

# Bert de Vries

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## Principal Interests

Signal processing, machine learning, computational neuroscience, data science, biomedical engineering, research management, technical writing; applications to multimedia processing, medical devices, hearing rehabilitation and clinical trial design/analysis.

## Academic Background

- 1999**      **Ph.D. Electrical Engineering, University of Florida**, Gainesville, FL
- Ph.D. research in signal processing under direction of Professor Jose C. Principe.  
Dissertation title: *Temporal processing with neural networks—the development of the gamma model*.
- 1986**      **M.Sc. Electrical Engineering, Eindhoven University of Technology**, Eindhoven, the Netherlands
- Focus areas: medical engineering (thesis: intelligent alarms during anaesthesia) and digital communications.

## Employment History

- 2012-pres.**      **Professor, Eindhoven University of Technology, Signal Processing Systems Group** (EE dept.), Eindhoven, the Netherlands
- 1 day/week appointment; previous engagement: Research Fellow ('04-'11)
  - Research on *Personalization of Medical Signal Processing Systems*
  - Teach graduate class on **Adaptive Information Processing**
  - Inaugural lecture: *In Situ Personalization of Signal Processing Systems* (at [youtube](#)), Sep. 2013
- 1999-pres.**      **Principal Scientist, GN ReSound** (Philips Hearing Technologies until 2001), Eindhoven, the Netherlands
- Other engagements include: DSP Functional Leader ('11-pres.), Head DSP Research ('08-'11), Manager External Research ('01-'08), Technology Leader ('99-'01, Philips)

- Research PI on low-power signal processing technology for the next generation of digital hearing aids
- Leadership/management tasks include(d) all aspects of team and project management (teams of about 10 engineers); (responsible for) the corporate DSP research track, including the roadmap, budget and management; initiating and managing key studies at academic institutions and contract research organizations

**1992-'99**

**Member Technical Staff, Sarnoff Corporation** (today **SRI Int'l**), Princeton, NJ

- Previous engagement: Postdoctoral fellow ('92-'93)
- Research in advanced signal processing algorithms, initiating new technical and commercial thrusts, technical proposal writing and project management
- Principal investigator of funded projects on keyword spotting, digital hearing aids signal processing, speech enhancement and noise-robust speech recognition (co-PI)
- Co-initiated and developed signal processing in financial markets program at Sarnoff
- Member medical image processing research team. Funded projects include blind signal processing for breast mammography and perceptually optimized image coding

**1987-'91**

**Research/Teaching Assistant, University of Florida**, Gainesville, FL

- Taught and assisted in graduate classes in digital signal processing, control theory and computer architecture.

## Special Achievements

### Awards

- *Return-on-Performance Award*, for “technical work on Speech Enhancement technology”, Sarnoff Corporation, 1998
- *David Sarnoff Achievement Award*, for “leadership and technical contributions in the area of adaptive speech enhancement”, Sarnoff Corporation, 1997
- *David Sarnoff Event Focus Award* for “Winning Sarnoff’s First Commercial Contract for Speech Processing”, David Sarnoff Research Center, 1996
- *Presidential Recognition Award*, University of Florida, 1988
- *δ-Butterweck Award* (awards top GPA), Technical University Eindhoven, 1984

### Invited Lectures (selection)

- University College London (UCL), “A Factor Graph Approach to Active Inference”, Nov. 2016
- Keynote lecture on “The Future of Hearing Aid personalization”, Cochlear/ReSound Event, Sep.2016
- WIC Mid-winter meeting on ‘Big Data and Data Analytics’, “Design of Signal Processing Algorithms through Probabilistic Inference”, Eindhoven, February 2016
- **CQM**, “In Situ Machine Learning for Signal Processing Systems”, Eindhoven, August 2015
- Radboud University Nijmegen, “Probabilistic Hearing Loss Compensation”, Nijmegen, March 2015
- INCAS3 Institute, “In Situ Personalization of Signal Processing Systems”, Assen, October 2014

