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Institute of Measurement Science
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CITIZENSHIP Slovak Republic

SCIENTIFIC RANK Degree IIa (samostatný vedecký pracovník) - awarded 10/02/2006

EDUCATION **Ph.D.**, Computer Science, 2001
Department of Computing and Information Systems,
University of Paisley, Scotland, UK

M.Sc., Mathematics, 1999
Faculty of Mathematics and Physics,
Comenius University, Bratislava, Slovak Republic
- Area of Study: Probability and Mathematical Statistics & Numerical Analysis
and Optimization

M.Sc., Electrical Engineering, 1993
Faculty of Electrical Engineering,
Czech Technical University, Prague, Czech Republic
- Area of Study: Technical Cybernetics

PROFESSIONAL EXPERIENCE **11/2011 - present**
Department of Theoretical Methods
Slovak Academy of Sciences, Bratislava, Slovakia
Institute of Measurement Sciences
Senior Researcher

01/2010 - 03/2011
Section for Artificial Intelligence
Center for Medical Statistics, Informatics, and Intelligent Systems
Medical University of Vienna, Vienna, Austria
Research Associate
Multi-sensor sleep modeling based on contextual data fusion; funded by FWF

10/2007 - 12/2009
Department of Medical Cybernetics and Artificial Intelligence,
Center for Brain Research
Medical University of Vienna, Vienna, Austria
Research Associate
Multi-sensor sleep modeling based on contextual data fusion; funded by FWF

11/2004 - 09/2007

Austrian Research Institute for Artificial Intelligence, Vienna, Austria
Research Associate
Generative probabilistic models for sleep-wakefulness research; funded by the integrated FP6-EU project Sensation

09/2005 - 10/2005

University of Birmingham, Birmingham, UK
School of Computer Science
Research Scholarship
Probabilistic modeling of the sleep process

10/2001 - 11/2004

NASA Ames Research Center, Moffett Field, CA
Computational Sciences Division
Research Associate
Kernel-based learning, complexity measures, cognitive fatigue monitoring, brain computer interfaces using EEG and SSVEP

10/1998 - 10/2001

University of Paisley, Paisley, UK
Department of Computing and Information
Laboratories and tutorial assistant

06/2000 - 08/2000

RIKEN Brain Science Institute, Wako-Shi, Japan
Laboratory for Advanced Brain Signal Processing
Research Scholarship
Complexity measures, kernel-based learning, depth of anaesthesia monitoring

04/1998 - 06/1998

University of Vienna, Vienna, Austria
Department of Medical Cybernetics and Artificial Intelligence
Research Scholarship
Sleep-spindles detection research; part of the BIOMED-2 EU project SIESTA

01/1996 - 09/1998

Slovak Academy of Sciences, Bratislava, Slovakia
Institute of Measurement Sciences
Research Assistant
Theory of artificial neural networks, math. statistics, event related potentials

10/1994 - 12/1995

Institute of Bionics, Bratislava, Slovakia
Laboratory of simulation methods
Research Assistant
Simulation methods and math. statistics in health care, software development

AWARDS	<p>2007: The Peter Fedor Award The Jan Hus Educational Foundation, Bratislava, Slovakia</p> <p>2003: Travel Grant American Mathematical Society, Providence, RI</p> <p>2001: Research Scholarship National Research Council, Washington, DC</p> <p>2000: Research Scholarship RIKEN Brain Science Institute, Wako-Shi, Japan</p> <p>2000: Research Poster Exhibition - award "Highly Commended" University of Paisley, March 22</p> <p>1998: Research Scholarship Action Austria-Slovakia, Bratislava, Slovak Republic</p>
RESEARCH INTERESTS	<p>Multivariate data analysis, latent variable regression and classification methods, kernel-based learning & support vector machines</p> <p>EEG data analysis, event-related potentials, sleep, study of cognitive fatigue, brain-computer interfaces</p> <p>Information theory, complexity measures</p>
EDITORIAL BOARD	<p>Computer Methods and Programs in Biomedicine</p> <p>Advances in Chemoinformatics and Computational Methods Book Series, IGI Global</p>
EVALUATION COMMITTEE	<p>Ph.D., Michal Teplan, IMS SAS, 2006</p>
JOURNAL REFEREEING	<p>BMC Bioinformatics, Biological Psychology, Computational Statistics & Data Analysis, Computer Methods and Programs in Biomedicine, IEEE Transactions on Biomedical Engineering, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Neural Networks, IEEE Transactions on Pattern Analysis and Machine Intelligence, Information Fusion, Information Sciences, Journal of Machine Learning Research, Journal of Multivariate Analysis, Journal of Neural Engineering, Measurement Science Review, Neural Computing & Applications, Neural Networks, Neural Processing Letters, Neurocomputing, NeuroImage, Pattern Analysis & Applications, Physiological Measurement, Signal Image and Video Processing, Signal Processing, Soft Computing</p>
PROGRAM & REVIEWING COMMITTEE	<p>Biotechno (2008), Conference on Learning Theory (2003), European Medical and Biological Engineering Conference (2011), European Conference on Machine Learning (2004), IDEAL (2007,2010), IASTED International Conference on Artificial Intelligence and Applications (2010), International Conference on Machine Learning (2005), International Joint Conference on Neural Networks (2004, 2007), Neural Information Processing Systems (2002, 2004), International Conference on Partial Least Squares (2009), Twenty-first National Conference on Artificial Intelligence (2006), EUSIPCO (2007).</p>
INVITED TALKS	<p>2009, April 15 Center for Brain Research, Medical University of Vienna, Austria <i>Multimodal neuroelectric computer interfaces</i>, invited talk to the USCKI Incognito group</p> <p>2007, December 19 Faculty IV - Institute for Software Engineering and Theoretical Computer Science, TU Berlin, Germany <i>A new way of the sleep-wakefulness process analysis: modeling the process as a continuum</i></p> <p>2007, December 13 Faculty of Natural Sciences, Comenius University, Bratislava, Slovakia</p>

