

## CURRICULUM VITAE

**Mikhail A. Lebedev**

Senior Research Scientist  
Center for Neuroengineering  
Department of Neurobiology  
Duke University Medical Center  
Box 3209  
101 Research Drive  
Durham, NC 27710

### DEGREES

1995	Ph.D.	University of Tennessee, Memphis
1986	Engineer Physicist (M.Sci. equivalent)	Moscow Institute of Physics and Technology Moscow, Russia

### APPOINTMENTS

2002-present	Senior Research Scientist	Center for Neuroengineering, Department of Neuroscience, Duke University, NC
1997-2002	Research Fellow	Laboratory of Systems Neuroscience, National Institute of Mental Health, Bethesda, MD
1995-1997	Postdoctoral Fellow	Cognitive Neuroscience Sector, International School for Advanced Studies, Trieste, Italy
1995	Postdoctoral Fellow	Department of Anatomy and Neurobiology, University of Tennessee, Memphis, TN
1991-1995	Graduate Teaching Assistant	Department of Anatomy and Neurobiology, University of Tennessee, Memphis, TN
1986-1991	Research Fellow	Institute for the Problems of Information Transmission, Moscow, Russia

### TEACHING EXPERIENCE

1997	Lecturer	Neuroscience, Cognitive Neuroscience Sector, International School for Advanced Studies, Trieste, Italy
1992-1995	Teaching Assistant	Histology and Gross Anatomy, Department of Anatomy and Neurobiology, University of Tennessee, Memphis, TN
1980-1984	Teaching Assistant	Physics and Mathematics for High School Students, Moscow Institute of Physics and Technology, Moscow, Russia

### SOCIETY MEMBERSHIP

1992 – present	Society for Neuroscience
2005 – present	Cognitive Neuroscience Society

## INVITED LECTURES

2011, September	Brain-Machine Interfaces: From Locomotion to Sensorized Hand Movements	Young European Scientist Meeting, Porto, Portugal
2011, September	Brain-Machine Interfaces: From Locomotion to Active Tactile Exploration	Horizons in Molecular Biology, Göttingen, Germany
2011, June	Brain-Machine Interfaces: From Locomotion to Fine Hand Movements	IGS 2011, Cancun, Mexico
2009, July	Brain-machine interfaces based on neuronal ensemble recordings	BBCI Workshop 2009, Advances in Neurotechnology, Berlin, Germany
2009, January	Neuronal ensembles in control of brain-machine interfaces	JST/ICORP Symposium "Create a robot, and know a human being". Tokyo, Japan
2008, July	Encoding principles in the brain: rate versus temporal encoding. Feedback and feedforward loops in somatosensory system. Representation of multiple spatial variables in the brain. Cortical oscillations and their role in information encoding. Decoding neuronal signals in brain-machine interfaces. Cortical microstimulation as the way to deliver information to the brain	First CAPES and ELS-IINN/UFRN Summer School, Natal, Brazil
2008, January	Brain-machine interfaces: past, present and future	Ethics of human techno-enhancement: future of brain-machine interface, Kyoto, Japan
2007, July	Decoding and encoding with cortical multielectrode implants	Organtechno 2007, Tokyo, Japan
2007, July	Decoding and encoding with cortical multielectrode implants	RIKEN, Wako City, Japan
2007, June	Decoding and encoding with multielectrode implants	Neurizons. Max Planck Institute for Experimental Medicine, Göttingen, Germany
2007, April	Decoding multiple behavioral variables from neuronal ensemble activity	Advanced Telecommunications Research Institute International, Kyoto, Japan
2006, April	Encoding of attended versus remembered locations by prefrontal cortex neurons	Cognitive Neuroscience Meeting, San Francisco, California
2006, February	Obtaining accurate read-out of multiple behavioral variables from large neuronal ensembles	Barrow Neurological Institute, Phoenix, Arizona
2004, August	Frontal cortex mechanisms of spatial motor behavior	IBRO Summer School: Sensory and Integrative Neuroscience, Moscow, Russia
2003, December	Monkey attend, monkey do. Dissociation of spatial attention from other variables in task-related activity of frontal cortex neurons	Department of Neurobiology and Anatomy, Wake Forest University, North Carolina
2002, May	Processing of spatial information in frontal cortex	Department of Neurobiology, Duke University, North Carolina

