*
- *Comparison of electric and magnetic neuronal excitation properties, Bakken Research Center, Maastricht, Holland, 1992*
- *Theoretical and experimental studies of the principle of magnetic stimulation, Northeast Bioengineering Conference, Newark, 1993*
- *Fundamental mechanisms and applications of the magnetic neuronal stimulation. University of Toronto, Toronto, 1993*
- *Electric field effects on epileptiform activity in the hippocampus, University of Toronto, Toronto, 1993*

- *Mechanisms underlying magnetic stimulation in the nervous system, Symposium on Magnetic Stimulation, IEEE, Engineering in Medicine and Biology Society Conference, Baltimore, 1994*
- *Recording hypoglossal nerve activity for obstructive sleep apnea prosthesis. Neural Prosthesis Workshop, NIH, Washington, 1994*
- *Interaction between tetanic and anoxic induced synaptic potentiation in brain slices. European Brain Research conference, Alpe d'Huez, 1995*
- *Biological and External Interference in the measurement of Electrotonic parameters of neurons. IEEE EMBS Satellite workshop: Concepts and Techniques in Bioelectric Measurements: is the medium carrying the message ? Montreal, 1995*
- *Computer Simulation in Applied Neural Control: What have we learned ? Applied Neural Control Research Day, Cleveland, 1997*
- *Control of electrical activity in the hippocampus with applied electric fields, Johns Hopkins, Dept of Biomedical Engineering, Baltimore, 1997*
- *Electric and Magnetic Stimulation of the Nervous System: Principles and applications, BioEngineering Department, University of Toledo, Toledo, 1998*
- *Biomedical Engineering in the United States: current status and directions: Ecole Polytechnique, University of Montreal, Montreal, 1998*
- *Bladder activation with pulsed magnetic fields, Applied Neural Control Research Day, Case Western Reserve University, Cleveland, 1998*
- *Effects of electrical on epileptiform activity, American Epilepsy Society Conference, San Diego, 1998*
- *Desynchronization of neural activity: Brain wave and epilepsy workshop, Playfair Neuroscience unit, University of Toronto, 1999*
- *Electric and Magnetic field interaction by neural tissue, Department of Neurobiology and Anatomy, University of Rochester, 1999*
- *Effect of electric fields on epileptiform activity, Spring Epilepsy Conference, Grand Cayman Island, 1999*
- *Parameter estimation methods for neural models, BMES/EMBS Meeting, Atlanta, 1999*
- *Desynchronization and Resetting of Neural Activity, Whitaker Foundation Conference, San Diego, 1999*
- *Flat Interface Nerve Electrode for Selective Nerve stimulation, Dept of Bioengineering, University of Aalborg, Denmark, 2000*
- *Principles and applications of electrical nerve stimulation, Dept of Chemical Engineering, University of California (Riverside), 2000*
- *Chronic recording of hypoglossal nerve activity, Neuro-prosthesis workshop 2000, Aalborg, 2000*
- *Stochastic resonance in hippocampal neurons, Biomedical Engineering Society Annual meeting, Seattle, 2000*
- *Effects of High Frequency Stimulation on Cortical Neuronal Firing, Biomedical Engineering Society Annual meeting, Seattle, 2000*
- *Engineering Electrodes for Peripheral Nerve stimulation: Marquette University, Dept. of Biomedical Engineering, 2001*
- *Improving the localization and efficiency of magnetic stimulation of the nervous system, International Symposium on Electromagnetics in Biology and Medicine, Tokyo, 2001*
- *Engineering Selective electrodes for peripheral nerve stimulation, Drexel University, School of Biomedical Engineering, Philadelphia, 2001*

