

Curriculum Vitae

Heikki Hyötyniemi

Born in Kemi, Finland, March 4, 1963

Parents Hannu and Maija (born Murtomäki)

Wife Sanna (born Kaarakainen), 1965 – 2000†

Second marriage with Riikka (born Korhonen) only lasted from 2008 to 2010

Children Sofia (1995 – 1996†), Elias (1996 –), and Matias (1998 –)

Education

- Matriculation Examination, 1982, Tervolan lukio
- Master of Science in Engineering, 1989, Helsinki University of Technology, Department of Electrical Engineering (Thesis: *A Universal Relation based Query Language: Implementation and Evaluation*, in Finnish)
- Doctor of Technology, 1995, Helsinki University of Technology, Department of Information Science (Thesis: *Self-Organizing Artificial Neural Networks in Dynamic Systems Modeling and Control*)

Career

- *SITRA, Kielikone project*
Researcher, 1987 – 1988
- *Control CAD Oy*
Consultant, several periods
- *Academy of Finland*
Junior and senior research fellow, several periods
- *Helsinki University of Technology*
 - Junior and senior assistant, researcher, several periods during the years 1989 – 2000
 - Docent, 1997 –
 - Acting professor, 2000 – 2001

- Professor, 2001 – 2006
- Part-time professor, 2006 – 2009
Leader of the *Cybernetics Group* at Control Engineering Lab
- Retirement due to multiple sclerosis 2009

Hobbies

Glass works

Mindboggling adventures with the kids!

