

# List of Publications

Thomas B. Schön

Division of Automatic Control

Linköping University

581 83 Linköping, Sweden

e-mail: schon@isy.liu.se

April 2012

This list contains papers that are published or accepted for publication.

## Peer Reviewed Journal Papers

- [J14] Adrian Wills, Thomas B. Schön, Lennart Ljung and Brett Ninness. Identification of Hammerstein-Wiener Models. *Automatica*, 2012. (Provisionally accepted for publication)
- [J13] Karl Granström, Thomas B. Schön, Juan I. Nieto, and Fabio T. Ramos. Learning to close loops from range data. *International Journal of Robotics Research*, 30(14): 1728–1754, December 2011.
- [J12] Christian Lundquist and Thomas B. Schön. Joint ego-motion and road geometry estimation. *Information Fusion*, 12(4):253–263, October 2011.
- [J11] Xiao-Li Hu, Thomas B. Schön, and Lennart Ljung. A General Convergence Result for Particle Filtering. *IEEE Transactions on Signal Processing*, 59(7):3424–3429, July 2011.
- [J10] Tianshi Chen, Thomas B. Schön, Henrik Ohlsson and Lennart Ljung. Decentralized Particle Filter with Arbitrary State Decomposition. *IEEE Transactions on Signal Processing*, 59(2):465–478, February 2011.
- [J9] Thomas B. Schön, Adrian Wills and Brett Ninness. System Identification of Nonlinear State-Space Models. *Automatica*, 47(1):39–49, January 2011.
- [J8] Jeroen D. Hol, Thomas B. Schön, and Fredrik Gustafsson. Modeling and Calibration of Inertial and Vision Sensors. *International Journal of Robotics Research (IJRR)*, 29(2):231–244, February 2010.
- [J7] David Törnqvist, Thomas B. Schön, Rickard Karlsson and Fredrik Gustafsson. Particle Filter SLAM with High Dimensional Vehicle Model. *Journal of Intelligent and Robotic Systems*, 55(4–5):249–266, August 2009.
- [J6] Xiao-Li Hu, Thomas B. Schön, and Lennart Ljung. A basic convergence result for particle filtering. *IEEE Transactions on Signal Processing*, 56(4):1337–1348, April 2008.
- [J5] Jeroen Hol, Thomas B. Schön, Henk Luinge, Per Slycke, and Fredrik Gustafsson. Robust real-time tracking by fusing measurements from inertial and vision sensors. *Journal of Real-Time Image Processing*, 2(2):149–160, 2007.
- [J4] J. Chandaria, G. Thomas, B. Bartczak, K. Koeser, R. Koch, M. Becker, G. Bleser, D. Stricker, C. Wohlleber, M. Felsberg, F. Gustafsson, J. Hol, T. B. Schön, J. Skoglund, P. J. Slycke, and S. Smeitz. Real-time camera tracking in the MATRIS project. *SMPTE Motion Imaging Journal*, 116(7–8):266–271, August 2007.
- [J3] Markus Gerdin, Thomas B. Schön, Torkel Glad, Fredrik Gustafsson, and Lennart Ljung. On parameter and state estimation for linear differential-algebraic equations. *Automatica*, 43(3):416–425, March 2007.
- [J2] Rickard Karlsson, Thomas Schön, and Fredrik Gustafsson. Complexity analysis of the marginalized particle filter. *IEEE Transactions on Signal Processing*, 53(11):4408–4411, November 2005.
- [J1] Thomas Schön, Fredrik Gustafsson, and Per-Johan Nordlund. Marginalized particle filters for mixed linear/nonlinear state-space models. *IEEE Transactions on Signal Processing*, 53(7):2279–2289, July 2005.