- *Non-synaptic epilepsy: propagation and synchronization, Grand Rounds, Neuro-surgery, Cleveland Clinic Foundation, 2001*
- *Model based design of nerve electrodes, Biomedical Engineering Society Conference, Durham, 2001*
- *Engineering electrodes for peripheral nervous system interfacing, Penn State, Dept. of Bioengineering, 2002*
- *Stochastic Resonance in the Hippocampus, Department of Mathematics, University of Houston, 2002*
- *Peripheral nervous system-machine interface, University of Michigan, Department of Electrical Engineering and Computer Science, 2002*
- *Grant writing workshop, Whitaker Foundation Conference, 2002*
- *Electrode design for neural interfacing, Louisiana Tech University, Ruston, 2002*
- *Noise and Neural Signal Processing, Mathematical Biology Institute, Ohio State University, Columbus, OH. 2002*
- *Stochastic Resonance in the nervous system, Howard University, Washington DC 2003*
- *Electric fields effects in the hippocampus, National Institute of Standards, Oxford, England, 2003*
- *Interictal and ictal activity in the hippocampus, Ferrara, Italy, 2003*
- *Neural Engineering at CWRU, Advanced Bionics, Los Angeles, 2003*
- *Neural Interfacing with the peripheral nervous system, Cyberonics, Houston, 2003*
- *Electrical stimulation of the Nervous system, Guidant, Minneapolis, 2004*
- *Neural Interfacing in the peripheral nervous system, Department of Biomedical Engineering Georgia Institute of Technology, 2004*
- *Fundamental Principles of electrical stimulation, short course for doctoral students, Universite Catholique de Louvain, Brussels, Louvain, 2004*
- *Phase synchronization of epileptiform activity, Hippocampus Conference, Grand Cayman Island, 2004*
- *Neural Interfacing with the nervous system. Advances in Neural Engineering Workshop, IEEE-EMBS, San Francisco, 2004*
- *Recording of non-synaptic epilepsy in the hippocampal slice NASA Goddard Center, 2004*
- *Design of a neural prosthesis for obstructive sleep apnea, School of Medicine, Johns Hopkins University, Baltimore, 2004*
- *Interfacing with the peripheral nervous system, Keynote lecture, Tsinghua University, Frontiers in Biomedical Engineering, Beijing, China, 2005*
- *Neural Signals in the nervous system, Keynote lecture, 5th International Workshop on Biosignal interpretation, Hosei University, Tokyo, Japan, 2005*
- *Neural Engineering: a new discipline in Biomedical Engineering. Keynote lecture, New trends in Biomedical Engineering, Renaissance of Biomechanics towards biorobotics, Tokyo Medical and Dental University, Tokyo, 2005*
- *Stochastic resonance and coherence synchronization. Keynote lecture, 20th Annual meeting of Japanese association for science, art and technology of fluctuations. Hosei University, 2005.*
- *Analysis and control of epileptic activity, Krasnow Institute, George Mason University, 2005*
- *Interfacing with the nervous system: City College of New York, New York, 2006*
- *Control of epileptiform activity with electrical stimulation: Neurology Ground Rounds, University Hospitals of Cleveland, 2006*
- *Suppression of seizures with electrical stimulation: National Institute of Neurological Disorders and Stroke Second International Workshop on Seizure Prediction, Washington, 2006*
- *Neural Interface with the peripheral nervous system, NSF Conference on Neural Interface Technology and Applications, Kunming, China, 2006*

- *Selective Interface with the peripheral nervous system. Neural Interface Workshop, Washington, 2006*
- *Suppression of Neural Activity with high frequency stimulation, Engineering in Medicine and Biology Annual Meeting, New-York, 2006*
- *A Neural Prosthesis for Obstructive Sleep Apnea, Biomedical Engineering Society Annual Meeting, Chicago, 2006*
- *Neural Interfacing with the peripheral nervous system, 4th International Conference on emerging technologies in biomedical engineering, Istanbul, 2006*
- *Neural Stimulation and recording. International conference in Neuromodulation, Las Vegas, 2006*
- *Nerve Interface for Prosthetic Design, Design of Medical Device Conference, Minneapolis, 2007*
- *Peripheral Nerve Signals for Neural Control. International Conference in Robotics and Rehabilitation, Noordwijk, 2007*
- *Nerve Interface for Prosthetic Design, Universite de Montpellier, 2007*
- *Neural Engineering and Implants, International Symposium on Emerging Technologies in Biomedicine, Antalya, Turkey, 2007*
- *Recovery of Peripheral Nerve Signals through Blind Separation, EMBS, Lyon, 2007*
- *Flexible Electrode Technology for Peripheral Nerve Interfacing, EMBS, Lyon, 2007*
- *Frequency dependant Control of Neural Activity with electrical stimulation, EMBS, Lyon, 2007*
- *Selective nerve interface with flexible electrode, BMES Proceedings, Los Angeles, 2007*
- *Neural Engineering Education Program at CWRU, BMES Proceedings, Los Angeles, 2007*
- *Localization and control of peripheral nerve activity, EMBS, Vancouver, 2008*
- *Diffusion coupling can generate neuronal oscillations, EMBS, Vancouver, 2008*
- *Recovery of fascicular activity from peripheral nerves. EMBS, Vancouver, 2008*
- *Fundamentals of Neural Engineering, NeuroTech Leaders Forum, San Francisco, 2008*
- *New Topic in Neural Engineering, NeuroTech Leaders Forum, San Francisco, 2008*
- *Epilepsy Control: Form Basic Science to the Clinic, Izmir, Turkey, Key note speaker, Emerging technologies in Biomedicine, 2009*
- *Neural Interfacing with the Nervous System, Purdue University, 2009*
- *Mechanisms of epilepsy Control with Electrical Stimulation, Neurology Grand Rounds, University Hospitals, 2009*
- *Durand DM, Control of Seizure Activity by Electrical Stimulation: Effect of Frequency, IEEE_EMBS conference Minneapolis, 2009*
- *Implantable Multiplexing Systems for nerve cuff electrodes, 5th International Symposium in Electronic Design, test and applications. Ho-Chi Minh, Vietnam, 2010*
- *Development of a Seizure Control Prosthetic device, Coulter Foundation, Fort Lauderdale, 2010*
- *Control of neural activity with electrical stimulation, University of Utah, 2010*
- *Neuromodulation: recent advances and fundamentals, Neurotech forum leaders, San Francisco, 2010*
- *Suppression of abnormal neural activity with electrical stimulation. Key Note Presentation, Canadian League Against Epilepsy, Annual Meeting, Kinston Ontario, 2010*
- *Neurostimulation Parameters and Emerging Opportunities for Clinical Applications, North American Neuromodulation Society, Las Vegas, 2010*
- *Neuromodulation Challenges and Future Directions, North American Neuromodulation Society. Las Vegas, 2010*
- *Controlling neural excitability with applied electromagnetic fields: frequency dependency: European Bioelectromagnetic Association, Keynote Lecture, Rome, 2011*

