Robert Mattila

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Research Interests

- Identification, control and inference in stochastic dynamical systems
- Hidden Markov models and (partially observed) Markov decision processes
- Machine learning and optimization

Education

- **KTH Royal Institute of Technology** — Stockholm, Sweden
  PhD Automatic Control — *2015 - 2020 (Projected)*
  - Supervisors: Prof. Bo Wahlberg and Assoc. Prof Cristian R. Rojas.
  - Topic: Identification and control of hidden Markov models.
- **KTH Royal Institute of Technology** — Stockholm, Sweden
  B.Sc. Engineering Physics, M.Sc. Systems, Control and Robotics — *2010 - 2015*
  - The Swedish degree of *Civilingenjör i Teknisk Fysik*.
  - The graduation date was one semester earlier than nominal time.
  - B.Sc. GPA of 4.98/5.0 and M.Sc. GPA of 5.0/5.0 .
- **UCM, Universidad Cumplutense de Madrid** — Madrid, Spain
  ERASMUS Exchange Studies — *Spring 2013*
  - All (five) courses taken were taught in Spanish (including reading material).
  - GPA of 8.13/10.0 .
- **THG, Thorildsplans gymnasium** — Stockholm, Sweden
  Natural Sciences with specialization on Mathemathics and Computer Science — *2007 - 2010*

Skills, Merits and Awards

- **Computer Skills:**

Programming:	Matlab, Python, Julia, Java
Operating Systems:	OSX, Linux, Windows
Other:	LaTeX, git

- **Languages:** Native in Swedish, fluent in English and proficient (B2) in Spanish
- **Awards:**
  - Awarded the KTH Electrical Engineering Scholarship of Excellence (1 MSEK) in 2015.
  - Awarded a SURF scholarship from Caltech to work with Prof. Richard Murray in 2014.

  - Awarded the Henrik Göransson's Sandviken Scholarship and the KTH Student Scholarship (twice), for outstanding grades.
  - Participated in *Wallenbergs Fysikpris 2010* (Swedish qualifications for the International Physics Olympiad). Reached the final with the best result amongst all participants from Stockholm (in the qualification round) and placed 7th in the final.
  - Awarded scholarship for outstanding grades when graduating from THG.

- **KIBok** (`www.kibok.se`): Have founded and developed a marketplace for used textbooks for students of Karolinska Institutet. The environment used is Python with Django.

- Hold a Swedish driver's license (B).

Publications

Journals

- Robert Mattila, Cristian. R. Rojas, Vikram. Krishnamurthy, and Bo Wahlberg, *Asymptotically Efficient Identification of Known-Sensor Hidden Markov Models.* Submitted to the IEEE Signal Processing Letters, 2017. Preprint available at arXiv:1702.00155 [cs.SY].

Conferences

- Robert Mattila, Cristian R. Rojas, Vikram Krishnamurthy and Bo Wahlberg, *Identification of Hidden Markov Models Using Spectral Learning with Likelihood Maximization.* In the 56th IEEE Conference on Decision and Control (CDC'17), Melbourne, Australia, 2017.

- Antti Siika, Robert Mattila, Bo Wahlberg and Joy Roy. *An Optimal Gender-Specific Treatment Policy for Abdominal Aortic Aneurysms Constructed Using a Markov Decision Process Model.* In the Society for Vascular Surgery's Vascular Annual Meeting (VAM'17), San Diego, USA, 2017.

- Robert Mattila, Cristian R. Rojas, Vikram Krishnamurthy, Bo Wahlberg, *Computing monotone policies for Markov decision processes: a nearly-isotonic penalty approach.* In the 20th IFAC World Congress, Toulouse, France, 2017.

- Robert Mattila, Antti Siika, Joy Roy and Bo Wahlberg, *A Markov Decision Process Model to Guide Treatment of Abdominal Aortic Aneurysms.* In IEEE Multi-Conference on Systems and Control, Buenos Aires, Argentina, 2016.

- Robert Mattila, Vikram Krishnamurthy and Bo Wahlberg, *Recursive Identification of Chain Dynamics in Hidden Markov Models Using Non-Negative Matrix Factorization.* In 54th IEEE Conference on Decision and Control, Osaka, Japan, 2015.