- Leiden University Medical Center, New Year's keynote lecture on "Personalization of Medical Signal Processing Systems", Leiden, January 2014
- Int'l Symposium on Auditory and Audiological Research (ISAAR), "Is Hearing Aid Signal Processing ready for Machine Learning?", Nyborg (DK), August 2013
- Clinical Physicist Post-graduate school, "The Future of Hearing Aids", Amersfoort January 2013
- Delft Univ. of Technology, "Machine Learning for Hearing Aids Technology", Delft March 2012
- International Forum for Hearing Instrument Developers, "Bayesian Machine Learning for Hearing Aid Design, Fitting and Personalization", Oldenburg (Germany), June 2011
- University of Florida, "Machine Learning Trends in the Hearing Aids Industry", Gainesville, FL, April 2010
- SIKS Research School, "Gaussian mixture models and the EM Algorithm", Vught, NL, Dec 2008
- GN Nordic Audiology College, "Learning technology in hearing aids", Oslo, Norway, Sep 29, 2006
- University of Nijmegen, "Machine learning for hearing aids", Nijmegen, Netherlands, June 2004
- University of Florida, "DSP for modern industrial hearing aids", Gainesville, FL, January 2004
- International Forum for Hearing Aid Developers, "Warped-frequency filterbanks", Oldenburg, Germany, July 2003
- Keynote address "An industrial perspective on intelligent hearing aids" at 2nd McMaster-Gennum Workshop on Intelligent Hearing Instruments, Niagara-on-the-Lake, ON, Sep 2001
- NIDCA/NASA/VA Hearing Aids Improvement Conference, May 1997
- Lucent Technologies, Bell Laboratories, November 1996
- AT&T Research, Murray Hill, NJ, July 1996
- NSA (U.S. Government), June 1993
- Neural Network Workshop, Rutgers University, October 1992
- David Sarnoff Research Center, October 1991

### Professional Activities (selection)

- 2012 - pres., **Associate Editor** for **IEEE Transactions on Neural Systems and Rehabilitation Engineering**
- 2012 - 2015, Invited member annual European Mathworks Advisory Board meetings
- 2010, Invited jury member for Open Technology Program (OTP) research proposals to Dutch Technology Foundation (STW)
- 11/2005 and 5/2006, Invited DSP expert on IWT (Flemish Institute for Science and Technology) panel to evaluate candidate PhD proposals, Brussels
- 5/2002, Organizer/chair special session 'DSP for Intelligent Hearing Aids', ICASSP 2002, Orlando, FL
- 1997-'98, Publicity chair, Neural Networks for Signal Processing Workshop, Amelia island, Florida (1997) and Cambridge, UK (1998)
- 1996 and 1998, Session chair Non-linear Systems Identification, ICASSP-96, Atlanta, GA (1996) and IEEE NNSP-98 Workshop, Cambridge, UK (1998)
- 1995-'98, (Elected) member of "IEEE Technical Committee on Neural Networks for Signal Processing Society"
- 1993, Invited researcher in government sponsored "Robust Speech Processing Workshop"
- 1986 - pres., Member of various professional societies (e.g. IEEE, INNS)

### Refereed Publications

IEEE Transactions on Signal Processing, IEEE Transactions on Neural Networks, NeuroComput-

ing Journal, Neural Networks Journal, EURASIP Journal of Applied Signal Processing, Advances in Neural Information Processing Systems (NIPS) Conferences, ICASSP Conferences and others

## Activities at Eindhoven Univ. of Technology (TU/e)

### Research Funding

Research at TU/e focusses on applications of Bayesian machine learning to personalization of hearing aid algorithms.

- 2017 - 2021, together with dr. **Sander Stuijk** and prof. **Henk Corporaal**, ~**550K euro** supporting 3 PhD students, from **STW** to pursue research on **Autonomous Acoustic Systems** in the context of **energy-autonomous systems for IoT**.
- 2015 - 2019, together with dr. **Tjalling Tjalkens**, ~**500K euro** supporting 2 PhD students, from Dutch Technology Foundation **STW** to pursue research on **Data-driven Hearing Aids**.
- 2014 - 2018, ~**500K euro** supporting 2 PhD students at TU/e, from GN ReSound to support research on hearing aids personalization.
- 2006 - 2008, ~**130K euro** from GN ReSound to support 2 PDEng students at TU/e.
- 2006 - 2010, together with **Tom Heskes** and **Wouter Dreschler**, ~**650K euro** grant from **STW** to pursue further research on **Personalization of Hearing Aids through Bayesian Preference Elicitation**.