## Peer Reviewed Book Chapters

- [BC3] Christian Lundquist, Thomas B. Schön and Fredrik Gustafsson (2011). Situational awareness and road prediction for trajectory control applications. In A. Eskandarian, editor, *Handbook of Intelligent Vehicles*. Springer. (Accepted for publication)
- [BC2] Fredrik Gustafsson, Umut Orguner, Thomas B. Schön, Per Skoglar and Rickard Karlsson (2011). Navigation and tracking of road-bound vehicles. In A. Eskandarian, editor, *Handbook of Intelligent Vehicles*. Springer. (Accepted for publication)
- [BC1] Thomas B. Schön, Fredrik Gustafsson, and Rickard Karlsson (2011). The particle filter in practice. In Crisan, D. and Rozovskii, B., editors, *The Oxford Handbook of Nonlinear Filtering*. Oxford University Press.

## Peer Reviewed Conference Papers

- [C58] Manon Kok, Jeroen Hol, Thomas B. Schön, Fredrik Gustafsson and Henk Luinge, Calibration of a magnetometer in combination with inertial sensors. In *Proceedings of the 15th International Conference on Information Fusion*, Singapore, July 2012. (accepted for publication)
- [C57] Tohid Ardeshiri, Umut Orguner, Christian Lundquist, Thomas B. Schön, On Mixture Reduction for Multiple Target Tracking. In *Proceedings of the 15th International Conference on Information Fusion*, Singapore, July 2012. (accepted for publication)
- [C56] Fredrik Lindsten, Thomas B. Schön and Michael I. Jordan, A semiparametric Bayesian approach to Wiener system identification. In *Proceedings of the 16th IFAC Symposium on System Identification (SYSID)*, Brussels, Belgium, July 2012. (accepted for publication)
- [C55] Johan Dahlin, Fredrik Lindsten, Thomas B. Schön and Adrian Wills, Hierarchical Bayesian ARX models for robust inference. In *Proceedings of the 16th IFAC Symposium on System Identification (SYSID)*, Brussels, Belgium, July 2012. (accepted for publication)
- [C54] Fredrik Lindsten, Thomas B. Schön and Lennart Svensson, A non-degenerate Rao-Blackwellised particle filter for estimating static parameters in dynamical models. In *Proceedings of the 16th IFAC Symposium on System Identification (SYSID)*, Brussels, Belgium, July 2012. (accepted for publication)
- [C53] Soren Henriksen, Adrian Wills, Thomas B. Schön and Brett Ninness, Parallel Implementation of Particle MCMC Methods on a GPU. In *Proceedings of the 16th IFAC Symposium on System Identification (SYSID)*, Brussels, Belgium, July 2012. (accepted for publication)
- [C52] Adrian Wills, Thomas B. Schön, Fredrik Lindsten and Brett Ninness, Estimation of Linear Systems using a Gibbs Sampler. In *Proceedings of the 16th IFAC Symposium on System Identification (SYSID)*, Brussels, Belgium, July 2012. (accepted for publication)
- [C51] Fredrik Lindsten and Thomas B. Schön, On the use of backward simulation in the particle Gibbs sampler. In *Proceedings of the 37th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Kyoto, Japan, March 2012.
- [C50] Adrian G. Wills, Thomas B. Schön, Lennart Ljung and Brett Ninness, Blind Identification of Wiener Models. In *Proceedings of the 18th World Congress of the International Federation of Automatic Control (IFAC)*, Milan, Italy, August-September 2011.
- [C49] Fredrik Lindsten, Thomas B. Schön and Jimmy Olsson, An Explicit Variance Reduction Expression for the Rao-Blackwellised Particle Filter. In *Proceedings of the 18th World Congress of the International Federation of Automatic Control (IFAC)*, Milan, Italy, August-September 2011.

