

Dr. Markus Loecher

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- WORK EXPERIENCE
- ◇ **Founder/President** of the consulting company DataInsight (2003). Clients include:
 - *Siemens Corporate Research*
 - *Nonlinear Solutions, Inc.*
 - *Siemens Westinghouse Power Corporation*
 - ◇ **Member of Technical Staff**, Siemens Corporate Research Princeton, NJ (1999 – 2003)
 - ◇ **Research Scientist**, Department of Physics, Georgia Institute of Technology, Atlanta, GA (March 1998 – September 1999)
 - ◇ **Postdoctoral Researcher**, Physics Department, The Ohio State University, Columbus, OH (July 1997 – February 1998)
 - ◇ **Research/Teaching Assistant**, Ohio University, Athens, OH (October 1991 – October 1995)
- EDUCATION
- ◇ **Rutgers University**, Piscataway, NJ.
Graduate Statistics course work leading to a Masters (GPA: 4).
 - ◇ **Ohio University**, Athens, OH.
Ph.D. in Physics, 1997 (GPA: 3.95).
 - ◇ **University of Cologne**, Cologne, Germany.
Bachelor in Physics (minor Mathematics), 1990.
- EXPERTISE
- Mathematical Modeling, Data Mining, Machine learning, Complex Networks, Nonlinear Dynamics
- RESEARCH PROJECTS
- ◇ Predictive Modeling
Adapted state-of-the-art models such as decision trees, adaptive regression splines, SVMs and random forests to specific industrial needs
 - ◇ Design of Data Collection
Blocking, Split-Plot Design, Fractional Factorials, Nested Designs
 - ◇ Blind Source Separation
Independent Component Analysis (ICA), Sparse Algorithms, GLM
 - ◇ Data Quality
Investigated effects of data ill conditioning on predictive power of statistical models
 - ◇ Lifetime estimation for X-ray tubes
Development and implementation of a nonlinear regression algorithm in C⁺⁺:
resulting lifetime prediction module is standard part of the Siemens CT software
 - ◇ Failure prediction algorithms
Fusion of traditional statistical survival analysis with anomaly detection algorithms
 - ◇ Signal processing for Siemens–Westinghouse
Responsible for all data mining and signal processing tasks
 - ◇ Proactive Detection of Software Aging and Intrusion
Adapted autoassociative networks to novel framework

