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Education

Ph.D., Computational Biology & Bioinformatics, George Mason University, expected graduation 2007

M.S., Biomedical Engineering, University of Virginia, 2000. Thesis: *Relationship Between Torque and EMG*

B.S., Electrical Engineering, University of Virginia, 1999

Employment History

2005-present: Biotechnology Group Leader, The MITRE Corporation, McLean, VA

2002-2005: Senior Signal Processing Engineer, The MITRE Corporation, McLean, VA

2000-2002: Signal Processing Engineer, The MITRE Corporation, McLean, VA

1999-2000: Research Assistant, Kluge Children's Research Center, Charlottesville, VA

1996-1999: Teaching Assistant, The University of Virginia, Charlottesville, VA

Professional Experience

Emerging Technologies Office, The MITRE Corporation, McLean, VA

Biotechnology Group Leader: Responsibilities include: participating in the council responsible for determining the strategic direction of biotechnology at MITRE; providing subject matter expertise to various intelligence committees; coordinating efforts to bring in new work (both internal and external); participating on international systems biology study group; leading Department of Defense Bioinformatics working group; aiding efforts to design and build the MITRE biotechnology lab; and identifying, interviewing, and hiring additional group members.

Biological & Chemical Agent Signature Extraction: The project is focused on extracting signatures for various pathogenic agents from experimental data, gathered in collaboration with Edgewood Chemical and Biological Command; the signatures are then used to quickly diagnose exposure to various agents. Responsibilities include: proposed and received funding for this project; identified project team; leading technical work; and briefing project progress internally and externally.

Biocomputational Modeling: The project goal is to develop a computational model, using both qualitative and quantitative methods, of pathways implicated in cellular apoptosis. The computational model is verified by experimental data collected in collaboration with Walter

Reed Army Institute of Research (WRAIR). Responsibilities include: played a lead role in proposing and receiving funding; performed early technical work; identified staff with required technical abilities; coordinating technical and experimental work.

DARPA BioComputation Program: The project focuses on (1) developing a comprehensive computational biology suite of software tools, and (2) developing a bioinformatics community. Responsibilities include: coordinating efforts across the program performers; developing and demonstrating software demonstrations; selecting and mentoring support staff; organizing and setting up project meetings; and briefing the project to internal management and external potential sponsors.

Complex Adaptive Systems: The goal of this project was to analyze a complex adaptive system used in battle modeling for the Marines to see if it could be evaluated and controlled, and the results applied to actual battle situations. Responsibilities included: developing a chaos analysis toolbox which allows the user to choose a timeseries from the system, then use multiple analysis tools to understand what is happening in the system. The tools available include the more traditional ones, such as timeseries analysis, Takens' embedding, power spectrum analysis, Poincare sections, critical dimensions and Lyapunov exponents. Also included were some more unconventional tools including Sinai-Ruelle-Bowen measures, Volterra-based nonlinearity tests, and fractal and wavelet analyses. All of these chaos analysis tools allow the user to more fully understand and control the complex adaptive system used in battle modeling.

Neural Networks: The focus of this project was to find low power neural networks which could replace the current components in a radio system. The replaceable components were identified and the advantages and disadvantages of replacing these parts with equivalent neural network parts was discussed. Two of the components which would provide the most obvious advances, A/D converters and equalizers, were further investigated, and the performance and power requirements were summarized in a report. Finally, several neural network equalizers were simulated in Matlab in order to test and compare their performance to more conventional equalizers.

Gait Analysis Lab, Kluge Children's Research Center, Charlottesville, VA

The purpose of this research was to gain an understanding of the torque-EMG relationship in several muscle groups in both spastic and non-spastic children. Experiments were developed and run to determine the torque-EMG relationship in the quadriceps and hamstrings; the results were analyzed and presented. Research was also done in conjunction with several peripheral studies, including back and knee stability studies.

Selected Publications

Brodzik, A.K., Dileo, J., Jensenius, A., Kim, T., and **Peters, O.** Cyclosarin Exposure Detection Via Microarray Data Analysis, in Proc. IEEE Workshop on Genomic Signal Processing and Statistics (GENSIPS), May 2005.

Brodzik, A.K., and **Peters, O.** Symbol-balanced quaternionic periodicity transform for latent pattern detection in DNA sequences, in Proc. IEEE International Conference on Accoustics, Speech, and Signal Processing (ICASSP '05), March 2005.

Peters, O. Designing Defenses Against Biological and Chemical Attacks, MITRE's *The Edge*, April 2005.

Peters, O. *Microarray Data Analysis Benchmark Study*, Technical Report, December 2003.

Tate, O. *Complex Adaptive Systems Toolbox Handbook: Non-Traditional Tools*, Technical Report, December 2003.

Feidler, J. and **Tate, O.** "Biotechnology: Implications and Opportunities for Test and Evaluation," *ITEA Journal of Test and Evaluation* 24(3): 31-38. October 2003.

Tate, O., and Damiano D. "Torque-EMG relationships in normal and spastic muscles," *Electromyogr Clin Neurophysiol.* 42(6): 347-57. September 2002.

Tate, O. *Complex Adaptive Systems Toolbox Handbook: Traditional Tools*, Technical Report, January 2002.

Tate, O. and Colella, D. *Artificial Neural Networks in Communications*, Technical Report, September 2001.