- [C48] R. Bhushan Gopaluni, Thomas B. Schön and Adrian G. Wills, Input Design for Nonlinear Stochastic Dynamic Systems - A Particle Filter Approach. In *Proceedings of the 18th World Congress of the International Federation of Automatic Control (IFAC)*, Milan, Italy, August-September 2011.
- [C47] Zoran Sjanic, Martin A. Skoglund, Thomas B. Schön and Fredrik Gustafsson, A Nonlinear least-Squares Approach to the SLAM Problem. In *Proceedings of the 18th World Congress of the International Federation of Automatic Control (IFAC)*, Milan, Italy, August-September 2011.
- [C46] Emil Nilsson, Christian Lundquist, Thomas B. Schön, David Forslund and Jacob Roll, Vehicle Motion Estimation Using an Infrared Camera. In *Proceedings of the 18th World Congress of the International Federation of Automatic Control (IFAC)*, Milan, Italy, August-September 2011.
- [C45] Tohid Ardehshiri, Fredrik Larsson, Fredrik Gustafsson, Thomas B. Schön and Michael Felsberg, Bicycle Tracking Using Ellipse Extraction. In *Proceedings of the 14th International Conference on Information Fusion*, Chicago, IL, USA, July, 2011. **Honorable mention, nominated for the best student paper award.**
- [C44] Fredrik Lindsten and Thomas B. Schön, Identification of Mixed Linear/Nonlinear State-Space Models. In *Proceedings of the 49th IEEE Conference on Decision and Control (CDC)*, Atlanta, USA, December 2010.
- [C43] Brett Ninness, Adrian Wills and Thomas B. Schön, Estimation of General Nonlinear State-Space Systems. In *Proceedings of the 49th IEEE Conference on Decision and Control (CDC)*, Atlanta, USA, December 2010.
- [C42] Adrian Wills, Thomas B. Schön and Brett Ninness, Estimating State-Space Models in Innovations Form using the Expectation Maximisation Algorithm. In *Proceedings of the 49th IEEE Conference on Decision and Control (CDC)*, Atlanta, USA, December 2010.
- [C41] Tianshi Chen, Thomas B. Schön, Henrik Ohlsson and Lennart Ljung, Decentralized Particle Filter with State Partitioning. In *Proceedings of the 49th IEEE Conference on Decision and Control (CDC)*, Atlanta, USA, December 2010.
- [C40] Karl Granström and Thomas B. Schön, Learning to Close the Loop from 3D Point Clouds. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Taipei, Taiwan, October 2010.
- [C39] Jeroen Hol, Thomas B. Schön and Fredrik Gustafsson, Ultra-Wideband Calibration for Indoor Positioning. In *Proceedings of the IEEE International Conference on Ultra-Wideband (ICUWB)*, Nanjing, China, September 2010.
- [C38] Magnus Axholt, Martin Skoglund, Stephen D. Peterson, Matthew D. Cooper, Thomas B. Schön, Fredrik Gustafsson, Anders Ynnerman and Stephen R. Ellis. Optical See-Through Head Mounted Display Direct Linear Transformation Calibration Robustness in the Presence of User Alignment Noise. In *Proceedings of the 54th Annual Meeting of the Human Factors and Ergonomics Society (HFES)*, San Francisco, CA, USA, September 2010.
- [C37] Michael Felsberg, Fredrik Larsson, Wang Han, Anders Ynnerman and Thomas B. Schön, Torchlight Navigation. In *Proceedings of the 20th International Conference on Pattern Recognition (ICPR)*, Istanbul, Turkey, August 2010.
- [C36] Fredrik Lindsten, Jonas Callmer, Henrik Ohlsson, David Törnqvist, Thomas B. Schön, Fredrik Gustafsson, Geo-referencing for UAV Navigation using Environmental Classification. In *Proceedings of the International Conference on Robotics and Automation (ICRA)*, Anchorage, Alaska, USA, May 2010.
- [C35] Carsten Fritsche, Thomas B. Schön and Anja Klein, The Marginalized Auxiliary Particle Filter. In *Proceedings of the Third International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Aruba, Dutch Antilles, December 2009.

