Dr. Dominic Buchstaller

Profile

A passionate electrical engineer with an excellent scientific track record and a deep knowledge in a wide range of areas, such as control theory, robust control, adaptive control, implementation of control algorithms (e.g. model predictive control), convex optimisation, estimation and soft-/hardware development. Strong communication and interpersonal skills as well as the ability to analyse and effectively solve tough problems repeatedly demonstrated in previous positions. Proven to perform to the highest standards e.g. by writing the best 2010 UK PhD thesis in the field of control and automation.

Education

Jan. 2010 **Doctor of Philosophy (PhD)**, *School of Electronics and Computer Science (ECS)*, University of Southampton (UK).
Awards: IET Control and Automation Doctoral Dissertation Prize (see below)
Title: "Stability and Performance for Multiple Model Switched Adaptive Control"
Analysis of a novel multiple model switched adaptive control algorithm where the switching decision is based on an online optimisation process. Gain bounds / robustness guarantees are established and it is shown how to conduct performance orientated design, a key open question in the field.

Nov. 2004 **Diploma (Dipl. Ing.)**, *Department for Data Processing*, Technical University of Munich (Germany).
Title: "Encryption of H.264/AVC Video" (Grade: summa cum laude)
Analysis of a novel video compression algorithm (H.264/AVC) where 3 schemes are proposed to seamlessly embed arbitrary encrypted payloads into a H.264/AVC video stream.

2003 **Bachelor of Science (B. Sc.)**, *Department for Real Time Computer Systems*, Technical University of Munich (Germany).
Title: "Measurement of Body Water" (Grade: magna cum laude)
Development of a small, portable high frequency AD - DA measurement platform to allow mobile multi-point frequency response measurements in order to determine the amount of (intra)cellular water in the skin.

1998 **Abitur**, *A-level, general qualification for university entrance*, Claude Dornier School Friedrichshafen (Germany).
Specialisation in Physics and Technology (including electrical and mechanical engineering).

Academic and Professional Experience

June-October 2010 **Research Associate**, *Electronics and Computer Science (ECS)*, University of Southampton (UK).
Adaptive control, robust control, multiple model control.
Performance evaluation of adaptive controllers, e.g. controlling an Atomic Force Microscope (AFMs).

June 2009-May 2010 **Research Associate**, *Control and Power (CAP) / Circuit and Systems (CAS) group*, Imperial College London (UK).
Digital control systems, model predictive control, convex optimization, numerical analysis.
Implementation of model predictive controllers on parallel hardware (FPGAs, GPUs).

2005-May 2009 **PhD program**, *University of Southampton (UK).*
Non-linear/adaptive control, multiple model systems, switched systems, estimation, robust stability analysis.
Strong background in analysis due to the nature of the theoretical subject. Deep knowledge in control theory as well as applied mathematics and physics.

May-Aug. 2005 **Research Assistant**, *Centre for Vision, Speech and Signal Processing (CVSSP)* , Surrey University (UK).
Function analysis, optimisation, neural networks.
Research on 3-D camera calibration and material reconstruction in multi-camera environments.

2001-2005 **Psychotronics GbR**, *Munich (Germany)*.
Foundation and successful operation of a start-up company (Psychotronics GbR). Focus: Design of high availability UNIX/LINUX computing systems, e.g. for the Technical University of Berlin. The company is still in operation, although I am no longer involved.

2000-2005 **Student**, *University of Munich (Germany)*.
Specialisation in control and automation as well as video coding.
Attended courses in e.g. control theory I+II, control of drive systems, robust control, electronics, FPGA/VHDL programming, real time computer systems, digital video.

1998-2002 **Work placements and summer jobs**, *EADS*, Immenstaad (Germany).
Analog and digital system design, prototyping, documentation.
Project: Implementation of payload-hardware test-equipment for the Mars Express mission.

1998-1999 **Civil Service**, *Red Cross Emergency Service*, Markdorf (Germany).
Trained as a paramedic and ambulance officer.

Voluntary Experience and Official Positions

2010 **Project coordinator**, *Department of Electrical and Electronic Engineering*, Imperial College London (UK).
Coordination of a joint project with the University of Cambridge and Nanyang Technological University with the goal to find new approaches for the analysis and implementation of (control) algorithms.

2009-2010 **Tutor**, *Department of Aeronautics*, Imperial College London (UK).
Tutor for 3rd year control systems course.

2006-2007 **Tutor**, *Department of Mathematics*, University of Southampton (UK).
Corrector for 1st and 2nd year self taught mathematics course. Demonstrator for control labs.

2003-2004 **Student representative**, *Technical University of Munich (Germany)*.
Student representative in the appointment committee of professorships for the school.
Representative of the union of electronics and information technology on the board of unions.

2002-2004 **President of the Student Union**, *Department of Electrical Engineering*, Technical University of Munich (Germany).

2002-2005 **UNIX/LINUX Administrator**, Technical University of Munich (Germany).
Responsible for two computer pools and servers.

2000-2001 **Tutor**, *Department of Informatics*, Technical University of Munich (Germany).
Demonstrator informatics laboratory. Corrector informatics lecture homework.

Awards

2010 Winner of the Institution of Engineering and Technology (IET) "Control and Automation Doctoral Dissertation Prize". This prize honours the best UK PhD thesis in control and automation.

Languages

German	Mother tongue
English	Fluent, written, spoken
French	Basic

Computer and Electronics Skills

Electronics hardware design	Analog, digital, wire wrap prototyping, PCB etching, SMD soldering, CAD.
Technologies	FPGA, ATMEL, 68000, PIC.
Coding/Software	BASIC, C, C++, HTML, Java Script, LaTeX, Matlab/Simulink, Perl, Office, UNIX/LINUX, VHDL.

Personal Interests

Electronics/Linux hacking, photography, running, cycling, windsurfing.

Contact Details

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Publications

D. Buchstaller and M. French. A Multiple Model Approach to Adaptive Control. Springer, 2010. In preparation.

D. Buchstaller and M. French. Estimation based Multiple Model Adaptive Control. IEEE Transactions on Automatic Control. Two part paper - in preparation.

D. Buchstaller, M. French and J. C. Willems. The deterministic interpretation of the Kalman Filter. Systems and Control Letters. In preparation.

D. Buchstaller, E. C. Kerrigan and G. A. Constantinides. Sampling and Controlling Faster than the Computational Delay. IET Control Theory and Applications. Submitted.

D. Buchstaller. Stability and Performance for Multiple Model Switched Adaptive Control. PhD thesis, University of Southampton, 2010.

D. Buchstaller and M. French. Robustness and design for estimation based multiple model switched adaptive control. In *Proc. of the 48th IEEE Conf. on Decision and Control, Shanghai (China)*, pp. 4234–4239, 2009.

D. Buchstaller and M. French. Gain bounds for multiple model switched adaptive control of general MIMO LTI systems. In *Proc. of the 47th IEEE Conf. on Decision and Control, Cancun (Mexico)*, pp. 5330–5335, 2008.

D. Buchstaller and M. French. Scaling of gain bounds for switched adaptive control with large uncertainties. In *Proc. of the 46th IEEE Conf. on Decision and Control, New Orleans (USA)*, pagp 915–920, 2007.

D. Buchstaller. Encryption of H.264/AVC Video. Diploma Thesis, Technical University of Munich, 2005.

D. Buchstaller. Measurement of Body Water. Bachelor Thesis, Technical University of Munich, 2003.