- *Extracting Neural Signals from peripheral nerves for amputees, University of Melbourne, Australia, 2011*
- *Selective recording and stimulating for the nervous system, Key-note lecture, IFESS-Ireland, Dublin, 2011*
- *Peripheral Interface with the Nervous system, DARPA Meeting, Austin, 2011*
- *Fundamental principles of neuromodulation, Workshop Neurostimulation, Berlin 2011*
- *Neural Interfacing with the Peripheral nervous system, Arizona State University, Tempe, 2012*
- *Advances in Neural Engineering, Summer Institute, Key-note speaker, Antalya, Turkey, 2012*
- *Interfacing with the Peripheral System, Plastic Surgery, Harvard University, 2012*
- *Neural Engineering at the interface, University of Pittsburg, 2012*
- *Control of Epilepsy with electrical stimulation, Neurology, Cleveland Clinic, 2012*

PROFESSIONAL CONFERENCE ACTIVITY

Organized and chaired session on Neural Modelling, IEEE, Engineering in Medicine and Biology Society (EMBS) Conference, 1989.

Organized and chaired session on BioMagnetism, IEEE EMBS conference, 1989.

Chaired session on Signal Processing, IEEE EMBS, 1989.

Organized and chaired session on Magnetic Stimulation, IEEE EMBS Conference, 1992

Chaired session on Biomagnetic stimulation, IEEE EMBS Conference, 1992

Chaired Session on Magnetic Stimulation, IEEE EMBS Conference, Amsterdam, 1996

Program Organizer, IEEE EMBS, Chicago, 1997

Chaired session on Magnetic Stimulation of the nervous system, IEEE EMBS, Chicago, 1997

Chaired session on Electrodes for Electrical Stimulation IEEE EMBS, Chicago, 1997

Organized the Neural Engineering track for the Biomedical Engineering Society Fall Meeting, 1998

Organized Track in Neural Engineering, EBMES, BMES conference Atlanta, 1999

Track chair, Neural Engineering, Biomedical Engineering Society Meeting, Seattle, 2000

Track Chair, Neural Engineering, IEEE-BMES, Istanbul, 2001

Organized the Applied Neural Control Research Day, Cleveland, 2001

Organized the Applied Neural Control Research Day, Cleveland, 2002

Neural Engineering track co chair, EMBS-BMES conference Houston, 2002

Co-chair: 1st International IEEE-EMBS Neural Engineering Conference, Capri, 2003

Neural Engineering track chair, EMBS-BMES conference Cancun, 2003

Neural Engineering track co chair, EMBS, San Francisco, 2004

Co-chair, 2nd Neural Engineering International conference, Washington, 2005

Track, co-chair, IEEE EMBS, New York, 2006

Track co-Chair, Neural Engineering, BMES, Chicago, 2006

Scientific and Advisory committee, 2nd International Symposium on Biomedical Engineering, Bangkok, Thailand, 2006

Co-Chair, 3rd International Conference on Neural Engineering, Hawaii, 2007

Scientific Advisory Committee, International Symposium on Neural Networks, to be held in Nanjing, China, June 3-7, 2007

Scientific advisory committee, International Conference on Advancements of Medicine and Health Care through Technology, MediTech 2007, Cluj-Napoca, Romania

Invited Session organizer and chair: Biomedical Engineering Society, Los Angeles, 2007