- [C34] Robert Henriksson, Mikael Norrlöf, Stig Moberg, Erik Wernholt and Thomas B. Schön, Experimental Comparison of Observers for Tool Position Estimation of Industrial Robots. In *Proceedings of the 48th IEEE Conference on Decision and Control (CDC)*, Shanghai, China, December 2009.
- [C33] Jeroen Hol, Fred Dijkstra, Henk Luinge and Thomas B. Schön, Tightly Coupled UWB/IMU Pose Estimation. In *Proceedings of the IEEE International Conference on Ultra-Wideband (ICUWB)*, Vancouver, Canada, September 2009. **Best Student Paper Award.**
- [C32] Christian Lundquist and Thomas B. Schön, Recursive Identification of Cornering Stiffness Parameters for an Enhanced Single Track Model. In *Proceedings of the 15th IFAC Symposium on System Identification (SYSID)*, Saint-Malo, France, July 2009.
- [C31] Bhushan Gopaluni, Thomas B. Schön and Adrian Wills, Particle Filter Approach to Nonlinear System Identification under Missing Observations with a Real Application. In *Proceedings of the 15th IFAC Symposium on System Identification (SYSID)*, Saint-Malo, France, July 2009.
- [C30] Henrik Tedefelt and Thomas B. Schön, Robust point-mass filters on manifolds. In *Proceedings of the 15th IFAC Symposium on System Identification (SYSID)*, Saint-Malo, France, July 2009.
- [C29] Thomas B. Schön and Jacob Roll, Ego-Motion and Indirect Road Geometry Estimation Using Night Vision. In *Proceedings of the IEEE Intelligent Vehicle Symposium (IV)*, Xi'an, Shaanxi, China, June 2009.
- [C28] Christian Lundquist, Umut Orguner and Thomas B. Schön, Tracking Stationary Extended Objects for Road Mapping using Radar Measurements. In *Proceedings of the IEEE Intelligent Vehicle Symposium (IV)*, Xi'an, Shaanxi, China, June 2009.
- [C27] Christian Lundquist and Thomas B. Schön, Estimation of the Free Space in Front of a Moving Vehicle. In *Proceedings of the SAE 2009 World Congress*, Detroit, MI, USA, April 2009.
- [C26] Umut Orguner, Thomas B. Schön, and Fredrik Gustafsson, Improved Target Tracking with Road Network Information. In *Proceedings 2008 IEEE Aerospace Conference*, Big Sky, MT, USA, March 2009.
- [C25] Jeroen D. Hol, Thomas B. Schön, and Fredrik Gustafsson. A New Algorithm for Calibrating a Combined Camera and IMU Sensor Unit. In *Proceedings of the 10th International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Hanoi, Vietnam, December 2008.
- [C24] David Törnqvist, Thomas B. Schön, and Fredrik Gustafsson. Detecting Spurious Features using Parity Space. In *Proceedings of the 10th International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Hanoi, Vietnam, December 2008.
- [C23] Thomas B. Schön. Fusion of data from different sources. In *Proceedings of the 10th International Symposium on 3D Analysis of Human Movement (3DMA)*, **Invited plenary lecture (the H.J. Woltring lecture)**, Santpoort-Amsterdam, The Netherlands, October 2008.
- [C22] Jeroen D. Hol, Thomas B. Schön, and Fredrik Gustafsson. Relative Pose Calibration of a Spherical Camera and an IMU. In *Proceedings of the 7th IEEE and ACM International Symposium on Mixed and Augmented Reality (ISMAR)*, Cambridge, United Kingdom, September 2008.
- [C21] Adrian Wills, Thomas B. Schön, and Brett Ninness. Parameter estimation for discrete-time nonlinear systems using EM. In *Proceedings of the 17th IFAC World Congress*, Seoul, South Korea, July 2008.
- [C20] Fredrik Gustafsson, Thomas B. Schön, and Jeroen Hol. Sensor fusion for augmented reality. In *Proceedings of the 17th IFAC World Congress*, Seoul, South Korea, July 2008.
- [C19] Christian Lundquist and Thomas B. Schön. Road Geometry Estimation and Vehicle Tracking using a Single Track Model In *Proceedings of IEEE Intelligent Vehicles Symposium (IV)*, Eindhoven, The Netherlands, June 2008.