Publications in English

1. Jäppinen, H., Honkela, T., Hyötyniemi, H., and Lehtola A.: *Hierarchical Multilevel Processing Model for Natural Language Database Interface*. The 4th Conf. Artificial Intelligence Applications CAIA'88, San Diego, California, March 14–18, 1988. The Computer Society of the IEEE, pp. 332–337.
2. Lehtola, A., Honkela, T., Hyötyniemi, H., and Jäppinen, H.: *Task Oriented Knowledge Representation Languages for NLP-Systems*. Third International Symposium on Methodologies for Intelligent Systems (ISMIS'88), Torino, Italy, 1988, pp. 250–259.
3. Lehtola, A., Honkela, T., Hyötyniemi, H., and Jäppinen, H.: *Knowledge Languages and Metatools for Natural Language Processing*. IEEE International Computer Science Conference ICSC'88, Hong Kong, December 19–22, 1988. IEEE Computer Society, IEEE Hongkong Section, pp. 273–280.
4. Jäppinen, H., Honkela, T., Hyötyniemi, H., and Lehtola, A.: *A Multilevel Natural Language Processing Model*. **Nordic Journal of Linguistics**, Vol. 11, 1988, pp. 69–87.
5. Hyötyniemi, H. and Lehtola, A.: *UQL—The Universal Relation Query Language*. STeP-88, Helsinki, August 15–18, 1988, Vol. 2, pp. 803–810.
6. Jäppinen, H., Honkela, T., Hyötyniemi, H., and Lehtola, A.: *Stratified Natural Language Database Interface for Finnish*. STeP-88, Helsinki, August 15–18, 1988, Vol. 2, pp. 793–802.
7. Hyötyniemi, H. and Lehtola, A.: *A Metatool for Implementing Task-Oriented Formalisms*. Proceedings of the IEEE International Workshop on Tools for Artificial Intelligence (TAI'89), Fairfax, Virginia, October 23–25, 1989, pp. 182–188.
8. Hyötyniemi, H.: *A Proposition for the Refinement of Motion Trajectories*. Nordisk Doktorgradsforskning innen Robotteknikk, Trondheim, Norway, November 23–24, 1989.
9. Hyötyniemi, H.: *Locally Controlled Optimization of Spray Painting Robot Trajectories*. Proceedings of the IEEE International Workshop on Intelligent Motion Control (IMCON'90), Istanbul, Turkey, August 20–22, 1990, pp. 283–287.
10. Hyötyniemi, H.: *Minor Moves—Global Results: Robot Trajectory Planning*. Proceedings of the Second International IEEE Conference on Tools for Artificial Intelligence (TAI'90), Fairfax, Virginia, November 6–9, 1990, pp. 16–22.
11. Hyötyniemi, H. and Marttinen, A.: *Towards Integrating AI and CAD in Control Systems Design*. Nordic CACE Symposium, Copenhagen, Denmark, November 15–16, 1990, pp. 1.5–1.10.
12. Hyötyniemi, H. and Lehtola, A.: *A Universal Relation Database Interface for Knowledge Based Systems*. Proceedings of the Second International Symposium on Database Systems for Advanced Applications (DASFAA'91), Tokyo, Japan, April 3–5, 1991, pp. 84–88.
13. Hyötyniemi, H.: *Postponing Chaos Using a Robust Stabilizer*. IFAC Symposium on Design Methods for Control Systems, Zurich, Switzerland, September 4–6, 1991, pp. 568–572 (Preprints), 359–363 (Proceedings).
14. Hyötyniemi, H.: *Tools for Coupling Expert Systems on Control Engineering Software*. Presented during the Second International Workshop on Computer Aided Systems Theory (EUROCAST'91), Krems, Austria, April 15–19, 1991. In "Lecture Notes in Computer Science 585" (eds. Pichler, F. and Moreno Díaz, R.), Springer-Verlag, Berlin, 1992, pp. 652–667.
15. Hyötyniemi, H.: *Coupling Expert Systems on Control Engineering Software*. Presented during the Sixth International Conference on Applications of Artificial Intelligence in Engineering (AIENG'91), Oxford, UK, July 2–4, 1991. In "Applications of Artificial Intelligence in Engineering VI" (eds. Rzevski, G. and Adey, R. A.), Computational Mechanics Publications, Southampton, UK, 1991, pp. 653–663.
16. Hyötyniemi, H.: *Computer-Aided Education of Control Engineers*. International Workshop on Computer Aided Education in Automation and Control Technology (CAE in ACT), Prague, Czechoslovakia, May 20–22, 1992.
17. Hyötyniemi, H.: *CoreWars: A Testbench for Artificial Life?* STeP-92, Espoo, June 9–11, 1992, Vol. 1, pp. 262–270.
18. Hyötyniemi, H.: *Symbolic Calculation in Computer Aided Modeling*. Presented during the Joint Finnish-Russian Symposium on Computer-Aided Control Engineering, Espoo, Finland, October 13–15, 1992 (in print).
19. Hyötyniemi, H. and Virkkunen, J.: *Applying Computers in Dynamic System Courses*. International Workshop on "Automation and Control Technology Education 2001", Vienna, Austria, January 23–25, 1993.
20. Hyötyniemi, H.: *Automating the Modeling of Dynamic Systems*. Presented during the Third International Workshop on Computer Aided Systems Theory (EUROCAST'93), Las Palmas, Spain, February 22–27, 1993. In "Lecture Notes in Computer Science 763" (eds. Pichler, F. and Moreno Díaz, R.), Springer-Verlag, Berlin, 1994, pp. 160–178.