Reviewer: IEEE-EMBS Lyon, 2007
Program Committee: International Functional Electrical Stimulation, Freiberg, 2008
Program Committee: American Epilepsy Society, Seattle, 2008
Co-Chair, Neural Engineering Track, EMBS, Vancouver, 2008
World Congress of Biomedical Engineering, Track Chair, Munich 2009
Co-chair 4th International Neural Engineering Conference, Turkey, Conference co-chair, 2009
IEEE_EBMS Conference, Chair, Neural Engineering Theme, 2009
MediTech, Cluj_Napoca, Romania, International Scientific Committee, 2009
BioSignal Interpretation, Scientific Committee, Yale, 2009
Neural Interface Conference, Los Angeles. Steering Committee, 2010
Grand Challenges in Neural Engineering, Organizing Committee, IEEE-EMBS, 2010
IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI), Hong-Kong, 2012

PATENT ACTIVITY

- 1) *Tremor measurement device;*
D. Zilm, D. Durand and H. Kaplan
Addiction Research Foundation, Toronto Canada.
Canadian Patent #: 1,112,301
U.S. Patent #: 4,306,291
- 2) *Slowly penetrating interfascicular nerve cuff electrode,*
D. M. Durand and D.J. Tyler.
US Patent , Serial No. 5,400,784
October, 1993.
- 3) *Corrugated nerve cuff design*
D. Tyler and D.M. Durand
US Patent Serial No. 5,634,462
January, 1997
- 4) *Parameter Current Sensor*
D. M. Durand and S.A. Ferguson
US Patent Serial No 5,776,668
June 16, 1998
- 5) *Remote Current Sensor*
D. M. Durand and S.A. Ferguson
US Patent Serial No. 6,154,023
Nov. 28, 2000
- 6) *Method an apparatus for closed stimulation of the hypoglossal nerve in human patients to treat obstructive sleep apnea.*
M. Sahin, D. Durand and M. Haxhiu
United Sates Patent # 6,587,725

July 1st, 2003

- 7) *Flat Interface Nerve Electrode and a Method for Use*
D. Tyler and DM. Durand
US Serial Number: 6,546,866
September 24, 2002
- 8) *A method to maintain patency of the airways for patients with obstructive sleep apnea*
D. Durand and P. Yoo
7,680,538
Filed: November, 2007, granted, 2010
- 9) *Improved Nerve Cuff for Implantable electrodes*
D. Durand, B. Cottrill, D. Tyler
11-839313
Filed: June, 2007
- 10) *Controlling seizure activity with electrical stimulation*
D. Durand, D. Tang and A. Jensen
12/215387
Filed: June 26 2008
- 11) *Novel High Contact Density Electrode and fabrication method for an implantable cuff.*
Brian Wodlinger and Dominique M Durand
#61/571,129
June 21, 2011

INVENTION DISCLOSURES

- 1) *Remote Current Sensor*
D. M. Durand and S.A. Ferguson
Filed: December 1993
- 2) *Closed Loop Control of Chronic Obstructive Apnea*
D. M. Durand, M. Haxhiu and Mesut Sahin
Filed: February 1994
- 3) *A method to improve nerve recordings*
M. Sahin and D. Durand
Filed: July 1996
- 4) *Nerve Cuff Electrode Pressure sensor*
F. Cuocco and D. Durand

Filed: July, 1996

- 5) *A miniature magnetically controlled urethral valve catheter*
Z. Jin Jin and D. Durand
Filed October, 1997
- 6) *Toroidal coil for efficient magnetic stimulation of the nervous system*
R. Carburaru and D. Durand
Filed: February 1998
- 7) *Method and apparatus for detecting and preventing obstruction in obstructive sleep apnea*
M. Sahin and D. Durand
Filed: February 1998
- 8) *A method to recruit selectively nerve fibers for peripheral electrical stimulation*
Zeng Leamanoratn and D.M. Durand, 2001
- 9) *A method for the prevention or treatment of Obstructive Sleep Apnea by inducing airway opening reflexes*, D.M. Durand and Paul Yoo
Filed: 1-23-2002
- 10) *A method for controlling nerve geometry for peripheral nerve Interfacing*
Antony Caparso and Dominique M. Durand
Filed: 1-23-2002
- 11) *An electrode array for reversing the recruitment order of peripheral nerve stimulation*
Z. Lertmanorat and DM Durand, 6-10-04
- 12) *Blind source separation of cuff electrode recordings of peripheral nerves for use a control signals in a closed loop neural prosthesis*
DM Durand and Wondimeneh Testayesus,
Filed: 6-10-04
- 13) *Effect of high frequency stimulation on axonal conduction*
A. Jensen and DM Durand,
Filed: 3-30-2004
- 14) *A method to maintain patency of the airways for patients with obsttuctive sleep apnea*
D. Durand and P. Yoo
Filed: 1-13- 2004
- 15) *Electrical Stimulation for micturition*
Z. Lertmanorat, DM Durand and K Gustafson
Filed: 5-16-05
- 16) *Stimulation Techniques for the treatment of Epilepsy*