2002, April	Dissociation of spatial, mnemonic, attentional, and intentional signals related to reaching movements and eye movements in frontal cortex.	Neural Control of Movement Meeting, Naples, Florida
2002, February	Processing of spatial information in frontal cortex	Department of Psychology, Vanderbilt University, Nashville, TN
2000, July	Oscillations in the activity of individual premotor cortex neurons	Department of Psychology, Vanderbilt University, Nashville, TN
1998, December	Premotor cortex: detection of oscillations in single-unit activity	Human Motor Control Section, National Institute of Neurological Disorders and Stroke
1998, May	Single unit oscillations in SI during reaction-time movements	Second Borsellino College of Neurophysics. The Abdus Salam International Centre for Theoretical Physics
1995, February	Rhythmic activity of SI neurons	Cognitive Neuroscience Sector, International School for Advanced Studies, Trieste, Italy

#### INVITED REVIEWER

Brain Research  
Cerebral Cortex  
European Journal of Neuroscience  
Experimental Brain Research  
IEEE Transactions on Biomedical Engineering  
IEEE Transactions on Systems, Man and Cybernetics  
International Journal of Psychophysiology  
Journal of Cognitive Neuroscience  
Journal of Neural Engineering  
Journal of Neuroscience  
Journal of Neurophysiology  
Journal of Neuroscience Methods  
Journal of Zhejiang University  
Netherlands Organisation for Scientific Research  
Neural Computation  
Neural Networks  
NSF Board on Robust Intelligence  
Trends in Cognitive Sciences

#### ACADEMIC AWARDS

2012	Science Education Grant Award, Duke University
1992, 1993	Travel Award from the Neuroscience Center of Excellence, University of Tennessee, Memphis
1988, 1989	2 <sup>nd</sup> Prize, Conference of Junior Scientists, Institute for the Problems of Information Transmission
1988	2 <sup>nd</sup> Prize, Annual Research Competition, Institute for the Problems of Information Transmission
1986	Diploma with distinction, Moscow Institute of Physics and Technology

#### PUBLICATIONS

1. Medina, L.E., **Lebedev, M.A.**, O'Doherty, J.E., Nicolelis, M.A. (2012) Stochastic facilitation of artificial tactile sensation in primates. *J. Neurosci.*, 32: 14271-14275.
2. Ifft, P.J., **Lebedev, M.A.**, Nicolelis, M.A. (2012) Reprogramming movements: extraction of motor intentions from cortical ensemble activity when movement goals change. *Front. Neuroeng.*, 5: 16.