### Teaching

- **2005 - pres.**, **Adaptive Information Processing**. Together with **dr.ir. Tjalling Tjalkens**, since spring 2005 I teach a core graduate class on the fundamentals of machine learning.
- **2011 - pres.**, guest lecturer for EE course **Development of (Electro)-technology** at TU/e
- 2004, Machine Learning. I organized a machine learning class (at GN ReSound premises) for TU/e graduate students and GN ReSound staff.

### Student Supervision

1. 6/2016, Wouter van Roosmalen, M.Sc. thesis project, *In-situ Design of Noise Reduction Algorithms*
2. 6/2016, Anouk van Diepen, M.Sc. internship, *Derivation and Implementation of Gaussssian Mixture Model in a Forney-style Factor Graph*
3. 10/2015, Pradeep Kumar, M.Sc. practical training project, *On Discrete-Valued Message Passing in Factor Graphs*
4. 10/2014, Rene Duijkers, M.Sc. thesis project, *A Factor Graph Approach to Hearing Loss Compensation*
5. 10/2014, Max Schoonderbeek, M.Sc. thesis project, *A Factor Graph Approach to Gaussian Process Preference Learning*
6. 6/2014, Art Senders, M.Sc. practical training project, *A Julia Toolbox for Forney-style Factor Graphs*
7. 4/2014, Robert Leenders, B.Sc. final project, *Gaussian Process based Preference Learning as a Classification Problem*
8. 1/2014, Rene Duijkers, M.Sc. practical training project, **Online Bayesian Spectral Tracking**
9. 12/2013, Brian Hutama Susilo, M.Sc. practical training project, *Automated Tuning Algorithm for Low-latency PC-based Audio Processing*

10. 8/2013, Zijian Xu, M.Sc. thesis project, *Fast Design of Audio Processing Algorithms by Interactive Parameter Exploration*
11. 8/2013, Timur Bagautdinov, M.Sc. thesis project, *A Machine Learning Framework for Bayesian Signal Processing*
12. 6/2013 Marno van der Maas, B.Sc. research project, *Browser-based Remote Control of Hearing Aids*
13. 12/2012 Timur Bagautdinov, traineeship project, *A MATLAB/C++ toolbox for Factor Graph Modeling*
14. 6/2012, Maarten Thomassen, M.Sc. practical training project, *Spectral Audio Monitoring*
15. 4/2012, Joris Kraak, M.Sc.-thesis, *Computer-Aided Algorithm Design for Audio Processing*
16. 10/2010, Joris Kraak, M.Sc. practical training project, *Optimization of a Spectral Noise Tracking Algorithm*
17. 8/2010, Jianfeng Li, M.Sc.-thesis, *Acoustic scene-adaptive speech enhancement*
18. 8/2009, Jianfeng Li, M.Sc.-project, *Spatial defect clustering on semiconductor wafers using image processing techniques*
19. 9/2008, Xueru Zhang, P.D.Eng.-thesis, *Bayesian periodogram smoothing for speech enhancement*
20. 6/2008, Rene Besseling, M.Sc.-project, *Gaussian processes in Bekesy audiometry*
21. 8/2007, Serkan Ozer, M.Sc.-thesis, *Bayesian linear regression for user-adaptive hearing aids*
22. 6/2007, Ronnie van Loon, M.Sc.-thesis, *a Probabilistic Approach to Sound Classification*
23. 9/2006, Anton Vakrushev, P.D.Eng.-thesis, *Interactive machine learning for Personalization of hearing aid algorithms*
24. 10/2005, Jorik Caljouw, M.Sc. practical training on *PDA-based Interfacing to a real-time audio platform*
25. 10/2005, Paul Aelen, M.Sc. project, *Determination of the Intra-Uterine Pressure with electrodes on the abdomen*
26. 6/2005, Job Geurts, M.Sc. practical training on *A PC-based real-time simulation platform for evaluating hearing aid algorithms*

### Member of Ph.D. Committee

1. 01/2017, Math Verstraelen, Ph.D., The WaveCore - A Scalable Architecture for Real-time Audio Processing, University of Twente.
2. 12/2016, Amir Jalalirad, Ph.D., Supervised Learning through Feature-based Models, TU Eindhoven
3. 6/2015, Yuan Zeng, Ph.D., Distributed Speech Enhancement in Wireless Acoustic Sensor Networks, TU Delft
4. 12/2013, Ingeborg Brons, Ph.D., Perceptual evaluation of noise reduction in hearing aids, University of Amsterdam
5. 9/2013, Jelte Vink, Ph.D., Machine Learning for Efficient Object Recognition, TU Eindhoven
6. 10/2011, Adriana Birlutiu, Ph.D., Machine Learning for Pairwise Data, University of Nijmegen

### Publications

- Publications with more than 50 citations at January 2016 are indicated by **[#citations]**. See also my [google scholar page](#).

