

# Stefan Markus Trenkwalder

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**CONTACT INFORMATION** Dept. of Automatic Control & Systems Engineering *Mobile (AT): +43-699-19870000*  
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**PERSONAL INFORMATION** *Birthday: 30<sup>th</sup> June 1987* *Gender: Male*  
*Birthplace: Innsbruck, Austria* *Nationality: Austria*

**LINGUISTIC PROFICIENCY** **German:** first language  
**English:** IELTS result: 7.0 (overall) October 2011  
*Listening: 7.5* *Reading: 6.0*  
*Writing: 7.0* *Speaking: 7.0*

**EDUCATION** **University of Sheffield**, Sheffield, UK

**PhD** (*currently*), Natural Robotics Lab, October 2013 - Today

- current PhD-project: Computational cooperation through a distributed operating system for swarms of small-scale robots.
- This project lead to the development of OpenSwarm — An operating system for miniature robots — <http://openswarm.org>
  - 1<sup>st</sup> Supervisor: Dr Roderich Groß
  - 2<sup>nd</sup> Supervisor: Dr Andreas Kolling
  - Area of Study: swarm robotics, multi-robot systems, autonomous robots, self-organized systems, swarm intelligence, evolutionary algorithms, artificial life, mathematical biology (decision making)

**Vienna University of Technology**, Vienna, Austria

**BSc**, Computer Engineering, April 2012

- 3<sup>rd</sup> Bachelor-project: Statistische Tests mit unscharfen Daten (Statistic Tests with Fuzzy Data)
  - Adviser: O.Univ.Prof. Dipl.-Ing. Dr.techn. Reinhard Viertl
  - Area of Study: Fuzzy Data, Fuzzy Information, Statistics with Fuzzy Data, Applied Statistics, Fuzzy Utility

**BSc**, Electrical Engineering and Information Technology, April 2011

- 1<sup>st</sup> Bachelor-project: *Elektrostimulation gegen Epilepsie (Electrical stimulation against epilepsy)*
  - Adviser: Ao.Univ.Prof. Dipl.-Ing. Dr.sc.med. Dr.techn. Dr.rer.nat. Frank Rattay
  - Area of Study: Computational Neuroscience and Biomedical Engineering
- 2<sup>nd</sup> Bachelor-project: *Kühlsystem mit dynamischen Regler (Cooling system with dynamic control)*
  - Adviser: Univ.Prof. Dipl.-Ing. Dr.techn. Andreas Kugi
  - Area of Study: Complex Dynamic Systems

**College of Chemistry - Rosensteingasse** (HBLVA für chemische Industrie - Rosensteingasse), Vienna, Austria

**Ingenieur (Ing.)**, Chemical Engineering, August 2011

**GCE A-levels**, Chemical Computer Science, 2006

EXPERIENCE

**SZ Informationstechnik**, Vienna, Austria

*Head of Research and Development* 2011-2013

- Development of desktop application in Qt (Cross platform: Linux and Windows)
- Development of embedded devices
- Development of automatic announcement Software for the Wiener Linien (Vienna Public Transport)

**Arbeiter Samariterbund (alternative civilian service)**, Vienna, Austria

*IT-Support* 2012-2013

- Support and repair of embedded devices, software engineering and customer support

**Data and Measurement Service GmbH**, Vienna, Austria

*Developer and service contractor* 2007-2011

- Development of embedded devices, software engineering and customer support

**Mattig-Schauer GmbH**, Vienna, Austria

*Software Engineer* 2008

- Automation and extension of an existing announcement software of the ÖBB (Austrian Federal Railway)

**Novartis**, Vienna, Austria

*Antibiotics research laboratory technician* August 2004

- Synthesis of hydrocarbons to produce new antibiotic-derivatives

*Antibiotics research laboratory technician* August 2003

- Synthesis of hydrocarbons to produce new antibiotic-derivatives

HARDWARE AND SOFTWARE SKILLS

Analog and Digital Circuits:

- Bipolar and FET implementations of amplifiers, converters, and filters
- Computer-Aided Design: National Instruments Multisim, SPICE, Solid-Works

Embedded Systems:

- Hardware and Software development including DSP (i.e. Texas Instruments DSP's, Analog Devices) and MCU (ATmega MCU, dsPIC and others)
- Hardware modelling with hardware description languages (i.e. VHDL)
- During my Computer Engineering course , I got fundamentals and experiences in real-time design, fault-tolerance and field buses (i.e. TTP).

Control Theory and Engineering:

- Linear Systems Theory, Model Predictive Control, Distributed Control, Optimization, Process-identification, Fuzzy Control
- Fundamentals of Robotics (calculation and simulation), mobile robotics (with ROS), Standard Platform League at RoboCup

Simulation, Modelling, Testing:

- Matlab Simulink, LabVIEW, CAD, CAE & CAM (with SOLID-Works)

Computer Programming:

- Software Engineering: UML (OOA and OOD), (OOP) C++, Java
- Script languages: JavaScript, PHP, UNIX shell scripting, GNU make
- Databases: SQL, MySQL
- Others: Matlab, Maple and Mathematica

Productivity Software:

- Word processing:  $\text{T}_{\text{E}}\text{X}$  ( $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ ,  $\text{BIB}\text{T}_{\text{E}}\text{X}$ ), most common productivity packages (for Windows and Linux platforms)
- statistical analysis: SPSS, R

#### AWARDS

#### DOC-Fellowship of the Austrian Academy of Sciences

2015-2017

*I obtained this fellowship with an overall rating of (65.5/70 points) to perform the proposed research project which will be conducted during my PhD course. This project will be performed at the University of Sheffield and in cooperation with the University of Innsbruck and involved the following supervising academics:*

- Dr Roderich Gross (University of Sheffield, UK)
- Dr Andreas Kolling (University of Sheffield, UK)
- Dr Radu Prodan (University of Innsbruck, Austria)

#### PUBLICATIONS

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#### Literatur

- [1] Yuri K. Lopes, **Stefan M. Trenkwalder**, André B. Leal, Tony J. Dodd, and Roderich Groß. Supervisory control theory applied to swarm robotics. *Swarm Intelligence*, 10(1):65–97, 2016.
- [2] **Stefan M. Trenkwalder**, Yuri K. Lopes, Andreas Kolling, Anders L. Christensen, Radu Prodan, and Roderich Groß. OpenSwarm: An Event-Driven Embedded Operating System for Miniature Robots. In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*. Piscataway, NJ: IEEE/RSJ, 2016.
- [3] Yuri K. Lopes, **Stefan M. Trenkwalder**, André B. Leal, Tony J. Dodd, and Roderich Groß. Probabilistic Supervisory Control Theory (pSCT) Applied to Swarm Robotics. In *Proceedings of the 2016 International Symposium on Distributed Autonomous Robotic Systems (DARS 2016)*. Berlin, Germany: Springer, 2016. under review.
- [4] Fernando Perez-Diaz, **Stefan M. Trenkwalder**, Ruediger Zillmer, and Roderich Groß. Emergence and inhibition of synchronization in robot swarms. In *Proceedings of the 2016 International Symposium on Distributed Autonomous Robotic Systems (DARS 2016)*. Berlin, Germany: Springer, 2016. under review.

#### INTERESTS

reading (mostly scientific books), DIY, cooking, bicycle

#### LICENCES

<i>Driver licence</i>	since 2007
<i>JAR-FCL Private Pilot Licence</i>	2009—2014
<i>Radiotelephone Operator's General Certificate for Aeronautical Service</i>	since 2009