D.Y. Tang and D.M. Durand
Filed: 3-15-06

- 17) *A method to stimulate the hypoglossal nerve through the jugular vein*
DM Durand, B. Cotrill and R. Saifur,
Filed: 2006
- 18) *Nasal EMG sensor for triggering respiration therapy*
DM Durand and M. Cullins
Filed: 4-13-2007
- 19) *Selective nerve block with high frequency stimulation*
DM Durand and A. Jensen
Filed: 5-29-2007
- 20) *Physiological Nerve Stimulation*
DM Durand
Filed: 6-04-2008
- 21) *Ear EEG*
DM Durand
Filed: 6-29-2009
- 22) *ENG Control of Prosthetic Limbs*
Wodlinger B and DM Durand
Filed: 8-10-2009
- 22) *Separation and Detection of Nerve Fascicular Signals Based on Location and Direction*
Wolinger and Durand,
8-13-2009
- 23) *Selective Pain Block*
B. Wodlinger and DM Durand
10-14-2009
- 24) *Novel High Contact Density Electrode and Fabrication Technique for an implantable cuff design*
B Wodlinger and DM Durand
1-12-10
- 24) *Transverse Nerve Electrode for Selective Pain Block*
B. Wodlinger and DM Durand
2-3-10
- 25) *Novel High Contact Density Electrode and Fabrication Technique for an implantable cuff design*
B Wodlinger and DM Durand
1-12-10

- 26) *Integrated, multiple channel low power ultra lownoise CMOS instrumentation amplifier*
 Durand DM and Dweiri, Y.
 7-13- 2011

UNIVERSITY SERVICE

Past committees

Undergraduate education committee in BME (Chairman: G. Chilsom)	(1983-1990)
Undergraduate education committee in BME (Chairman: D. Durand)	(1987-1990)
Undergraduate engineering education committee (Chairman: D. Davy)	(1989-1990)
University Committee on curriculum development (Chairman: A. Hucklebridge)	(1991-1992)
School of Medicine Faculty Council	(1988-1991)
School of medicine Computer committee	(1994-1995)
Clinical Engineering, Program coordinator	(1984-1995)
Academic standing committee(Chairman: Robert P. Davis)	(1992-1995)
UUF Curriculum Committee (Chairman: G Previts)	(1993-1995)
Graduate Education committee of the faculty senate	(1996-1999)
Undergraduate recruiting committee	(1996-1999)
Biophysics/Biomedical Engineering program committee (Chairman: U. Hopfer)	(1992-1998)
Gateway undergraduate program (Chairman: S. Topham)	(1992-1996)
Board of UCITE	(1996-1999)
Smith/Treuhft Scholarship committee	1993-1997
CSETenure committee	(1997)
CSE Tenure Committee	(2002)
Neuroscience/Bioengineering committee	(1993-2004)
Chair, BME and Research Day Committee	(1995-2005)
Presidential Research Initiative	(2006)
University Promotion Committee	2005-2007
Chair, Research Day committee	1995-2006
Search committee; faculty in Imaging, BME	2001-2003
Faculty Search Comm. – Neural	2007-2009
Provost Budget Committee	2009-2010
CSE PromotionTenure Committee	2008-2009
Faculty Search Neural	2009-2010
BME Ford Lecture Committee	2007-2009
Graduate Education Committee of Biomedical Engineering (Chair of committee: 1994-2000)	1990-Present
Faculty senate	2005-2008
Faculty Senate Executive Committee	2006-2009
CSE Strategic Planning Committee	2008-2009

Present committees

BME Chair Associate_Master Programs	2012-Present
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BME chair Search Committee	2012-Present
BME Undergraduate Committee	2011-Present
Faculty Mentoring Committee:	2004-Present
MD/PhD Executive Committee	2005-Present
NEC Exec. Comm.	2007- Present
School of Engineering Ambassador	2007- Present
School of Engineering Continuing Education Comm.	2007-Present
Dean's Research Council	2007-Present

GRADUATE STUDENT SUPERVISION:

Name <i>Thesis/Project</i>	Degree	Start Date	Date of degree
Geoffrey Yuen <i>Reconstruction of hippocampal granule cell electrophysiology by computer simulation</i>	MSc	Jan. 85	May 88
Wassim Ali Hassan <i>Estimation of electrotonic parameters of hippocampal neurons</i>	MSc	Sept. 88	May 90
Michael Nakagawa <i>Inhibition of spontaneous epileptiform activity with applied currents</i> Engineer, Agilent Technology	MSc	Oct. 88	May 90
Hani Kayyali <i>Effects of applied currents in epileptiform bursts in-vitro</i> President: Cleveland Medical Devices, Cleveland	MSc	Sept. 87	May 90
Somasekhar Kovuru <i>Synchronous activation of intercostal muscles and diaphragm for artificial respiration</i>	MSc	Sept. 89	Dec. 91
Srikantan Nagarajan <i>Modelling the effects of magnetically induced electric fields on finite neuronal structures</i> Assistant Professor, Neurosurgery, University of California, San Francisco	MSc	Jan. 90	May 91

Omar Shane <i>A microprocessor-controlled 60Hz notch filter</i>	MSc	Sept. 89	May 92
Lin Ching-Hsi <i>Design of a 60Hz harmonic filter</i>	MSc	Sept. 89	Jan. 92
Frank Kopyt <i>Magnetic sensing of current amplitude</i> Clinical Engineer, Cleveland Clinic	MSc	Sept. 90	May 93
K.S. Hsu <i>Determination of excitation of nerve fibers during magnetic stimulation</i>	M.Sc.	Sept. 92	May 96
Jim Cavanaugh <i>Finite element analysis of electrical nerve stimulation</i> Engineer, GE Medical Systems	M.S.c.	Sept. 93	May 96
Frank Cuoco <i>Measurement of external pressure generated by nerve electrodes</i> Medical Student Georgetown University	M.Sc.	Sept. 93	May 96
Rafael Carburaru <i>Axonal stimulation under MRI Z-gradient magnetic fields: a modelling study</i> Scientist, Advanced Bionics	M.Sc.	Sept. 93	May 96
Jim Warren <i>Control of low calcium activity with applied currents</i> Medical School Student, University of Cincinnati	M.Sc. B	(Neuroscience)	Dec. 96
Albert Guzman <i>Detection of tactile slip using the power spectrum of spiral cuff recordings from sensory nerve</i> Engineer, Cyberonics	M.Sc.	Sept 95	Dec. 97
Rahul S. Ghai <i>Electric field suppression of spontaneous low calcium epileptiform activity in the CA1 region</i>	MSc.	Sept 96	May 98

of rat hippocampal slices

Consultant, Deloitte and Touche

J. Perez Orive <i>Modelling study of peripheral nerve recording selectivity</i>	MSc	Sept 95	Dec 98
Graduate student, California Institute of Technology			
Adam Choi <i>Nerve electrode design for improved selectivity</i>	MSc.	Sep 95	Dec 98
Amnol Majmudar <i>Measurement of the impedance of the dura matter</i>	MSc	Sept 98	Jan 00
Andrea Oates <i>Development of a method to measure the impedance of biological membranes</i>	MSc.	Sept 98	May00
Phil Hahn <i>Bifurcation properties of hippocampal neurons</i>	MSc	Sept 99	May 01
Kara Buehrer <i>Effect of Fuoremide on potassium dynamics in vitro</i>	MSc	Fall 2001	Aug.03
Alicia Jensen <i>Effect of high frequency stimulation in axonal conduction</i>	MSc	Fall 2000	Dec03
Antony Caparso <i>Controlled reshaping of nerve geometry</i>	MSc	Fall 2001	Aug 03
Andrew Kibler <i>Intact hippocampal planar preparation in-vitro</i>	MSc	Fall 2002	May 04
Dave Hill <i>Measurement of current in embedded wires using magnetic sensors</i>	MSc (EECS)	Fall 2002	May 04
Deng-Hung Liu <i>Inductive coupling for high power load</i>	MSc	Fall 2004	May 06
Kevin Wang <i>Electrochemical Characterization of iridium Oxide films on liquid crystal polymer for Electrical stimulation of neural tissue</i>	MSc	Fall 2005	May 07
Brian Barbarits <i>Low noise amplification for nerve signals</i>	MSc	Fall 2006	May 08

Brian Wodlinger Recovery of fascicular signals peripheral nerves recordings	MSc	Fall 2006	May 08