- [C18] Rickard Karlsson, Thomas B. Schön, David Törnqvist, Gianpaolo Conte, and Fredrik Gustafsson. Utilizing model structure for efficient simultaneous localization and mapping for a UAV application. In *Proceedings of IEEE Aerospace Conference*, Big Sky, MT, USA, March 2008.
- [C17] Xiao-Li Hu, Thomas B. Schön, and Lennart Ljung. A robust particle filter for state estimation – with convergence results. In *Proceedings of the 46th IEEE Conference on Decision and Control (CDC)*, New Orleans, USA, December 2007.
- [C16] Thomas B. Schön, David Törnqvist, and Fredrik Gustafsson. Fast particle filters for multi-rate sensors. In *15th European Signal Processing Conference (EUSIPCO)*, Poznań, Poland, September 2007.
- [C15] Xiao-Li Hu, Thomas B. Schön, and Lennart Ljung. A basic convergence result for particle filtering. In *Proceedings of the 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS)*, Pretoria, South Africa, August 2007.
- [C14] Thomas B. Schön, Rickard Karlsson, David Törnqvist, and Fredrik Gustafsson. A Framework for Simultaneous Localization and Mapping Utilizing Model Structure. In *Proceedings of the 10th international conference on information fusion*, Québec, Canada, July 2007.
- [C13] Fredrik Gustafsson, Thomas B. Schön, Rickard Karlsson, and Per-Johan Nordlund. State-of-the-art for the marginalized particle filter. In *Nonlinear Statistical Signal Processing Workshop*, Cambridge, United Kingdom, September 2006.
- [C12] Jeroen D. Hol, Thomas B. Schön, and Fredrik Gustafsson. On resampling algorithms for particle filters. In *Nonlinear Statistical Signal Processing Workshop*, Cambridge, United Kingdom, September 2006.
- [C11] J. Chandaria, G. Thomas, B. Bartczak, K. Koeser, R. Koch, M. Becker, G. Bleser, D. Stricker, C. Wohlleber, M. Felsberg, F. Gustafsson, J. Hol, T. B. Schön, J. Skoglund, P. J. Slycke, and S. Smeitz. Real-time camera tracking in the MATRIS project. In *Proceedings of the International Broadcasting Convention (IBC)*, Amsterdam, The Netherlands, September 2006.
- [C10] Jeroen D. Hol, Thomas B. Schön, Fredrik Gustafsson, and Per J. Slycke. Sensor fusion for augmented reality. In *The 9th International Conference on Information Fusion*, Florence, Italy, July 2006.
- [C9] Thomas B. Schön, Rickard Karlsson, and Fredrik Gustafsson. The marginalized particle filter – analysis, applications and generalizations. In *Workshop on Sequential Monte Carlo Methods, filtering and other applications*, Oxford, United Kingdom, July 2006.
- [C8] Thomas B. Schön, Andreas Eidehall, and Fredrik Gustafsson. Lane departure detection for improved road geometry estimation. In *Proceedings of the IEEE Intelligent Vehicle Symposium (IV)*, pages 546–551, Tokyo, Japan, June 2006.
- [C7] Thomas B. Schön, Adrian Wills, and Brett Ninness. Maximum likelihood nonlinear system estimation. In *Proceedings of the 14th IFAC Symposium on System Identification (SYSID)*, pages 1003–1008, Newcastle, Australia, March 2006.
- [C6] Thomas B. Schön, Rickard Karlsson, and Fredrik Gustafsson. The marginalized particle filter in practice. In *Proceedings of IEEE Aerospace Conference*, Big Sky, MT, USA, March 2006.
- [C5] Thomas B. Schön and Fredrik Gustafsson. Integrated navigation of cameras for augmented reality. In *Proceedings of the 16th IFAC world Congress*, Prague, Czech Republic, July 2005.
- [C4] Andreas Eidehall, Thomas B. Schön, and Fredrik Gustafsson. The marginalized particle filter for automotive tracking applications. In *Proceedings of the IEEE Intelligent Vehicle Symposium (IV)*, pages 369–374, Las Vegas, USA, June 2005.