## Journal Articles and Book Chapters

1. Thijs van de Laar and Bert de Vries, **A Probabilistic Modeling Approach to Hearing Loss Compensation**, *IEEE Tr. on Audio, Speech and Language Processing*, Nov. 2016
2. Rik Vullings et al., An Adaptive Kalman Filter for ECG Signal Enhancement, *IEEE Transactions on Biomedical Engineering*, vol.58, no.4, April 2011 **[58]**
3. A. Ypma et al., **On-line Personalization of Hearing Instruments**, *EURASIP Journal on Audio, Speech, and Music Processing*, September 2008
4. Tjeerd Dijkstra et al., **The Learning Hearing Aid: Common-Sense Reasoning in Hearing Aid Circuits**, *The Hearing Review*, issue October 2007
5. David Zhao et al., On-line Noise Estimation Using Stochastic-Gain HMM for Speech Enhancement, *IEEE Transactions on Audio, Speech and Language Processing*, vol.16, no.4, May 2008
6. Jose Principe et al., Locally Recurrent Networks: The Gamma Operator, Properties and Extensions, invited book chapter in *Neural Networks and Pattern Recognition*, Omidvar and Dayhoff (eds.), Academic Press, 1997
7. Bert de Vries, Short term memory structures for dynamic neural networks, book chapter in: *Artificial Neural Networks for Speech and Vision*, Richard Mammone (ed.), Chapman & Hall Ltd., 1994
8. Bert de Vries and Jose Principe, The gamma model—A new neural network for temporal processing, *Neural Networks* vol. 5(4), pp. 565-576, 1992 **[240]**
9. Jose Principe and Bert de Vries, The gamma filter—A new class of adaptive IIR filters with restricted feedback, *IEEE transactions on signal processing* vol. 41(2), pp. 649-656, 1992 **[142]**
10. Bert de Vries, **Temporal processing with neural networks-the development of the Gamma model**, *Ph.D. dissertation*, University of Florida, 1991
11. Joachim Gravenstein et al., Sampling intervals for clinical monitoring of variables during anesthesia, *Journal of clinical monitoring* vol 5(1), 1989
12. Jan J. van der Aa, Bert de Vries and Joachim Gravenstein, Toward more sophisticated monitoring alarms, *Journal of clinical monitoring* 4 (2), 1986

## Patents

1. Almer van den Berg and Bert de Vries, Sound signal modelling based on recorded object sound, filed by GN ReSound, EP16206941.3, Dec. 2016
2. Bert de Vries and Joris Kraak, Automated Scanning for Hearing Aid Parameters, filed by GN ReSound, July 2016
3. Fredrik Gran et al., Performance-based In Situ Optimization of Hearing Aids, filed by GN ReSound, with the Danish Patent and Trademark Office, PA 2015-70379, June 2015
4. Bert de Vries and Erik van der Werf, A Multi-band Signal Processor for Digital Audio Signals, filed by GN ReSound with European Patent and Office, Feb. 2014
5. Andrew Dittberner et al., A Location Learning Hearing Aid, filed by GN ReSound with European Patent and Office, App. 13197214.3-1901, December 2013
6. Bert de Vries and Mojtaba Farmani, A Hearing Aid with Probabilistic Hearing Loss Compensation, filed by GN ReSound with US Patent and Trademark Office, App. number 14077031, Nov. 2013
7. Bert de Vries et al., Efficient evaluation of hearing ability, submitted by GNR Ref.: P1669 EP, Albihns Ref.: P13304 US / P13303, April 2009
8. Alexander Ypma et al., Asymmetric synchronization of hearing aid algorithms, submitted by GN ReSound, patent no. 09174982.0-2225, filed 4-Nov-2009