Geoffrey Yuen <i>Modulation of excitability in hippocampal granule cells by ethanol: role of NMDA receptors</i> Vive President, PCCW, Honk-Kong, China	Ph.D.	June 88	Dec. 91
Stewart Ferguson <i>Theoretical calculation of magnetic fields generated by neural currents</i> Director of Technology, Alaska Federal Health Care Access Network	Ph.D.	Sept. 86	May 91
Eduardo Warman <i>Modulation of neuronal firing with applied currents</i> Senior Research Scientist, Bakken Fellow, Medtronic	Ph.D.	Sept. 87	May 92
Srikantan Nagarajan <i>Theoretical and Experimental Analysis of Magnetic stimulation of Neuronal System</i> Assistant Professor, Neurosurgery, University of California, San Francisco	Ph.D.	Sept. 91	Dec. 94
Madhavi Patil <i>Effect of hypoxia on the nervous system</i> Research Associate, Harvard University, Boston University	Ph.D.	Sept. 90	May 95
Mesut Sahin <i>Chronic recording and stimulation of the hypoglossal nerve in dogs for obstructive sleep apnea</i> Associate Professor, Biomedical Engineering, New Jersey Institute of Technology	Ph.D	Sept 94	May 98
Anila Jahangiri <i>Phase Resetting analysis of high potassium epileptiform activity</i> Post Doctoral Fellow, MINDSET Program, Department of Systems and Information Engineering, University of Virginia	Ph.D	Sept 94	May 98
Dustin Tyler <i>Functional Electrical Stimulation of Peripheral nerve: electrodes that alter nerve geometry</i>	PhD	Sept 93	May 99

Assistant Professor, Biomedical Engineering, CWRU

Rafael Carburnaru PhD Sept 94 May 99

Coil design for efficient and localized magnetic Stimulation of the nervous system

Director for Emerging Indications R&D, Boston Scientific

Kai-Hsiung Hsu PhD May 96 Aug 00

Analysis of excitation characteristics of Magnetic stimulation

Director, Innovation Incubator, Assistant Professor, Biomedical Eng. National Yang-Ming University

William Stacey PhD Sept 97 Aug 00

Stochastic resonance in the hippocampus

Neurology Fellow, University of Pennsylvania

Marom Bikson PhD Sept 95 Dec 00

Mechanisms and control of non-synaptic epileptiform activity

Assistant Professor, Biomedical Engineering, City University of New York

Levent Yobas PhD Sept 94 May01

Implementing and testing a novel microvalve using MEMS technology

Scientist, Micromachining Facility, Singapore

Jun Lian PhD Sept 96 Dec 01

Synchronization and analysis of low-calcium neuronal activity

Assistant Professor, UNC Dept. of Radiation Oncology

Dan Leventhal MD/PhD Sept 96 May 04

Fascicular and sub-fascicular selectivity of the flat nerve electrode in chronic animal preparations

Resident, Neurology, University of Michigan

Paul Yoo PhD Sep 99 May 04

Selective stimulation and recording of the canine hypoglossal nerve for the treatment obstructive sleep apnea

Research Associate, Duke University

Zeng, Leatmanorathn PhD Sept 99 May 04

Diameter selective nerve electrode design

Assistant Professor, Mahidol University, Bangkok, Thailand

Alicia Jensen	PhD	Sept 01	Dec 08
<i>High frequency Stimulation for the control of axonal activity</i>			
Research Associate, Cleveland Clinic			
Kara Kile	PhD	Dec 02	Dec 08
<i>Control and analysis of seizure activity in a sodium channel mutation model of epilepsy</i>			
Assistant Professor, Oberlin University			
Brain Wodlinger	PhD	Sept 06	Dec 10
<i>Extracting commands signals from peripheral nerves</i>			
Research Associate, University of Pittsburg			
Andrew Kibler	PhD	Sept 04	May 11
<i>Epileptiform propagation in the hippocampus and a recording electrode array for in vitro analysis</i>			

HyungJo Park: **PhD** **Sept 05** **August 11**
Motion Control of Neuromuscular systems using a multiple contact nerve electrode
Post-doc Fellow, Cleveland Clinic, Cleveland

David Yuang Tang: **PhD** **Sep06** **Dec 11**
METHODS FOR THE DETECTION AND SUPPRESSION OF MESIAL TEMPORAL LOBE EPILEPSY

Postdoctoral Fellows, Research Associates, Visiting Researchers

Names	Dates	Title	Current position
Chou-Chin Lin	2010-Present	Visiting Professor	Neurology, NCKU, Taiwan
Luis Gonzales	2009-Present	Research Associate Instructor	
Saifur Rashid	2004-Present	Senior Research Associate	
Zeng Letmanorat	2004-06	Research Associate	Assistant Professor, Mahidol University, Bangkok, Thailand
Eun-Hyoung Park	2003-06	Research Associate	Research Fellow Department of Neurosurgery, Children's Hospital Boston Department of Surgery, Harvard Medical School
Zhouyan Feng	2002-04	Visiting Professor	Associate Professor Zhejiang University, Hangzhou, China
Katie Holland	2003-04	Visiting Clinician	Assistant Professor,