3. Hanson, T.L., Fuller, A.M., **Lebedev, M.A.**, Turner, D.A., Nicolelis, M.A. (2012) Subcortical neuronal ensembles: an analysis of motor task association, tremor, oscillations, and synchrony in human patients. *J. Neurosci.*, 32: 8620-8632.
4. Hanson, T., Omarsson, B., O'Doherty, J., Peikon, I., **Lebedev, M.A.**, Nicolelis, M.A. (2012) High-side digitally current controlled biphasic bipolar microstimulator. *IEEE Trans. Neural Syst. Rehabil. Eng.*, 20: 331-340.
5. Ifft, P.J., **Lebedev, M.A.**, Nicolelis, M.A. (2012) Cortical correlates of Fitts' law. *Front. Integr. Neurosci.*, 5: 85.
6. O'Doherty, J.E., **Lebedev, M.A.**, Li, Z., Nicolelis, M.A.L. (2012) Virtual active touch using randomly patterned intracortical microstimulation. *IEEE Trans. Neural Syst. Rehabil. Eng.*, 20: 85-93.
7. O'Doherty, J.E., **Lebedev, M.A.**, Ifft, P.J., Zhuang, K.Z., Shokur, S., Bleuler, H., Nicolelis, M.A.L. (2011) Active tactile exploration enabled by a brain-machine-brain interface. *Nature*, 479: 228-231.
8. **Lebedev, M.A.**, Nicolelis, M.A.L. (2011) Towards A Whole Body Neuroprosthetic. *Prog. Brain Res.*, 194: 47-60.
9. Li, Z., O'Doherty, J.E., **Lebedev, M.A.**, Nicolelis, M.A.L. (2011) Adaptive decoding for brain-machine interfaces through Bayesian parameter updates. *Neural Comput.*, 23: 3162-3204.
10. **Lebedev, M.A.**, Tate, A.J., Hanson, T.L., Li, Z., O'Doherty, J.E., Winans, J.A., Ifft, P.J., Zhuang, K.Z., Fitzsimmons, N.A., Schwarz, D.A., Fuller, A.M., An, J.H., Nicolelis, M.A. (2011) Future developments in brain-machine interface research. *Clinics (Sao Paulo)*, 66 Suppl 1: 25-32.
11. Opris I., **Lebedev M.A.**, Nelson R.J. (2011) Motor Planning under Unpredictable Reward: Modulations of Movement Vigor and Primate Striatum Activity. *Front. Neurosci.*, 5: 61.
12. Thiagarajan, T.C., **Lebedev, M.A.**, Nicolelis, M.A., Plenz, D. (2010) Coherence potentials: loss-less, all-or-none network events in the cortex. *PLoS Biol.* 8: e1000278.
13. O'Doherty, J.E., **Lebedev, M.A.**, Hanson, T.L., Fitzsimmons, N.A., Nicolelis, M.A. (2009) A brain-machine interface instructed by direct intracortical microstimulation. *Front. Integr. Neurosci.*, 3: 20.
14. Li, Z., O'Doherty, J.E., Hanson, T.L., **Lebedev, M.A.**, Henriquez, C.S., Nicolelis, M.A.L. (2009) Unscented Kalman filter for brain-machine Interfaces. *PLoS ONE*, 4: e6243.
15. Petermann, T., Thiagarajan, T.C., **Lebedev, M.A.**, Nicolelis, M.A., Chialvo, R.C., Plenz, D. (2009) Spontaneous cortical activity in awake monkeys composed of neuronal avalanches. *Proc. Natl. Acad. Sci. U. S. A.* 106: 15921-15926.
16. Nicolelis, M.A.L., **Lebedev, M.A.** (2009) Principles of neural ensemble physiology underlying the operation of brain-machine interfaces. *Nature Rev. Neurosci.*, 10: 530-540.
17. Messinger, A., **Lebedev, M.A.**, Kralik, J.D., Wise, S.P. (2009) Multitasking of attention and memory functions in the primate prefrontal cortex. *J. Neurosci.*, 29: 5640-5653.
18. Fitzsimmons, N.A., **Lebedev, M.A.**, Peikon, I.D., Nicolelis, M.A.L. (2009) Extracting kinematic parameters for monkey bipedal walking from cortical neuronal ensemble activity. *Front. Integr. Neurosci.* 3 (Article 3): 1-19.
19. Peikon, I.D., Fitzsimmons, N.A., **Lebedev, M.A.**, Nicolelis, M.A.L. (2009) Three-dimensional, automated, real-time video system for tracking limb motion in brain-machine interface studies. *J. Neurosci. Meth.* 180: 224-33.
20. Zacksenhouse, M., Nemets, S., **Lebedev, M.A.**, Nicolelis, M.A.L. (2009) Robust satisficing linear regression: robustness/performance trade-off and consistency criterion. *Mech. Syst. Signal Process.* 23: 1954-1964.
21. **Lebedev, M.A.**, O'Doherty, J.E., Nicolelis M.A.L. (2008) Decoding of temporal intervals from cortical ensemble activity. *J. Neurophys.*, 99: 166-186.