21. Hyötyniemi, H.: *Optimal Control of Dynamic Systems Using Self-Organizing Maps*. Proceedings of International Conference on Artificial Neural Networks (ICANN'93), Amsterdam, The Netherlands, September 13–16, 1993, pp. 850–853.
22. Hyötyniemi, H.: *Self-Organizing Networks for Dynamic Systems*. Helsinki University of Technology, Control Engineering Laboratory, Report 94, November 1993, 17 p.
23. Hyötyniemi, H.: *Information Content Weighting of Algorithms*. Preprints of the 10th IFAC Symposium on System Identification (SYSID'94), Copenhagen, Denmark, July 4–6, 1994, Vol. 3, pp. 417–422.
24. Hyötyniemi, H. and Ylinen, R.: *Improving Robustness of Parameter Estimation*. Proceedings of the First Asian Control Conference (ASCC'94), Tokyo, Japan, July 27–30, 1994, Vol. 1, pp. 415–418.
25. Hyötyniemi, H.: *Towards Portability of Knowledge in Control Systems Design*. Proceedings of the First Asian Control Conference (ASCC'94), Tokyo, Japan, July 27–30, 1994, Vol. 3, pp. 721–724.
26. Hyötyniemi, H.: *Hypertechniques in Control Engineering Design*. Preprints of the IFAC Symposium on Advances in Control Education (ACE'94), Tokyo, Japan, August 1–2, 1994, pp. 185–188.
27. Hyötyniemi, H.: *Self-Organizing Artificial Neural Networks in Dynamic Systems Modeling and Control*. Helsinki University of Technology, Control Engineering Laboratory, Report 97, November 1994, 136 p. *Doctoral Thesis*
28. Hyötyniemi, H.: *Causal Relations, Correlations, and Self-Organization*. In Keinoelämä — Artificial Life (eds. Hyvönen, E. and Seppänen, J.), Publications of the Finnish Artificial Intelligence Society, Helsinki, 1995, pp. 142–150. Presented during the symposium on Artificial Life, Helsinki, May 12, 1995. (Finnish abstract also in In *Arpakannus* 1, 1995, pp. 8–12.)
29. Hyötyniemi, H.: *'Mode Maps' in Process Modeling*. Proceedings of the Conference on Engineering Applications of Neural Networks (EANN'95), August 21–23, 1995, Helsinki, Finland, pp. 147–154.
30. Hyötyniemi, H.: *Correlations — Building Blocks of Intelligence?* In “Älyn ulottuvuudet ja oppihistoria” (History and Dimensions of Intelligence), Finnish Artificial Intelligence Society, 1995, pp. 199–226.
31. Hyötyniemi, H.: *Constructing Non-Orthogonal Feature bases*. Proceedings of the International Conference on Neural Networks (ICNN'96), June 3–6, 1996, Washington DC, pp. 1759–1764.
32. Hyötyniemi, H.: *Regularization of Parameter Estimation*. The 13th IFAC World Congress, July 1–5, 1996, San Francisco, California.
33. Hyötyniemi, H.: *Turing Machines are Recurrent Neural Networks*. STeP'96 (Finnish Artificial Intelligence Conference), Vaasa, Finland, August 20–23, 1996, pp. 13–24.
34. Hyötyniemi, H.: *Structural Optimization of Feedforward Networks*. Finnish Artificial Intelligence Conference STeP'96, Vaasa, Finland, August 20–23, 1996, pp. 25–34.
35. Hyötyniemi, H.: *Text Document Classification with Self-Organizing Maps*. STeP'96 (Finnish Artificial Intelligence Conference), Vaasa, Finland, August 20–23, 1996, pp. 64–72.
36. Hyötyniemi, H. and Koivo, H.: *Genes, Codes, and Dynamic Systems*. Proceedings of 2NWGA (2nd Nordic Workshop on Genetic Algorithms), Vaasa, Finland, August 20–23, 1996, pp. 225–232.
37. Hyötyniemi, H.: *Supplement to 'Self-Organizing Artificial Neural Networks in Dynamic Systems Modeling and Control'*. Helsinki University of Technology, Control Engineering Laboratory, Report 105, December 1996.
38. Hyötyniemi, H.: *State-Space Modeling Using Self-Organizing Maps*. Proceedings of the European Symposium on Artificial Neural Networks (ESANN'97), Bruges, Belgium, April 16–18, 1997, pp. 187–192.
39. Hyötyniemi, H.: *Minimum Description Length (MDL) Principle and Self-Organizing Maps*. Proceedings of the Workshop on Self-Organizing Maps (WSOM'97), Espoo, Finland, June 4–6, 1997, pp. 124–129.
40. Hyötyniemi, H. and Ylöstalo, T.: *'Mode Maps' in Process Control*. Proceedings of the Conference on Engineering Applications of Neural Networks (EANN'97), Stockholm, Sweden, June 16–18, 1997, pp. 99–102.
41. Hyötyniemi, H.: *Automatic Structuring of Unknown Dynamic Systems*. In “Soft Computing in Engineering Design and Manufacturing” (eds. Chawdry, P.K., Roy, R., and Pant, R.K.), Springer-Verlag, London, 1998. Presented during the Second On-Line Conference on Soft Computing WSC2, June 23–27, 1997.
42. Hyötyniemi, H. and Koivo, H. (eds.): *Multimedia Applications in Industrial Automation*. Helsinki University of Technology, Control Engineering Laboratory, Report 103, June 1997. The chapters *Introduction* (pp. 7–11) and *Modeling of High-Dimensional Data* (pp. 115–138) therein also written by H. Hyötyniemi.
43. Hyötyniemi, H.: *On Unsolvability of Nonlinear System Stability*. Proceedings of the European Control Conference (ECC'97), Brussels, Belgium, July 1–5, 1997 (CD-ROM format).