Dr. Markus Loecher

- SKILLS ◇ C, C++, Matlab, Splus/R, SAS, Mathematica, Unix & C, BUGS
 ◇ Fluent spoken/written English and German
- RECENT
TALKS *Hierarchical Propagation of epidemics in scale-free networks*,
 APS March Meeting, Baltimore, 2006.
 Statistics of Complex Networks,
 Statistical Mechanics Meeting, Rutgers University, December 2005.
 Probabilistic models of cumulative damage,
 Maintenance And Reliability CONFERENCE (MARCON 03), Knoxville, TN, May 5, 2003.
 Cumulative effect regression,
 invited talk, Southwest Conference on Industrial and Interdisciplinary Mathematics, Col-
 orado State University, Fort Collins, CO, March 1, 2003.
 Noise Sustained Patterns,
 invited talk, APS Centennial Meeting, Atlanta, GA, March 24, 1999.
- PATENTS *Markov transition probabilities for predictive maintenance*,
 M. Loecher, US patent P 9074.
 Neural network-based virtual age estimation for remaining lifetime prediction,
 C. Darken and M. Loecher, US patent 00 P 9072.
 Polynomial based virtual age estimations for remaining lifetime prediction,
 M. Loecher and C. Darken, US patent 00 P 9073.
 A generic, computer-based approach to the estimation of asset lifetimes,
 C. Darken, W. Hasling, M. Loecher, and A. Mueller, US patent P24463us01.
 Controlled Stochastic Resonance Circuit, US Patent 6, 285, 249 B1 Sept 4, 2001.
- BOOKS *Noise Sustained Patterns: Fluctuations and Nonlinearities*,
 M. Loecher, World Scientific Lecture Notes in Physics, World Scientific (2003).
 Experimental Control of Chaos in Electronic Circuits,
 G. A. Johnson, M. Löcher and E. R. Hunt, in "Control of Chaos: From Theory to Applica-
 tion", ed. by H. G. Schuster, VCH (1998).
- CONFERENCE
POCEEDINGS *Concurrent estimation of time-to-failure and effective wear*,
 M. Loecher and C. Darken, Maintenance And Reliability CONFERENCE (MARCON 03),
 Knoxville, TN, May 4-7, 2003.
 Noise Sustained Kink Propagation in Pseudo-Excitable Systems,
 M. Löcher, D. Cigna and E. R. Hunt, Proceedings of the International Conference on Non-
 linear Dynamics: Integrability and Chaos, Bharathidasan University, Tiruchirapalli, India,
 February 1998.
 Control of a system with two unstable manifolds,
 M. Löcher, D. Cigna and E. R. Hunt, Proceedings of the 4th Experimental Chaos Conference,
 Florida Atlantic University, August 1997.
- REFEREED
ARTICLES *Failure Prediction Based on Wear Estimation*,
 C. Darken and M. Loecher, submitted to IEEE Transactions on Reliability (2006).
 Theory of controlling stochastic resonance,
 Markus Löcher, Mario Inchiosa, Joseph Neff, Adi Bulsara, K. Wiesenfeld, Luca Gammaitoni,
 Peter Hänggi, and William Ditto, Phys. Rev. E **62**, 317 (2000).
 Noise sustained propagation: Local versus global noise,
 M. Löcher, N. Chatterjee, F. Marchesoni, W. L. Ditto, E. R. Hunt, Phys. Rev. E **61**, 4954
 (2000).

Controlling Stochastic Resonance,

Luca Gammaitoni, Markus Löcher, Adi Bulsara, Peter Hänggi, Joseph Neff, Kurt Wiesenfeld and William Ditto, Phys. Rev. Lett. **82**, 4574 (1999).

Noise enhanced propagation,

J. F. Lindner, S. Chandramouli, A.R. Bulsara, M. Löcher, and W. L. Ditto, Phys. Rev. Lett. **81**, 5048 (1998).

Stochastic Resonance in coupled nonlinear dynamic elements,

M. Löcher, D. Cigna, E. R. Hunt, G. A. Johnson, F. Marchesoni, L. Gammaitoni, A. R. Bulsara and M. E. Inchiosa, CHAOS **8**, 604 (1998).

Noise sustained propagation of a signal in coupled bistable electronic elements,

M. Löcher, D. Cigna and E. R. Hunt, Phys. Rev. Lett. **80**, 5212 (1998).

Control of high-dimensional chaos in systems with symmetry,

M. Löcher and E. R. Hunt, Phys. Rev. Lett. **79**, 63 (1997).

Stability Analysis of Fixed Points via Chaos Control,

M. Löcher, G. A. Johnson and E. R. Hunt, CHAOS **7** (4), 590 (1997).

Stabilizing Spatiotemporal Patterns in a Convectively Unstable Open Flow System Via Kink-Antikink Pairs,

M. Löcher, G. A. Johnson and E. R. Hunt, "Chaos, Solitons and Fractals", **8**, 1523 (1997).

Spatiotemporal Stochastic Resonance in a System of Coupled Diode Resonators,

M. Löcher, G. A. Johnson and E. R. Hunt, Phys. Rev. Lett. **77**, 4698 (1996).

Parametric feedback resonance in chaotic systems,

H. G. Schuster, E. Niebur, E.R. Hunt, G. A. Johnson, M. Löcher, Phys. Rev. Lett. **76**, 400 (1996).

Stable states and kink dynamics in a system of coupled diode resonators,

G. A. Johnson, M. Löcher, E. R. Hunt, Physica D **96**, 367-437 (1996).

Stabilized spatiotemporal waves in convectively unstable open flow systems,

G. A. Johnson, M. Löcher, E. R. Hunt, Phys. Rev. E **51**, R1625-1628 (1995).

REFERENCES

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