- [C3] Thomas Schön, Markus Gerdin, Torkel Glad, and Fredrik Gustafsson. A modeling and filtering framework for linear differential-algebraic equations. In *Proceedings of the 42nd Conference on Decision and Control (CDC)*, pages 892–897, Maui, Hawaii, USA, December 2003.
- [C2] Thomas Schön and Fredrik Gustafsson. Particle filters for system identification of state-space models linear in either parameters or states. In *Proceedings of the 13th IFAC Symposium on System Identification (SYSID)*, pages 1287–1292, Rotterdam, The Netherlands, September 2003.
- [C1] Thomas Schön, Fredrik Gustafsson, and Anders Hansson. A note on state estimation as a convex optimization problem. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, volume 6, pages 61–64, Hong Kong, April 2003.

## Relevant National Conference Papers

- [NC3] Joel Hermansson, Andreas Gising, Martin Skoglund and Thomas B. Schön. Autonomous Landing of an Unmanned Aerial Vehicle. In *Proceedings of Reglermöte (Swedish Control Conference)*, Lund, Sweden, June 2010.
- [NC2] Michael Felsberg, Fredrik Larsson, Wang Han, Anders Ynnerman and Thomas B. Schön. Torch Guided Navigation. In *Proceedings of the Swedish Symposium on Image Analysis (SSBA)*, Uppsala, Sweden, March 2010. **Nominated for the best industry-relevant paper award.**
- [NC1] Viktor Kolbe, Folke Isaksson, Thomas Beckman and Thomas B. Schön. Indoor photorealistic 3D mapping using stereo images from SLR cameras. In *Proceedings of the Swedish Symposium on Image Analysis (SSBA)*, Halmstad, Sweden, March 2009. **Nominated for the best industry-relevant paper award.**

## Technical Reports not Published Elsewhere

- [TR6] Fredrik Lindsten and Thomas B. Schön. *On the use of backward simulation in particle Markov chain Monte Carlo methods*. arXiv:1110.2873v2, March 2012.
- [TR5] Fredrik Lindsten and Thomas B. Schön. *Rao-Blackwellised particle smoothers for mixed linear/nonlinear state-space models*. Division of Automatic Control, Linköping University, Linköping, Sweden, January 2011.
- [TR4] Thomas B. Schön and Fredrik Lindsten. *Manipulating the Multivariate Gaussian Density*. Division of Automatic Control, Linköping University, Linköping, Sweden, January 2011.
- [TR3] Thomas B. Schön. *Solving Nonlinear State Estimation Problems Using Particle Filters - An Engineering Perspective*. Division of Automatic Control, Linköping University, Linköping, Sweden, Technical Report LiTH-ISY-R-2953, May 2010.
- [TR2] Fredrik Lindsten and Thomas B. Schön. *Inference in Mixed Linear/Nonlinear State-Space Models using Sequential Monte Carlo*. Division of Automatic Control, Linköping University, Linköping, Sweden, Technical Report LiTH-ISY-R-2946, March 2010.
- [TR1] Thomas B. Schön. *An Explanation of the Expectation Maximization Algorithm*. Division of Automatic Control, Linköping University, Linköping, Sweden, Technical Report LiTH-ISY-R-2915, August 2009.

## Theses

- [T1] Thoms B. Schön. *Estimation of Nonlinear Dynamic Systems – Theory and Applications*. PhD thesis No 998, Linköping Studies in Science and Technology, Department of Electrical Engineering, Linköping University, Sweden, February 2006.

- [T2] Thoms Schön. *On Computational Methods for Nonlinear Estimation*. Licentiate Thesis No 1047, Linköping Studies in Science and Technology, Department of Electrical Engineering, Linköping University, Sweden, October 2003.
- [T3] Thoms Schön. *Identification for Predictive Control – A Multiple Model Approach*. Master's Thesis No LiTH-ISY-EX-3164, Department of Electrical Engineering, Linköping University, Sweden, October 2001.