9. Alexander Ypma et al., Learning control of hearing aid parameter settings, submitted by GN ReSound, filed 16-Mar-2007
10. Bert de Vries and Alexander Ypma, Optimization of Hearing Aid Parameters, filed by GN ReSound, patent no. WO/2007/042043, 10/13/06
11. Bert de Vries, Bastiaan Kleijn, Alexander Ypma and David Zhao, Method and Apparatus for Improved Estimation of Non-stationary Noise for Speech Enhancement, filed by GN ReSound, patent no. 06119399.1-224, 08/23/06
12. Bert de Vries and Rob de Vries, Fitting methodology and hearing prosthesis based on signal-to-noise ratio loss data, USA patent registered for GN ReSound, no. 20040047474, 03/11/2004
13. L. Parra and B. de Vries, Method and apparatus for adaptive speech detection by applying a probabilistic description to the classification and tracking of signal components, patent registered for Sarnoff Corporation, LG Electronics, Inc., no. 6691087, 10-Feb. 2004
14. Bert de Vries, Noise Spectrum Tracking for Speech Enhancement, patent registered for Sarnoff Corporation, no. US6289309, 9/11/2001 **[71]**
15. J. Lubin et al., Method and apparatus for training a neural network to learn and use fidelity metric as a control mechanism, patent registered for Sarnoff Corporation, no. US6075884, 6/13/2000
16. Bert de Vries, Method and apparatus for filtering signals using a gamma delay line based estimation of power spectrum, patent registered for Sarnoff Corporation, no. US6073152, 6/6/2000
17. M. Brill, J. Lubin, B. de Vries, O. Finard, Method and apparatus for assessing the visibility of differences between two image sequences, patent registered for Sarnoff Corporation, no. US5974159, 10/26/1999 **[76]**
18. Bert de Vries, Method and system for training a neural network with adaptive weight updating and adaptive pruning in principal components space, patent registered for David Sarnoff Research Center, no. 5,812,992, 9/22/98
19. Bert de Vries and Jose Principe, An adaptive filter based on a recursive delay line, patent registered for University of Florida, no. 5,301,135, April 1994

## Professional Interviews

1. **Introducing Data Science: Hearing Aids on the Brink of a Paradigm Shift.** Interview in **Audiology Info Magazine**, Dec 2014

## Conferences and Workshops

1. Mojtaba Farmani and Bert de Vries, A Probabilistic Approach To Hearing Loss Compensation, *IEEE Machine Learning for Signal Processing workshop (MLSP)*, Reims, FR, Sep 2014
2. Bert de Vries et al., Efficient Hearing Aid Spectral Signal Processing with an Asynchronous Warped Filterbank, *Int'l Hearing Aid Research Conference (IHCON)*, Lake Tahoe, CA, August 2014
3. Bert de Vries and Andrew Dittberner, Is Hearing Aid Signal Processing Ready for Machine Learning? *Int'l Symposium on Auditory and Audiological Research*, Nyborg, DK, Aug. 2013
4. Ungureanu C. et al., A Bayesian Network for Detection of Seizures, *1st Jan Beneken Conference on Modeling and Simulation of Human Physiology*, Eindhoven, NL, 2013
5. Petkov P. et al., Discrete Choice Models for Non-Intrusive Quality Assessment, *Interspeech 2011*, Florence, Italy, 2011
6. Rob de Vries et al., A software suite for automatic beamforming calibration, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2010