*EEG Analysis of the Selected Brain States: Brain-Computer Interface (BCI),
The Peter Fedor Award Seminar*

2007, April 17

Center for Brain Research, Medical University of Vienna, Austria
Towards a new way of sleep EEG analysis by modeling sleep depth as a continuum

2005, February 24

Subspace, Latent Structure and Feature Selection techniques: Statistical and Optimisation perspectives Workshop, Bohinj, Slovenia
Overview and some aspects of Partial Least Squares

2003, September 10

Department of Electrical Engineering and Computer Science, TU Berlin, Germany
Kernel-based Algorithms for EEG Data Processing: Emphasis on Partial Least Squares

2003, July 27

Redwood Neuroscience Institute, Menlo Park, CA
Signal Processing and Machine-learning Algorithms for Brain-Computer Interfaces (with Leonard J. Trejo)

2003, April 28

Department of Applied Mathematics & Statistics, UC Santa Cruz, CA
Signal Processing and Machine-learning Algorithms for Brain-Computer Interfaces (with Leonard J. Trejo)

2002, November 5

Statistics Department, UC Davis, CA
Kernel Partial Least Squares

2000, August

RIKEN Brain Science Institute, Wako-Shi, Japan
EEG Signal Processing for Depth of Anaesthesia Monitoring

1999, November 2

Department of Computing and Information Systems, University of Paisley, UK
Kernel PCA, Multi-layer SVR and other Kernel Methods

1998, April

Department of Medical Cybernetics and Artificial Intelligence, University of Vienna, Austria
ICA for sleep-spindle detection

Journal Papers

Trejo, L.J., Rosipal, R. & Matthews, B. (2006). Brain-Computer Interfaces for 1-D and 2-D Cursor Control: Designs using Volitional Control of the EEG Spectrum or Steady-State Visual Evoked Potentials. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 14, 225–229.

Rosipal, R. (2003). Kernel Partial Least Squares for Nonlinear Regression and Discrimination. *Neural Network World*, 13, 291–300.

Trejo, L. J., Wheeler, K. R., Jorgensen, C. C., Rosipal, R., Clanton, S. T., Matthews, B., Hibbs, A. D., Matthews, R., & Krupka, M. (2003). Multimodal Neuroelectric Interface Development. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 11, 199–204.

Rosipal, R., & Trejo, L. J. (2001). Kernel Partial Least Squares Regression in Reproducing Kernel Hilbert Space. *Journal of Machine Learning Research*, 2, 97–123.

Rosipal, R., Girolami, M., Trejo, L. J., & Cichocki, A. (2001). Kernel PCA for Feature Extraction and De-Noising in Nonlinear Regression. *Neural Computing & Applications*, 10, 231–243.

Rosipal, R., & Girolami, M. (2001). An Expectation-Maximization Approach to Nonlinear Component Analysis. *Neural Computation*, 13, 505–510.

Rosipal, R., Dorffner, G., & Trenker, E. (1998). Can ICA improve sleep-spindles detection? *Neural Network World*, 8, 539–547.