22. **Lebedev, M.A.**, Crist, R.E., Nicolelis, M.A.L. (2007) Building brain-machine interfaces to restore neurological functions - chapter 11. In: Nicolelis M.A.L. (Ed.) *Methods for Neural Ensemble Recordings*, CRC Press.
23. Crist, R.E., **Lebedev, M.A.** (2007) Multielectrode recordings in behaving monkeys - chapter 9. In: Nicolelis M.A.L. (Ed.) *Methods for Neural Ensemble Recordings*, CRC Press.
24. Zacksenhouse, M., **Lebedev, M.A.**, Carmena, J.M., O'Doherty, J.E., Henriquez, C.S., Nicolelis, M.A.L. (2007) Cortical Modulations Increase in Early Sessions with Brain-Machine Interface. *PlosOne* 2: e619. doi:10.1371/journal.pone.0000619
25. Fitzsimmons, N.A., Drake, W., Hanson, T.L., **Lebedev, M.A.**, Nicolelis, M.A.L. (2007) Primate Reaching Cued by Multichannel Spatiotemporal Cortical Microstimulation. *J. Neurosci.*, 27: 5593-5602.
26. **Lebedev, M.A.**, Nicolelis, M.A.L. (2006) Brain-machine interfaces: past, present and future. *Trends in Neurosci.*, 29: 493-546.
27. Kim, S.P., Sanchez, J.C., Rao, Y.N., Erdogmus, D., Carmena, J.M., **Lebedev, M.A.**, Nicolelis, M.A.L., Principe, J.C. (2006) A comparison of optimal MIMO linear and nonlinear models for brain-machine interfaces. *J Neural Eng.*, 3: 145-161.
28. Kim, H.K., Biggs, S.J., Schloerb, D.W., Carmena, J.M., **Lebedev, M.A.**, Nicolelis, M.A.L., Srinivasan, M.A. (2006). Continuous shared control stabilizes reach and grasping with brain-machine interfaces. *IEEE Trans. on Biomed. Eng.*, 53(6): 1164-1173.
29. **Lebedev, M.A.**, Carmena, J.M., O'Doherty, J.E., Zacksenhouse, M., Henriquez, C.S., Principe, J.C., Nicolelis, M.A.L. (2005) Cortical ensemble adaptation to represent actuators controlled by a brain machine interface. *J. Neurosci.*, 25: 4681-4693.
30. Santucci, D.M., Kralik, J.D., **Lebedev, M.A.**, Nicolelis, M.A.L. (2005) Frontal and parietal cortical ensembles predict single-trial muscle activity during reaching movements *Eur. J. Neurosci.*, 22: 1529-1540.
31. Carmena, J.M., **Lebedev, M.A.**, Henriquez, C.S., Nicolelis, M.A.L. (2005) Stable ensemble performance with single neuron variability during reaching movements in primates. *J. Neurosci.*, 25: 10712-10716.
32. **Lebedev, M.A.**, Messinger, A., Kralik, J.D., Wise, S.P. (2004) Representation of attended versus remembered locations in prefrontal cortex. *PLoS Biology*, 2: 1919-1935.
33. Sanchez, J.C., Carmena, J.M., **Lebedev, M.A.**, Nicolelis, M.A., Harris, J.G., Principe, J.C. (2004) Ascertaining the importance of neurons to develop better brain machine interfaces. *IEEE Trans Biomed Eng.*, 51: 943-953.
34. Carmena, J.M., **Lebedev, M.A.**, Crist, R.E., O'Doherty, J.E., Santucci, D.M., Dimitrov, D.F., Patil, P.G., Henriquez, C.S., Nicolelis, M.A.L. (2003) Learning to control a brain-machine interface for reaching and grasping by primates. *PLoS Biology*, 1: 193-208.
35. **Lebedev, M.A.**, Wise, S.P. (2002) Insights into seeing and grasping: distinguishing the neural correlates of perception and action. *Behavioral and Cognitive Neuroscience Reviews*, 1: 108-129.
36. Erchova, I., **Lebedev, M.A.**, Diamond, M.E. (2002) Somatosensory cortical neuronal population activity across states of anesthesia. *Eur. J. Neurosci.*, 15: 744-752.
37. **Lebedev, M.A.**, Wise, S.P. (2001) Tuning for the orientation of spatial attention in dorsal premotor cortex. *Eur. J. Neurosci.*, 13: 1002-1008.
38. **Lebedev, M.A.**, Douglass, D.K., Moody, S.L., Wise, S.P. (2001) Prefrontal cortex neurons reflecting reports of a visual illusion. *J. Neurophysiol.*, 85: 1395-1411.
39. Nelson, R.J., **Lebedev, M.A.** (2001) Deciphering the code - dynamic modulation of neural activity during tactile behavior - chapter 10. In: Nelson R.J. (Ed.) *Somatosensory System: Deciphering the Brain's Own Body Image*, CRC Press.
40. Panzeri, S., Petersen, R.S., Schultz, S.R., **Lebedev, M.A.**, Diamond, M.E. (2001) The role of spike timing in the coding of stimulus location in rat somatosensory cortex. *Neuron*, 29: 769-777.

