

# Robert Mattila

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## Research Interests

- Identification, control and inference in stochastic dynamical systems;
- Hidden Markov models;
- (Partially observed) Markov decision processes;
- Machine learning and optimization;
- Applications to social networks, next-generation health care and medicine.

## 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

- **S<sup>3</sup>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.

## Publications

### Conferences

- 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 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, Java  
**Operating Systems:** OSX, Linux, Windows  
**Productivity:** L<sup>A</sup>T<sub>E</sub>X, 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](http://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**

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

- **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*