Rosipal, R., Koska, M., & Farkaš, I. (1998). Prediction of Chaotic Time-Series with a Resource-Allocating RBF Network. *Neural Processing Letters*, 7, 185–197.

Book Chapters

Rosipal R. (2011). Nonlinear Partial Least Squares: An Overview. In *Chemoinformatics and Advanced Machine Learning Perspectives: Complex Computational Methods and Collaborative Techniques*, Lodhi H., Yamanishi Y. (eds.), ACCM, IGI Global, pp. 169–189.

Rosipal, R., & Krämer, N. (2006). Overview and Recent Advances in Partial Least Squares. In *Subspace, Latent Structure and Feature Selection Techniques*, Series: Lecture Notes in Computer Science, Vol. 3940, Saunders C., Grobelnik M., Gunn S., Shawe-Taylor J. (eds.), Springer, pp. 34–51.

De Bie, T., Cristianini, N., & Rosipal, R. (2005). Eigenproblems in Pattern Recognition. In *Handbook of Geometric Computing: Applications in Pattern Recognition, Computer Vision, Neuralcomputing, and Robotics*, Bayro-Corrochano E. (eds.), Springer, pp. 129–170.

Fyfe, C., MacDonald, D., Lai, P. L., Rosipal, R., & Charles, D. (2001). Unsupervised learning using radial kernels. In *Radial Basis Function Networks 1: Recent Developments in Theory and Applications*, Series: Studies in Fuzziness and Soft Computing, Vol. 66, Howlett R. J., Jain L. C., Kacprzyk J. (eds.), Physica-Verlag, pp. 193–218.

Koska, M., Rosipal, R., König, A., & Trejo, L. J. (1997). Estimation of human signal detection performance from event-related potentials using feed-forward neural network model. In *Computer Intensive Methods in Control and Signal Processing: The Curse of Dimensionality*, Warwick K., Karny M. (eds.), Birkhauser, pp. 271–282.

Conference Papers

- Rosipal R., Trejo L. J., & Nunez P. L. (2009). Application of Multi-way EEG Decomposition for Cognitive Workload Monitoring. In *Proceedings of the 6th International Conference on Partial Least Squares and Related Methods*, Vinzi V. E, Tenenhaus M., Guan R. (eds.), Beijing, China, pp. 145–149.
- Rosipal, R., Peters, B., Kecklund, G., Åkerstedt, T., Gruber, G., Woertz, M., Anderer, P., & Dorffner, G. (2007). EEG-based Drivers' Drowsiness Monitoring using a Hierarchical Gaussian Mixture Model. In *Proceedings of 13th International Conference on Human Computer Interaction*, Series: Lecture Notes in Artificial Intelligence, Vol. 4565, Schmorow D. D, Reeves L. M.(eds.): Augmented Cognition, HCII 2007, Beijing, China, pp. 294–303, Springer.
- Trejo, L. J., Knuth, K., Prado, R., Rosipal, R., Kubitz, K., Kochavi R., Matthews, B., & Zhang, Y. (2007). EEG-based Estimation of Mental Fatigue: Convergent Evidence for a Three-State Model. In *Proceedings of 13th International Conference on Human Computer Interaction*, Series: Lecture Notes in Artificial Intelligence, Vol. 4565, Schmorow D. D, Reeves L. M.(eds.): Augmented Cognition, HCII 2007, Beijing, China, pp. 201–21, Springer.
- Trejo, L. J., Kochavi, R., Kubitz, K., Montgomery, L. D., Rosipal, R., & Matthews, B. (2005). EEG-based estimation of cognitive fatigue. In *Proceedings of SPIE Vol. 5797: Biomonitoring for Physiological and Cognitive Performance During Military Operations*, SPIE Defense & Security Symposium, pp. 105–115, Orlando, FL.
- Wallerius, J., Trejo, L. J, Matthews, R., Rosipal, R., & Caldwell, J. A. (2005). Robust feature extraction and classification of EEG spectra for real-time classification of cognitive state. In *Proceedings of 11th International Conference on Human Computer Interaction*, Las Vegas, NV.
- Rosipal, R., Trejo, L. J., Matthews, B., & Wheeler, K. (2003). Nonlinear Kernel-Based Chemometric Tools: a Machine Learning Approach. In *Proceedings of 3rd International Symposium on PLS and Related Methods (PLS'03)*, pp.249–260, Lisbon, Portugal.
- Rosipal, R., Trejo, L. J., & Matthews, B. (2003). Kernel PLS-SVC for Linear and Nonlinear Classification. In *Proceedings of the Twentieth International Conference on Machine Learning (ICML-2003)*, pp. 640–647, Washington DC.
- Rosipal, R., Girolami, M., & Trejo, L. J. (2000). Kernel PCA Feature Extraction of Event-Related Potentials for Human Signal Detection Task. In *Artificial Neural Networks in Medicine and Biology, (Proceedings of the ANNIMAB-1 Conference)*, Series: Perspectives in Neural Computing, pp. 321–326, Springer.
- Barros, A. K., Rosipal, R., Girolami, M., Dorffner, G., & Ohnishi, N. (2000). Extraction of Sleep-Spindles from the Electroencephalogram (EEG). In *Artificial Neural Networks in Medicine and Biology, (Proceedings of the ANNIMAB-1 Conference)*, Series: Perspectives in Neural Computing, pp. 125–130, Springer.
- Rosipal, R., & Girolami, M. (1999). An Adaptive Support Vector Regression Filter: A Signal Detection Application. In *Proceedings of International Conference on Artificial Neural Networks (ICANN)*, vol 2, pp. 603–607, Edinburgh, Scotland, UK.
- Rosipal, R., Koska, M., & Farkaš, I. (1997). Chaotic time-series prediction using resource-allocating RBF networks. In *Proceedings of Conference Measurement '97*, Smolenice, Slovakia.
- Popper, M., Guregová, M., & Rosipal, R. (1995). Discrete event simulation: Hospital department resource identification. In *Advanced simulation of systems, XVIIth International Czech-Poland-Slovak Colloquium-Workshop*, vol 2, pp. 45–51, Zabrehna Morave, Czech Republic.

