

Carl Marcus Greiff

Curriculum Vitae

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Educational Background

2017

Lund University, LTH, Lund, Sweden.

PhD candidate at the Department of Automatic Control

- Focus: Bayesian state estimation and nonlinear output feedback of rigid-body dynamics.
- Selected courses: Nonlinear Control, Optimal Control, Robust Control, Stochastic Control.

2012

2017

Lund University, LTH, Lund, Sweden.

M.Sc degree in Engineering Physics (Systems Control)

- Thesis: Modelling and control of the Crazyflie quad-rotor for aggressive and autonomous flight by optical flow driven state estimation.

Teaching Assistant Positions

2019

FRTN15 - Predictive Control, LTH, Lund, Sweden, Spring of 2018, 2019 and 2020.

Graduate level course on MPC, ILC, and Kalman filtering. Exercises, lab sessions and project supervision.

2018

FRTN40 - Projects in Automatic Control, LTH, Lund, Sweden, Fall of 2017 and 2018.

Graduate level project course. Supervision of projects on UAV/UGV control involving machine learning.

2018

FRTF05 - Basic Course in Automatic Control, Beihang, Beijing, China, Fall of 2018.

Basic course in linear systems control. Exercises and lab sessions.

2017

FRTN25 - Systems Control, LTH, Lund, Sweden, Spring of 2017.

Undergraduate level course in systems control and chemical engineering. Exercises and lab sessions.

Languages and tools

Fluent: Swedish, English

Highly proficient: Matlab, Simulink, Julia, ROS, Python, C, Git \LaTeX

Proficient: HTML, Java, Javascript, Ruby, C++

Selected Open Source Projects

2018

Robust Control in Julia¹, Lund University, Lund, Sweden.

- Implementation of a robust control systems toolbox in `ControlSystems.jl`, LMI and Riccati synthesis

2016

The crazyflie project¹, Bitcraze AB, Malmö, Sweden.

- Geometric control of the Crazyflie UAV utilizing differential flatness

Academic Merits

Peer-reviewed papers

2020

Exploiting linear substructure in linear regression Kalman filters, *CDC*, 2020.

2020

MSE-optimal measurement dimension reduction in Gaussian filtering, *CCTA*, 2020.

2020

Filtered Output Feedback Tracking Control of a Quadrotor UAV, *IFAC*, 2020.

2020

Coordination Control of Double-Integrator Systems with Weighed Inputs, *IFAC*, 2020.

2020

Optimal Measurement Projections with Adaptive MKFs for GNSS Positioning, *ACC*, 2020.

2019

Performance bounds in positioning with the VIVE lighthouse system, *FUSION*, 2019.

2019

Temporal viability regulation of control affine systems with time-varying constraints, *ECC*, 2019.

2019

Feasible coordination of heterogeneous mobile vehicles with various constraints, *ICRA*, 2019.

2018

Incremental reference generation for nonsingular control on $SE(3)$, *CCTA*, 2018.

¹Report available at request. Source code: <https://github.com/mgreiff>

- 2018 Evaluation of the discrete time feedback particle filter for $SE(2)$ -configured systems, *ACC*, 2018.
- 2018 A time-warping transformation for optimal movement in differentially flat systems, *ACC*, 2018.
- 2017 Optimization-based motion planning with obstacles and priorities, *IFAC*, 2017.

Academic Awards

- Best M.Sc. Thesis at LTH, 2018. Sparbanksstiftelsen Skåne, Malmö.
Awarded for theoretical and practical contributions of the thesis.
- Dedication in Philosophy, 2012. Katedralskolan, Lund.
Awarded an argumentative essay and a shorter essay on syllogism.
- Excellent academic results, 3rd year, 2012. Katedralskolan, Lund.
Awarded for achieving the highest marks in all subjects during all three years.
- Excellent academic results, 2nd year, 2011. Katedralskolan, Lund.
Awarded for achieving highest marks in all subjects during the first two years.

Professional Experiences

- 2019 **Consultant**, Mitsubishi Electric (MERL), Cambridge, USA, 18/11/2019 – to date.
The topics of the consultancy are the currently confidential.
- 2019 **Internship**, Mitsubishi Electric (MERL), Cambridge, USA, 27/05/2019 – 28/07/2019.
Development of marginalized particle filters for GNSS positioning. This involved the development of novel particle filters, and standalone implementations in both Matlab and C89 (ACC 2020, CCTA 2020).
- 2017 **Consultant**, Bitcraze AB, Malmö, Sweden, 05/11/2016 – 12/03/2017.
Development and implementation of algorithms for sensor fusion of optical flow, laser ranging and IMU measurements for the Crazyflie quad-rotor UAV. Derivation and real-time implementation in C of the differential flatness equations of the quadrotor, as well as various nonlinear tracking controllers.
- 2016 **Research project assistant**, LTH, Lund, Sweden, 23/05/2016 – 24/08/2016.
Development and implementation of an MPC-based control system for the Crazyflie UAV, with motion planning using novel genetic algorithms (IFAC 2017) and measurement feedback from a Kinect camera.
- 2015 **Summer research fellow**, Caltech, Pasadena, US, 16/06/2015 – 23/08/2015.
The research fellowship involved rapidly prototyping robots for use in the synthetic biology lab. The first part of the work concerned the development of automated experimental protocols. The second part involved creating software using ROS, interfaced with the Beaglebone board. The third part concerned the hardware design and development of schematics required to operate the motors and sensors of the robots.
- 2013 **Software developer**, Blocon AB, Lund, Sweden, 17/12/2013 – 22/07/2014.
Blocon AB develops tools for structural engineering. My assignment was to create a series of plugins for Google's free CAD-program SketchUp, in order to run the Heat3 GPU engine from the CAD-program. The work was done independently and involved extensive work in the computer language Ruby.
- 2013 **Intership**, Minesto AB, Gothenburg, Sweden, 03/06/2013 – 11/08/2013.
Minesto is an R&D/engineering company in the renewable energy sector, focusing on extracting energy from tidal streams. During the internship, I developed a tidal analysis tool in Matlab. The program was used to identify potential global testing sites for Minesto's "Deep Green kite" prototype.
- 2012 **Tutor**, Allakando AB, Lund, Sweden, 14/03/2012 – 11/08/2016.
Private tutor in maths, physics, and English for students in upper secondary school.
- 2012 **Intership**, Minesto AB, Gothenburg, Sweden, 18/06/2012 – 13/07/2012.
Aided the development of the control system and curvature-based motion planning of Minesto's "Deep Green kite" in Matlab, as well as performing hardware tests of the device's buoyancy system.

References

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