7. S.I. Mossavat et al., A Bayesian hierarchical mixture of experts approach to estimate speech quality, *QoMEX 2010*, Trondheim, Norway, June 2010
8. Jos Leenen and Bert de Vries, Current DSP and Machine Learning Trends in the Hearing Aids Industry, *IEEE Benelux Signal Processing Symposium: Signal Processing for Digital Hearing Aids*, Delft, NL, April 2010
9. Xueru Zhang et al., Bayesian periodogram smoothing for speech enhancement, *European Symposium on Artificial Neural Networks (ESANN-09)*, Bruges, April 2009
10. Adriana Birlutiu et al., Towards hearing aid personalization: preference elicitation from audiological data, *Scientific ICT-Research Event Netherlands (SIREN)*, Amsterdam, Sep. 2008
11. Tjeerd Dijkstra et al., HearClip: an Application of Bayesian Machine Learning to Personalization of Hearing Aids, Presentation at *Dutch Society for Audiology Meeting*, Sep. 2008
12. Bert de Vries, Fast Model-Based Fitting through Active Data Selection, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2008
13. Rolph Houben et al., Construction of a virtual subject response database to reduce subject testing, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2008
14. Bert de Vries et al., The Complexity of Hearing Aid Fitting, presented at *International Symposium on Auditory and Audiological Research 2007*, Helsingor, Denmark, August 2007
15. Jos Leenen et al., Learning Volume Control for Hearing Aids, presented at *International Symposium on Auditory and Audiological Research 2007*, Helsingor, Denmark, August 2007
16. Alexander Ypma et al., Bayesian Feature Selection for Hearing Aid Personalization, *MLSP-07*, Thessaloniki, Greece, 2007
17. Adriana Birlutiu et al., Personalization of Hearing Aids through Bayesian Preference Elicitation, *NIPS workshop on User Adaptive Systems*, Whistler, BC, Canada, December 2006
18. Bert de Vries et al., Bayesian Machine Learning for Personalization of Hearing Aid Algorithms, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2006
19. Alexander Ypma, Bert de Vries and Job Geurts, Robust Volume Control Personalization from On-line Preference Feedback, *IEEE Int. Workshop on Machine Learning for Signal Processing*, Maynooth, Ireland, 2006
20. Bert de Vries, Tom M. Heskes and Tjeerd M. H. Dijkstra, Bayesian Incremental Utility Elicitation with Application to Hearing Aids Personalization, *Valencia/ISBA 8th World Meeting on Bayesian Statistics*, Benidorm, Spain, June 2006
21. Tjeerd M. H. Dijkstra et al., A Bayesian decision-theoretic framework for psychophysics, *Valencia/ISBA 8th World Meeting on Bayesian Statistics*, Benidorm, Spain, June 2006
22. Alexander Ypma, Bert de Vries and Job Geurts, A learning volume control that is robust to user inconsistency, *The second annual IEEE BENELUX/DSP Valley Signal Processing Symposium*, Antwerp, March 2006
23. Paul Aelen et al., Electrohysterographic Estimation of the Intra-Uterine Pressure, *The second annual IEEE BENELUX/DSP Valley Signal Processing Symposium*, Antwerp, March 2006
24. Tom Heskes and Bert de Vries, Incremental Utility Elicitation for Adaptive Personalization, *The 17th Belgian-Dutch Conference on Artificial Intelligence*, Brussels, Belgium, October 2005
25. Bert de Vries and Rob de Vries, An Integrated Approach to Hearing Aid Algorithm Design, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2004
26. Harald Pobloth et al., Speech Coding for Wireless Communication in the Hearing Aid Environment, *Int'l Hearing Aid Research Conference*, Lake Tahoe, CA, August 2004
27. Bert de Vries and Rob de Vries, An Integrated Approach to Hearing Aid Algorithm Design for Enhancement of Audibility, Intelligibility and Comfort, *IEEE Benelux Signal Processing Symposium*, Hilvarenbeek, Netherlands, April 2004