41. Panzeri, S., Petersen, R.S., Schultz, S.R., **Lebedev, M.A.**, Diamond, M.E. (2001) Coding of stimulus location by spike timing in rat somatosensory cortex. *Neurocomputing*, 44: 573-578.
42. Mitz, A.R., Boring, S.A., Wise, S.P., **Lebedev, M.A.** (2001) A novel food-delivery device for neurophysiological and neuropsychological studies in monkeys. *J. Neurosci. Methods*, 109: 129-135.
43. **Lebedev, M.A.**, Mirabella, G., Erchova, I., Diamond, M.E. (2000) Experience-dependent plasticity of rat barrel cortex: redistribution of activity across barrel-columns. *Cerebral Cortex*, 10: 23-31.
44. **Lebedev, M.A.**, Wise, S.P. (2000) Oscillations in the premotor cortex: single-unit activity from awake, behaving monkeys. *Exp. Brain Res.*, 130: 195-215.
45. **Lebedev, M.A.**, Nelson, R.J. (1999) Rhythmically firing neostriatal neurons in monkeys: activity patterns during reaction-time hand movements. *J. Neurophysiol.*, 82: 1832-1842.
46. Mirabella, G., **Lebedev, M.A.**, Diamond, M.E. (1999) Integration and storage of sensory events in adult rat barrel cortex. In: M. Kossut (Ed.) *Plasticity of Adult Rat Barrel Cortex*, F.P. Graham, Johnson City, TN: 97-126.
47. **Lebedev, M.A.**, Nelson, R.J. (1996) High-frequency vibratory sensitive neurons in monkey primary somatosensory cortex: entrained and non-entrained responses to vibration during the performance of vibratory-cued hand movements. *Exp. Brain Res.* 111: 313-325.
48. **Lebedev, M.A.**, Nelson, R.J. (1995) Rhythmically firing (20-50 Hz) neurons in monkey primary somatosensory cortex: activity patterns during initiation of vibratory-cued hand movements. *J. Comput. Neurosci.* 2: 313-334.
49. **Lebedev, M.A.**, Denton, J.M., Nelson, R.J. (1994) Vibration-entrained and premovement activity in monkey primary somatosensory cortex. *J. Neurophysiol.* 72: 1654-1673.
50. **Lebedev, M.A.** (1993) Further observations on ischemic suppression of motor units in human soleus muscle. A single case study. *J. Electromyography and Kinesiology* 3: 183-186.
51. Gurfinkel, V.S., **Lebedev, M.A.**, Levick, Yu.S. (1992) What about the so-called neck reflexes in humans? In: A. Bertoz, W. Graf, P. P. Vidal (Eds) *The Head-Neck Sensory Motor System*, New York, Oxford, Oxford University Press: 543-547.
52. Gurfinkel, V.S., **Lebedev, M.A.**, Levik, Yu.S. (1992) Effects of reversal in the human equilibrium regulation system. *Neirofiziologiya (Kiev)* 24: 462-470. Translation into English: *Neurophysiology* 24: 297-304.
53. Gurfinkel, V.S., **Lebedev, M.A.**, Levik, Yu.S. (1992) The sensory effects caused by neck afferentation. *Sensory Systems* 6: 83-87.
54. **Lebedev, M.A.**, Polyakov, A.V. (1992) Analysis of surface EMG of human soleus muscle subjected to vibration. *J. Electromyography and Kinesiology* 2: 26-35.
55. Gurfinkel, V.S., Levick, Yu.S. **Lebedev, M.A.** (1991) Body scheme concept and motor control. Body scheme in the postural automatism regulation. In: *Intellectual Processes and Their Modelling*, Moscow, Nauka: 24-53.
56. **Lebedev, M.A.** (1991) Impairment of human soleus motor units during ischemia. *J. Electromyography and Kinesiology* 1: 244-249.
57. **Lebedev, M.A.**, Polyakov, A.V. (1991) Analysis of the interference electromyogram of the human soleus muscle under vibrational stimulation. *Neirofiziologiya (Kiev)* 23: 57-65. Translation into English: *Neurophysiology* 23: 47-54.
58. **Lebedev, M.A.**, Polyakov, A.V. (1990) The analysis of surface EMG of human soleus muscle during vibration. In: *Systems of Information Transmission and Processing*. Institute for the Problems of Information Transmission, USSR Acad. Sci, Moscow: 34-38.
59. Gurfinkel, V.S., Levik, Yu.S., **Lebedev, M.A.** (1989) Immediate and remote postactivation effects in the human motor system. *Neirofiziologiya (Kiev)* 21: 343-351. Translation into English: *Neurophysiology* 21: 247-253.

60. Gurfinkel, V.S., Levik, Yu.S., **Lebedev, M.A.** (1989) The postural automatism revealed by the enhancement of tonic background. Postural automatisms revealed by tonic background activation. *Doklady Akademii Nauk SSSR* 305:1266-1269.
61. **Lebedev M.A.**, Polyakov A.V. (1989) Switched vibratory activation of muscle. 1. Spectral analysis of surface EMG. In: *Systems of Information Transmission and Processing*. Institute for the Problems of Information Transmission USSR Acad. Sci, Moscow: 54-58.
62. Polyakov, A.V., **Lebedev, M.A.** (1989) Switched vibratory activation of muscle. 2. Motor unit firing. In: *Systems of Information Transmission and Processing*. Institute for the Problems of Information Transmission, USSR Acad. Sci, Moscow: 59-61.
63. **Lebedev, M.A.** (1988) Domination of peripheral visual field in human vertical posture control. In: *Systems of Information Transmission and Processing. Part 1*. Institute for the Problems of Information Transmission, USSR Acad. Sci, Moscow: 61-63.
64. **Lebedev, M.A.** (1988) Research methods of basic postural control mechanisms. In: *Systems of Information Transmission and Processing. Part 2*. Institute for the Problems of Information Transmission, USSR Acad. Sci, Moscow: 64-67.