44. Hyötyniemi, H.: *On Structural Identifiability of Dynamic Models*. Preprints of the IFAC Symposium on System Identification (SYSID'97), Fukuoka, Japan, July 8–11, 1997, Vol. 1, pp. 243–248.
45. Hyötyniemi, H. and Ylöstalo, T.: *Modeling and Control of a pH process Using a Self-Organizing Map*. Preprints of the IFAC Symposium on System Identification (SYSID'97), Fukuoka, Japan, July 8–11, 1997, Vol. 2, pp. 559–564.
46. Hyötyniemi, H.: *On the Statistical Nature of Complex Data*. Presented at the Scandinavian Conference on Artificial Intelligence (SCAI'97), Helsinki, Finland, August 18–20, 1997. In “SCAI'97 — Sixth Scandinavian Conference on Artificial Intelligence: Research Announcements” (ed. Grahne, G.), Helsinki University, Department of Computer Science, Report C-1997-49, Helsinki, Finland, pp. 13–27.
47. Hyötyniemi, H., Nissinen, A., and Koivo, H.: *Evolution Based Self-Organization of Structures in Linear Time-Series Modeling*. Proceedings of the Third Nordic Workshop on Genetic Algorithms and their Applications (3NWGA), Helsinki, Finland, August 18–20, 1997, Chapter 11, pp. 135–152.
48. Nissinen, A., Hyötyniemi, H., and Koivo, H.: *Multimedia and Networked Computing Environment in Teaching of Control Engineering*. International Symposium on Issues and Challenges of Manufacturing Education for the 21st Century, Patras, Greece, June 26–28, 1997.
49. Hyötyniemi, H., Marttinen, A., Hirvola, E., Penttinen, K., and Vanne, M.: *Java Language in an Automation System*. Automation Days '97, Helsinki, September 23–25, 1997 (CD-ROM format).
50. Ylöstalo, T., Hyötyniemi, H., and Jutila, P.: *Comparison of adaptive control methods in the control of a pH process*. Automation Days '97, Helsinki, September 23–25, 1997 (CD-ROM format).
51. Niemi, A.J., Ylinen, R., and Hyötyniemi, H.: *On Characterization of Pulp and Froth in Cells of Flotation Plant*. **International Journal of Mineral Processing**, Vol. 51, 1997, pp. 51–65.
52. Hyötyniemi, H. and Saariluoma, P.: *Simulating Chess Players' Recall: How Many Chunks and What Kind Can They Be?* Proceedings of the Second European Conference on Cognitive Modelling ECCM'98 (eds. Ritter, F.E. and Young, R.M.), Nottingham University Press, Nottingham, UK, April 1–4, 1998, pp. 195–196.
53. Hyötyniemi, H. and Nissinen, A.: *New Simulation Tools: Towards Mastering the Explosion of Information*. Proceedings of the EUROSIM'98 Simulation Congress (ed. Juslin, K.), Espoo, Finland, April 14–15, 1998, Vol. 1, pp. 103–110.
54. Ylöstalo, T. and Hyötyniemi, H.: *Maps of Process Dynamics*. Proceedings of the EUROSIM'98 Simulation Congress (ed. Juslin, K.), Espoo, Finland, April 14–15, 1998, Vol. 2, pp. 225–229.
55. Nissinen, A. and Hyötyniemi, H.: *Evolutionary training of behavior-based self-organizing map*. IEEE International Conference on Evolutionary Computation (ICEC'98), Anchorage, Alaska, May 4–9, 1998.
56. Nissinen, A. and Hyötyniemi, H., and Koivo, H.: *Evolutionary SOM for generation of classifier maps*. Advanced Summer Institute (ASI'98), June 14–17, 1998, Bremen, Germany.
57. Hyötyniemi, H. and Ylinen, R.: *Modeling of Visual Froth Data*. Proceedings of the IFAC Symposium on Automation in Mining, Mineral and Metal Processing (MMM'98) (ed. Heidepriem, J.), International Federation of Automatic Control / Elsevier Science, New York, 1998, pp. 309–314. Reprinted also in **Control Engineering Practice**, Vol. 8, 2000, pp. 313–318.
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59. Nissinen, A.S. and Hyötyniemi, H.: *Evolutionary Self-Organizing Map*. Proceedings of the European Congress on Intelligent Techniques and Soft Computing (EUFIT'98), September 7–10, 1998, Aachen, Germany.
60. Hyötyniemi, H.: *Structure from Data: AI Approaches to Systems Modeling*. Proceedings of the 8th Finnish Artificial Intelligence Conference STeP'98 (eds. Koikkalainen, P. and Puuronen, S.), Publications of Finnish Artificial Intelligence Society (FAIS), Helsinki, 1998, pp. 31–40.
61. Hyötyniemi, H.: *On Mental Images and “Computational Semantics”*. Proceedings of the 8th Finnish Artificial Intelligence Conference STeP'98 (eds. Koikkalainen, P. and Puuronen, S.), Publications of Finnish Artificial Intelligence Society (FAIS), Helsinki, 1998, pp. 199–208.
62. Hyötyniemi, H.: *Semantic Feature Extraction: Reader-Specific Text Document Classification*. Proceedings of the 8th Finnish Artificial Intelligence Conference STeP'98 (eds. Koikkalainen, P. and Puuronen, S.), Publications of Finnish Artificial Intelligence Society (FAIS), Helsinki, 1998, pp. 55–60.
63. Hyötyniemi, H.: *Mental Imagery: Unified Framework for Associative Representations*. Helsinki University of Technology, Control Engineering Laboratory, Report 111, August 1998.