Chris Sciortino	2002-02	Research associate	University of Cincinnati Medical School
Mesut Sahin	1998-01	Research Associate	Assistant Professor, NJIT, Newark
Jian-Wei Shuai	1998-01	Research Associ	Professor, Xiamen University, China
Johannes Strujk	1998-99	Visiting Professor	Associate Professor, Aalborg, University of Aalborg, Denmark
Lin, Jian-Cheng	1994-98	Senior Research Associate	
Qi, Haiming	1996-98	Senior Research Associate	
Tawfik, Bassel	1997-97	Visiting Professor,	Professor, University of Cairo Cairo, Egypt
	Summer 1996		
	Summer 1995		
	Summer 1993	(Fulbright Fellow)	
Radu Ciupa	Summer 1994	(Fulbright Fellow) Visiting Professor	Dean of the Electrical Engineering Faculty, Cluj-Napoca, Romania

TEACHING INVOLVEMENT

ENGR 144: Engineering Concepts and Applications: Experimental course designed to introduce entering students to the concepts of engineering across many disciplines while integrating the physics and the mathematical concepts learned during the same year. I taught a section of this course related to fundamental principles of engineering related to biomedical engineering. I offered two laboratories for this course. The first one was a robotic arm made out of Lego pieces interfaced to a computer equipped with Labview. The arm could be controlled directly from the computer or by a two-channel EMG interface. The second laboratory was on the energy consumption on a bicycle also interface to a computer through Labview. The program displays directly the energy consumed from an electrocardiogram measurement and the energy generated in watts.

EBME 310: Principals of Biomedical Instrumentation: Electrical, mechanical and chemical principles of biomedical measurements. Modular blocks and system integration. Sensors for electric potentials, measurements of pressure, flow and other physiological variables. Patient safety and ethics.

EBME 360: Biomedical Instrumentation Laboratory. A laboratory which focuses on the basic components of biomedical instrumentation and provides hands-on experience for students in EBME 310, Biomedical Instrumentation. The purpose of the course is to develop design skills and laboratory skills in analysis and circuit development.

EBME 313/314: Biomedical Engineering Laboratories: The undergraduate biomedical engineering laboratories that I teach focus on the fundamentals of biomedical engineering such as biomedical electrodes and biomedical signals and amplification

EBME 401: Bioelectric Phenomena: Fundamental concepts of interaction between electrical and magnetic field with excitable tissue. Models of excitable cells and membranes. Neural and cardiac action potentials. Propagation of excitation. Principle of electrical stimulation of the nervous system. Bioelectric sources, volume conduction fields. Electric field interaction with tissue. Electrical recording from excitable tissue. Bi-domain models. Inverse problem in electrophysiology.

EBME 407: Applied Neural Control: Fundamental concepts related to electrical stimulation of the nervous system. Electrical stimulation for the control of the nervous system. Applications to neuromuscular, sensory and other physiological systems. I teach the first half of this course namely the fundamental principles of electrical and magnetic stimulation of the nervous system.

EBME 418: Applied Electronics for Biomedical Engineers: Analog design for biomedical electronics. Low noise precision amplification, shielding, grounding telemetry, interfacing and electrical safety. Applications include biomagnetic field measurements, electronics for electrophysiological recordings.

EBME 451: Physiological Processes: Cell biology, metabolism, and immunology. Nerve and muscle function. Motor system and feedback control. Fundamentals of neurophysiology. Functional anatomy of the brain. Auditory, visual and autonomic nervous system. I teach a third of this course and focus on the nervous system.

EBME 403: Biomedical Transducers. Analysis and design of transducers and signal processors. Measurements of physical, chemical, biological and physiological variables. Electrical transducers, thermoelectric transducers, photo-electric transducers, transducers using acoustic waves, biopotential electrodes, electrochemical transducers and optical sensing methods will be reviewed. I teach on third of this course on the electrical and thermoelectric transducers.

EBME 517: Quantitative Neurophysiology. This course will provide a unique opportunity to gain advanced knowledge in the area of neurophysiology, neuroscience, and cellular biophysics/physiology from the quantitative point of view. The first part of the course deals with the voltage-gated ion channels of the excitable cell: activity, structure, functions and models. The second part will describe how synaptic interaction between neurons occurs. The activity of the ligand-gated channels will be analyzed. In the third part, models of the nerve cell will be studied.

EBME 607: Neural Engineering Topics: The goal of this class is to explore topics in Neural Engineering not covered in the curriculum. A single topic will be chosen per semester. Four speakers with expertise in the chosen area will be invited to the campus. Each speaker will give a seminar and participate in a 2-hour workshop/journal club on the specific topic. The students will be assigned one or two seminal papers written by the speaker prior to the visit. Students will take turns presenting these papers to the rest of the class. The paper and the topic will then be open for discussion.