Posters & Talks

Trejo L.J., Rosipal R., & Nunez P.L. (2010) Advanced Physiological Estimation of Cognitive Status. poster presented at *The 27th Army Science Conference*, Orlando, Florida.

Rosipal R., Lewandowski A., & Dorffner G. (2010). From polysomnography to sleep parameters indexing sleep quality and sleep related physiological and psychometric factors. talk at *The 20th Congress of the European Sleep Research Society (ESRS'10)*, Lisbon, Portugal.
Journal of Sleep Research, 19 (Suppl. 2, O290):86-86, 2010.

Lewandowski A., Rosipal R., & Dorffner G. (2009). Continuous probabilistic modelling of the sleep process. poster presented at *Complex Dynamics in Large-Scale Interacting Brain Systems: Towards Physical Models of Sleep and Consciousness*, MPIPKS, Dresden, Germany.

Rosipal, R., Peters, B., Kecklund, G., Åkerstedt, T., Gruber, G., Woertz, M., Anderer, P., & Dorffner, G. (2007). Probabilistic framework for EEG-based drowsiness and vigilance monitoring. talk at *Monitoring sleep and sleepiness with new sensors within medical and industrial applications (SENSATION 2nd International Conference)*, Crete, Greece, 2007.

Rosipal, R., Neubauer, S., Anderer, P., Gruber, G., Parapatics, S., Woertz, M., & Dorffner, G. (2006). A continuous probabilistic approach to sleep and daytime sleepiness modeling. poster presented at *The 18th Congress of the European Sleep Research Society (ESRS'06)*, P299, Innsbruck, Austria.
Journal of Sleep Research, 15 (Suppl. 1, P299):169-169, 2006.

Woertz, M., Anderer, P., Gruber, G., Parapatics, S., Rosipal, R., Saletu, B., & Dorffner, G. (2006). Agreement of apnea-hypopnea indexes based on visual and automatic detection. poster presented at *The 18th Congress of the European Sleep Research Society (ESRS'06)*, P244, Innsbruck, Austria.
Journal of Sleep Research, 15(Suppl. 1, P244):169-169, 2006.

Dorffner, G. , Rosipal, R., Neubauer, S., Gruber G., & Anderer, P. (2006). Sleep quality in healthy subjects - What can PSG really tell us? talk at *Monitoring Sleep and Sleepiness - from Physiology to New Sensors (SENSATION 1st International Conference)*, Basel, Switzerland.

Rosipal R., Neubauer S., Anderer P., Gruber G., Parapatics S., Woertz M., & Dorffner G. (2006). A hierarchical Gaussian mixture model for continuous high-resolution sleep analysis. talk at *Monitoring Sleep and Sleepiness - from Physiology to New Sensors (SENSATION 1st International Conference)*, Basel, Switzerland.

