

Robert Mattila

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KTH EE-AC, Sweden

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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 Complutense 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 Mathematics and Computer Science 2007 - 2010

Academic Experience

- **S³CS, 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.

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, 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.

Skills, Merits and Awards

- **Computer Skills:**

Programming: Matlab, Python, Julia, Java
Operating Systems: OSX, Linux, Windows
Other: L^AT_EX, git

- **Language:**

- Native in Swedish
- Fluent in English
- B2/C1 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 at Karolinska Institutet. The environment used is Python with Django. Currently maintaining and hosting the website on a Raspberry Pi.
- Hold a Swedish driver's license (B).

Industry Experience

- **Stockholm Vatten AB**

Summer Intern

Stockholm, Sweden

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

- **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