64. Hyötyniemi, H. and Koivo, H. (eds.): *Multivariate Statistical Methods in Systems Engineering*. Helsinki University of Technology, Control Engineering Laboratory, Report 112, December 1998. The chapters “Introduction” (pp. 7–12), “Statistical analysis — frontier research?” (pp. 13–39), and “Summary: On linear multivariate methods” (pp. 165–193) therein also written by H. Hyötyniemi.
65. Nissinen, A.S., Hyötyniemi, H., and Koivo, H.: *Classification of Radiation Spectra Using Map of Linear Classifiers*. In “Computational Intelligence for Modelling, Control & Automation: Evolutionary Computation & Fuzzy Logic for Intelligent Control, Knowledge Acquisition & Information Retrieval” (ed. Mohammadian, M.), IOS Press, Amsterdam, 1999, pp. 128–133.
66. Hyötyniemi, H.: *Artificial Intelligence*. In “Encyclopedia of Electrical and Electronics Engineering” (J.G. Webster, ed.), John Wiley & Sons, 1999. Vol. 1, pp. 666–684.
67. Hyötyniemi, H. and Saariluoma, P.: *Chess — Beyond the Rules*. In “Games, Computers and People”, (Honkela, T., ed.), Finnish Artificial Intelligence Society (FAIS), 1999, pp. 100–112.
68. Hätönen, J., Hyötyniemi, H., Bonifazi, G., Serranti, S., Volpe, F., and Carlsson, L.-E.: *Using PCA in Controller Strategy Design for a Flotation Process*. Proceedings of the 14th IFAC World Congress, July 5–9, Beijing, P.R. China, Vol. N, pp. 385–390.
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71. Hyötyniemi, H.: *From Intelligent Models to Smart Ones*. Proceedings of the Second International Conference on Intelligent Processing and Manufacturing of Materials IPMM’99, July 11–15, 1999, Hawaii, USA, Vol. 1, pp. 179–184.
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73. Hyötyniemi, H.: *From knowledge to “virtual data”*. Arpakannus 1/1999 (guest editor H. Hyötyniemi), pp. 31–34.
74. Ylinen, R., Hasu, V., Hyötyniemi, H., and Sipari P.: *Control of Flotation by Machine Vision*. Proceedings of the Automation Days 1999, Helsinki, Sep. 14.–16.9., 1999, pp. 459–464.
75. Nissinen, A. S. and Hyötyniemi, H.: *Analysis of Evolutionary Self-Organizing Map*. Helsinki University of Technology, Control Engineering Laboratory, Report 115, 1999 (49 p).
76. Hyötyniemi, H.: *GGHA Toolbox for Matlab*. Helsinki University of Technology, Control Engineering Laboratory, Report 117, 1999 (a Matlab toolbox included).
77. Nissinen, A.S., Hyötyniemi, H., and Koivo, H.: *Evolutionary self-organizing model bank*. Proceeding of Contol Systems 2000, May 1–4, 2000.
78. Hyötyniemi, H.: *First-order vs. second-order algorithms: New perspectives*. Proceedings of the IFAC Symposium on System Identification SYSID 2000, Santa Barbara, California, June 21 – 23, 2000 (CD-ROM format).
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80. Hyötyniemi, H., Hasu, V., Hätönen, J., and Ylinen, R.: *“Data Mining” for Mining Data*. Proceedings of the XXI International Mineral Processing Congress, July 23–27, 2000, in Roma, Italy, Vol. A, pp. A3-39–a3-45.
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85. Hyötyniemi, H.: *Explorations in “Naturalistic Formalisms”*. Finnish Artificial Intelligence Days STeP 2000, August 28–30, 2000, Vol. 3, pp. 123–131.