28. Rob de Vries and Bert de Vries, Toward SNR-Loss Restoration in Digital Hearing Aids, *ICASSP 2002*, Orlando, FL, May 2002
29. Bert de Vries, Jos Leenen, A Low Power Digital AGC Circuit for Dynamic Range Control of an A/D Converter, *International Hearing Aids Research (IHCON) Conference 2000*, Lake Tahoe (CA), August 2000
30. Lucas Parra, Clay Spence and Bert de Vries, Convolutional Blind Source Separation based on Multiple Decorrelation, *IEEE workshop on Neural Networks for Signal Processing VIII*, pp.23-32, Cambridge, UK, 1998 [93]
31. Bert de Vries, Blind Signal Processing for Hearing Aids, *NIH Hearing Aids Improvement Conference*, Bethesda, MA, May 1997
32. Bert de Vries, Adaptive Gamma Filters for Miniature Hearing Aids, *NIH Hearing Aids Improvement Conference*, Bethesda, MA, May 1997
33. Bert de Vries, Adaptive rank filtering based on error minimization, *ICASSP-97*, Munich, April 1997
34. Lucas Parra, Clay Spence, Bert De Vries, Convolutional Source Separation and Signal Modeling with Maximum Likelihood, *International Symposium on Intelligent Systems (ISIS'97)*, Reggio Calabria, Italy, 1997
35. Q. Lin et al., Robust distant-talking speech recognition, *ICASSP-96*, Atlanta, GA, May 1996
36. Bert de Vries et al., Neural network speech enhancement for noise robust speech recognition, *International Workshop on Applications of Neural Networks to Telecommunications*, Sweden, May 1995
37. Lin et al., Experiments on distant-talking speech recognition, *ARPA Workshop on Spoken Language Technology*, Austin, TX, January 1995
38. Qiguang Lin et al., System of microphone arrays and neural networks for robust speech recognition in multimedia environments, *Proceedings International Conference on Spoken Language Processing*, Yokohama, Japan, September 1994
39. Bert de Vries, Gradient-based adaptation of network structure, *International Conference on Artificial Neural Networks 94*, Sorrento, Italy, May 94
40. Che et al., Microphone Arrays and Neural Networks for Robust Speech Recognition, *ARPA Workshop on Human Language Technology*, Princeton, NJ, March 1994
41. Bert de Vries et al., An application of Gamma delay lines to "BDG" phoneme classification, *Government Microcircuit Applications Conference proceedings*, New Orleans, LA, November 1993
42. Bert de Vries, Time-varying neural networks for large tasks, *International Conference on Artificial Neural Networks proceedings*, Amsterdam, the Netherlands, September 13-16, 1993
43. J.C. Principe et al., Backpropagation through time with fixed memory size requirements, *Proceedings of Workshop on Neural Networks for Signal Processing*, Linthicum Heights, MD, USA, Sep. 1993
44. Bert de Vries et al., Learning with target trajectory constraints for sequence classification tasks, *ICASSP-93*, Minneapolis, MN, April 1993
45. Bert de Vries et al., Short Term Memory Structures for Dynamic Neural Networks, *Asilomar-92 Conference proceedings*, Pacific Grove, CA, 1992
46. T. Oliveira a Silva et al., Generalized feedforward filters with complex poles, *Proceedings of the 1992 IEEE workshop on Neural Networks for Signal Processing*, Copenhagen, Denmark, 1992
47. Jyh-Ming Kuo, Jose Principe and Bert de Vries, Prediction of chaotic time series using recurrent networks, *Proc. of the 1992 IEEE workshop on Neural Networks for Signal Processing*, 1992
48. Jose Principe, Bert de Vries and Pedro G. de Oliveira, Generalized feedforward structures: a new class of adaptive filters, *ICASSP-92*, San Francisco, vol. IV, pp. 245-248, 1992
49. T. Oliveira e Silva, P. Guedes de Oliveira, J. C. Principe and B. de Vries, A Complex Pole Ex-

tension to the Gamma Filter, *The INESC Journal of Research and Development*, vol. 3, no. 1, pp. 35-41, Jan./Jun. 1992

50. Bert de Vries et al., Adaline with adaptive recursive memory, *Proceedings IEEE workshop on signal processing*, Princeton, NJ, 1991
51. Principe et al., Modeling applications with the focused gamma net, *NIPS-4 proceedings*, Denver, CO, 1992
52. Bert de Vries et al., Some practical issues concerning the gamma neural net, *Proceedings IJCNN-91*, Seattle, WA, 1991
53. Bert de Vries and Jose Principe, A theory for neural nets with time delays, *NIPS-3 Proceedings*, Denver, 1991 **[63]**
54. Bert de Vries et al., Neural net models for temporal processing, *Proceedings ninth southern biom. eng. conference*, Miami, FL, 1991
55. Bert de Vries et al., A new neural net model for temporal processing, *12th ann. int. conf. IEEE on the eng. in medicine and biology society*, Philadelphia, PA, 1990
56. Bert de Vries et al., Artificial neural networks as a computational paradigm for detection of anaesthetic complications, *Computers in Anesthesia 10*, New Orleans, LA, 1989
57. Bert de Vries et al., Distribution of anesthesia related occurrences during surgical operations, *Anesthesiology review* 14 (6), 1987