Woertz, M., Gruber, G., Parapatics, S., Anderer, P., Miazhynskaia, T., Rosipal, R., Saletu, B., & Dorffner, G. (2005). Automatic sleep apnea detection and its application in patients of the siesta database adaptation night effects. poster presented at *The 13th German Sleep Society Annual Meeting, (DGSM'05)*, PO-41, Berlin, Germany.

Woertz M., Gruber G., Parapatics S., Anderer P., Miazhynskaia T., Rosipal R., Saletu B., & Dorffner G. (2005). Automatic sleep apnea detection: analysis of apnea distribution with respect to sleep stages, depending on the severity of sleep apnea. poster presented at *The First Congress of the World Association of Sleep Medicine, (WASM'05)*, P-083, Berlin, Germany.

Trejo, L. J., Matthews, B., & Rosipal, R. (2005). Brain-Computer Interfaces for 1-D and 2-D Cursor Control: Designs using Volitional Control of the EEG Spectrum or Steady-State Visual Evoked Potentials. poster presented at *Brain-Computer Interface Technology. Third International Meeting*, Rensselaerville, NY.

Trejo, L. J., Kochavi, R., Kubitz, K, Montgomery, L. D., Rosipal, R., & Matthews B. (2004). Measures and Models for Estimating and Predicting Cognitive Fatigue.

poster presented at *44th Society for Psychophysiological Research Annual Meeting (SPR'04)*, Santa Fe, NM.

Psychophysiology, 41, S86, Suppl. 1, 2004.

Rosipal, R., & Trejo, L.J. (2004). Kernel PLS Estimation of Single-trial Event-related Potentials. poster presented at *44th Society for Psychophysiological Research Annual Meeting (SPR'04)*, Santa Fe, NM.

Psychophysiology, 41, S94, Suppl. 1, 2004.

Rosipal, R., Trejo, L. J., Wheeler, K., & Tino, P. (2002). Locally Based Kernel PLS Regression De-noising with Application to Event-related Potentials poster presented at *NATO Advanced Study Institute on Learning Theory and Practice (LTP 2002)*, K.U. Leuven, Belgium.

Tino, P., Sun, Y., Nabney, I., Kaban, A., & Rosipal, R. (2002). Principled Semi-Supervised Construction of Visualization Hierarchies. poster presented at *NATO Advanced Study Institute on Learning Theory and Practice (LTP 2002)*, K.U. Leuven, Belgium.

Trejo, L. J., Wheeler, K., Jorgensen, C., Rosipal, R., & Hibbs, A. (2002). Multimodal Neuroelectric Interface Development. poster presented at *The Second International Brain-Computer Interface Workshop*, The Rensselaerville Institute, Albany, NY.

Technical Reports & Theses

Trejo L.J., Rosipal R., & Nunez P.L. (2009). *Advanced Physiological Estimation of Cognitive Status (APECS)* (Final Project Report). U.S. Army Research Office, Research Triangle Park, NC.

Rosipal, R., Trejo, L.J., & Wheeler, K. (2003). *Kernel PLS Smoothing for Non-parametric Regression Curve Fitting: an Application to Event Related Potentials* (Working Paper). NASA Ames Research Center, Moffett Field.

Rosipal, R. (2001). *Kernel-Based Regression and Objective Nonlinear Measures to Assess Brain Functioning* (PhD Thesis). Computing and Information Systems, University of Paisley, Scotland, UK.

Hope, A., & Rosipal, R. (2001). *Measuring Depth of Anesthesia using Electroencephalogram Entropy Rates* (Working Paper). Computing and Information Systems, University of Paisley, Scotland, UK.

Rosipal, R., Girolami, M., & Trejo, L. J. (2001). *On Kernel Principal Component Regression with Covariance Inflation Criterion for Model Selection* (Technical Report). Department of Computing and Information Systems, University of Paisley, Scotland, UK.

Rosipal, R., Trejo, L. J., & Cichocki, A. (2000). *Kernel Principal Component Regression with EM Approach to Nonlinear Principal Components Extraction* (Technical Report). Department of Computing and Information Systems, University of Paisley, Scotland, UK.

Rosipal, R. (1999). *Non-linear time-series analysis* (Master Thesis). Comenius University, Bratislava, Slovakia.

Rosipal, R., & Dorffner, G. (1998). *Independent Component Analysis for sleep-spindles detection using an Extended Infomax Algorithm and Fixed-point Algorithm* (Technical Report). Institute of Measurement Science, Slovak Academy of Sciences, Bratislava, Slovakia.

Rosipal, R. (1993). *Relation analysis in stochastic systems* (Master Thesis). Czech Technical University, Prague, Czech Republic.