86. Hyötyniemi, H.: *Expertise: An Optimized Data Model?* Finnish Artificial Intelligence Days STeP 2000, August 28–30, 2000, Vol. 2, pp. 95–102.
87. Hyötyniemi, H., Ylinen, R., and Miettunen, J.: *AI in Practice: Case Study at a Flotation Plant.* Finnish Artificial Intelligence Days STeP 2000, August 28–30, 2000, Vol. 2, pp. 159–166.
88. Hyötyniemi, H.: *Systems Theory vs. Theory of Mind: Towards a Synthesis?* Finnish Artificial Intelligence Days STeP 2000, August 28–30, 2000, Vol. 3, pp. 25–34.
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91. Hyötyniemi, H. and Dosa, F.: *Modeling User Preferences: Radio Channel of Your Own.* Nokia NERD Conference, November 2000, Helsinki, Finland.
92. Hyötyniemi, H.: *Control Engineering — The Heavy Machinery of Feedback.* Chapter 3 in “Feedback to the Future” (ed. Heikki Hyötyniemi), Finnish Artificial Intelligence Society (FAIS), Helsinki, 2001, pp. 95–108.
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111. Pöyhönen, S., Negrea, M., Arkkio, A., Hyötyniemi, H., and Koivo, H.: *Fault diagnostics of an electrical machine with multiple support vector classifiers*. IEEE International Symposium on Signal Processing (ISIC'02), 27–30 October, 2002, Vancouver, Canada, pp. 373–378.
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