- Robert Mattila, Yilin Mo and Richard M. Murray, *An Iterative Abstraction Algorithm for Reactive Correct-by-Construction Controller Synthesis.* In 54th IEEE Conference on Decision and Control, Osaka, Japan, 2015.

- Robert Mattila, Cristian R. Rojas and Bo Wahlberg, *Evaluation of Spectral Learning for the Identification of Hidden Markov Models.* In 17th IFAC Symposium on System Identification (SYSID 2015), Beijing, China, 2015.

Other

- Robert Mattila, Cristian R. Rojas, Vikram Krishnamurthy and Bo Wahlberg, *Method of Moments Identification of Hidden Markov Models with Known Sensor Uncertainty Using Convex Optimization*. Poster at the 2016 Workshop of the European Research Network on System Identification (ERNSI), September, Cison di Valmarino, Italy.
- Robert Mattila, Cristian R. Rojas, Vikram Krishnamurthy and Bo Wahlberg, *Method of Moments Identification of Hidden Markov Models with Known Sensor Uncertainty Using Convex Optimization*. Poster at Reglermötet 2016, June, Göteborg, Sweden.
- Robert Mattila, Vikram Krishnamurthy and Bo Wahlberg, *Recursive Method of Moments Identification of Hidden Markov Models using Convex Optimization*. Poster at the 2015 Workshop of the European Research Network on System Identification (ERNSI), September, Varberg, Sweden.
- Robert Mattila, *On Identification of Hidden Markov Models Using Spectral and Non-Negative Matrix Factorization Methods*. Master's thesis, KTH Royal Institute of Technology. Stockholm, Sweden, 2015. Supervisors: Prof. Bo Wahlberg and Assoc. Prof. Cristian R. Rojas.
- Robert Mattila, *Including Bathymetric Data in Autonomous Surface Vessels' Maneuvering Optimisation Tool*. Bachelor's thesis, KTH Royal Institute of Technology. Stockholm, Sweden, 2015. Supervisors: Prof. Juan Jiménez and José María Benítez.

Academic Experience

- **VUB-ELEC, Workshop on System Identification** — Brussels, Belgium
  Included courses on — *Summer 2017*
  - Frequency response function measurements (non-parametric tools), dynamic system identification (parametric tools) and control-oriented system identification by, among others, John Lataire, Yves Rolain, Rik Pintelon, Ivan Markovsky, Philippe Dreesen and Simone Formentin.
- **S^{3}CS, Swedish Summer School in Computer Science** — Djurö, Sweden
  The courses were taught by — *Summer 2016*
  - Michael Mitzenmacher (Hashing Algorithms);
  - Sergei Vassilvitskii (Algorithms for Modern Parallel Systems).
- **UBC, University of British Columbia** — Vancouver, Canada
  Invited Researcher by Prof. Vikram Krishnamurthy — *Summer 2015*
- **UBC, University of British Columbia** — Vancouver, Canada
  Master Thesis with Prof. Vikram Krishnamurthy — *Autumn 2014*
- **Caltech, California Institute of Technology** — Pasadena, USA
  SURF in the Control and Dynamical Systems (CDS) Group — *Summer 2014*
  - Supervisors: Prof. Richard M. Murray and Asst. Prof. Yilin Mo
  - Developed an improved abstraction algorithm for the correct-by-construction controller synthesis framework `TuLiP`.
- **KTH, Royal Institute of Technology** — Stockholm, Sweden
  Research Intern for Prof. Bo Wahlberg — *Summer 2013*
- **ZJU, Zhejiang University** — Hangzhou, China
  Participated in the Joint Research Center of Photonics Workshop — *Summer, 2012*
  - Implemented optical logic gates exploiting non-linearities in fibers.

Industry Experience

- **Stockholm Vatten AB** — Stockholm, Sweden
  Summer Intern — *Summer 2011 and 2012*
  - Warehouse work including collecting and delivering items; cleaning and repairing machines; contacting customers; administrative work in the supply system Agresso.

Teaching

- **Master Thesis** — KTH
  Supervisor for Daniel Merkoulova — *Spring 2017*
- **EL1000 Automatic Control** — KTH
  Teaching Assistant — *Autumn 2016*
- **EH1010 Project Course in Electrical Engineering** — KTH
  Supervisor — *Spring 2016*
- **EL1000 Automatic Control** — KTH
  Teaching Assistant — *Autumn 2015*