Dominik Widhalm

Curriculum Vitae

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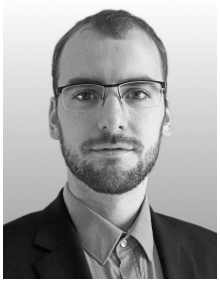

Education

2018 – 2022 **PhD Computer Science**, *Vienna University of Technology*.
participant in the *Doctoral College Resilient Embedded Systems*;
passed with highest distinction

2012 – 2014 **Master Embedded Systems**, *UAS Technikum Wien*.
passed with highest distinction

2010 – 2012 **Bachelor Electronic Engineering**, *UAS Technikum Wien*.
passed with highest distinction

2004 – 2009 **Electrical Engineering/Information Technology**, *HTBLuVA St. Pölten*.
passed with highest distinction

Doctoral Thesis

Title Sensor Node Fault Detection in Wireless Sensor Networks: An Immune-inspired Approach

Supervisors Priv.-Doz. Mag. DI. DI. Dr. Karl M. Göschka
Univ.-Prof. DI. Dr. Wolfgang Kastner

Ext. Reviewer Prof. Dr.h.c. Andrea Bondavalli
Assoc.-Prof. Davide Quaglia, PhD

Description In this thesis, a novel sensor node fault detection approach is presented. It integrates node-level diagnostics with the characteristics of the sensor data to improve the detectability of faults and, more importantly, to allow to distinguish between the effect of faults and environmental data events. The approach is inspired by the functioning of dendritic cells in the human immune system. Nevertheless, the strength of the presented approach lies in expressive node-level diagnostics rather than deeply embedding immune-related knowledge.

Master Thesis

Title *Bridging the Gap between AGENtiX and JAZZ*

Supervisors FH-Prof. DI. Dr. Martin Horauer
DI. Mag. Matthias Wenzl

Description This thesis describes the development of a novel testing framework to bridge pre- and post-silicon verification activities in mixed-signal SoC development flows. Its suitability is shown based on the verification flow of Infineon Technologies Austria AG where two main software frameworks are used, namely AGENtiX and JAZZ; hence the name of the thesis.

Achievements

2014 Kapsch Award 2014

2013 & 2014 Merit-based scholarship, Master Embedded Systems

2011 & 2012 Merit-based scholarship, Bachelor Electronic Engineering

2009 OVE GIT-Preis 2009

Experience

Vocational

since 2022/10 **Researcher**, *UAS Technikum Wien*, Austria.

2018/10 – 2022/09 **Researcher**, *UAS Technikum Wien*, Austria.
Doctoral College Resilient Embedded Systems

2017/07 – 2018/10 **Researcher**, *UAS Technikum Wien*, Austria.
In a research cooperation with Elektrobit Austria GmbH

2013/04 – 2018/04 **Researcher**, *UAS Technikum Wien*, Austria.
In the Josef Ressel Center for Verification of Embedded Computing Systems (funded by CDG)

2012/09 – 2012/12 **Junior Researcher**, *UAS Technikum Wien*, Austria.
In the AC-Centrope II research project (funded by EU-EFRE)

2012/03 – 2012/05 **Electronic Engineer**, *Zizala Lichtsysteme GmbH*, Wieselburg, Austria.
Student apprentice

Freelance

2006 – 2014 **Event Technology**, *Mado GmbH*.
Light Board Operator, Event Light Designer, Show Equipment Maintenance, etc.

2011 – 2012 **Administration System Development**, *Fried von Neuman GmbH*.
Concept design, Database design & implementation, Frontend design & implementation

Teaching Academic Courses

since 2019 **Embedded Systems Software Design**, bachelor level course.

since 2017 **Wireless Communication Networks & Systems**, bachelor level course.

since 2016 **Internet of Things Applications**, *(specialization course)*, bachelor level course.

since 2016 **Embedded Software Testing**, master level course.

since 2014 **Supervisor of several bachelor/master projects & theses**.

since 2013 **C & System Programming**, bachelor level course.

Publications

Journal Publications

[1] D. Widhalm, K. M. Goeschka, and W. Kastner, "A review on immune-inspired node fault detection in wireless sensor networks with a focus on the danger theory," *Sensors*, vol. 23, no. 3, 2023.

[2] ——, "An open-source wireless sensor node platform with active node-level reliability for monitoring applications," *Sensors*, vol. 21, no. 22, 2021.

[3] M. Horauer, D. Widhalm, S. Tauner, and S. Mirtl, "Verification Challenges of Complex System-on-Chip Devices," *e & i Elektrotechnik und Informationstechnik*, vol. 132, no. 6, pp. 269–273, 2015.

Conference Publications

[4] D. Widhalm, K. M. Goeschka, and W. Kastner, "Undervolting on wireless sensor nodes: A critical perspective," in *2022 23rd International Conference on Distributed Computing and Networking (ICDCN)*, 2022.

[5] ——, "Is arduino a suitable platform for sensor nodes?" In *IECON 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society*, 2021, pp. 1–6.

[6] ——, "Node-level indicators of soft faults in wireless sensor networks," in *2021 40th International Symposium on Reliable Distributed Systems (SRDS)*, 2021, pp. 13–22.

[7] ——, "Sok: A taxonomy for anomaly detection in wireless sensor networks focused on node-level techniques," in *Proceedings of the 15th International Conference on Availability, Reliability and Security*, ser. ARES '20, Virtual Event, Ireland: Association for Computing Machinery, 2020.

[8] D. Widhalm, S. Tauner, and M. Horauer, "Augmenting Pre-Silicon Simulation by embedding a Scripting Language in a SystemC Environment," in *Mechatronic and Embedded Systems and Applications (MESA), 2016 IEEE/ASME 12th International Conference on*, Aug. 2016.

[9] S. Tauner, D. Widhalm, and Horauer, "Synchronization Approaches for Testing Mixed-Signal SoCs under Real-Time Constraints using On-Chip Capabilities," in *Proceedings of the 2015 IEEE Austrian Workshop on Microelectronics (AUSTROCHIP)*, Sep. 2015, pp. 36–41.

[10] D. Widhalm, S. Tauner, M. Horauer, A. Schumacher, and A. Haggenmiller, "A Common Platform for Bridging Pre- and Post-Silicon Verification in Mixed-Signal Designs," in *Instrumentation and Measurement Technology Conference (I2MTC), 2015 IEEE International*, May 2015, pp. 1584–1589.

Conference Poster Presentations

[11] S. Tauner, D. Widhalm, and M. Horauer, *Unification of Pre- and Post-Silicon Verification Flows in Mixed-Signal Designs*, Microelectronic Systems Symposium (MESS'16), Apr. 2016.

Theses

[12] D. Widhalm, "Sensor node fault detection in wireless sensor networks: An immune-inspired approach," PhD thesis, Vienna University of Technology, Doctoral College Resilient Embedded Systems, Sep. 2022.

[13] ——, "Bridging the gap between agentix and jazz," Master's thesis, University of Applied Sciences Technikum Wien, Jun. 2014.

SW/HW Engineering Skills

Languages	C/C++, Assembly (ARM/AVR), Python, Perl, Java, VHDL, SystemC, PHP, AJAX, Javascript, HTML, CSS, LaTeX, AsciiDoc, Markdown
Software	Code Blocks, Eclipse, AVR/Atmel Studio, Visual Studio, Matlab/Simulink, LabView, Altera Quartus & Modelsim, Protel/Altium, Proteus, Mathcad, AutoCAD, ePlan, KiCad

Languages

German	native
English	excellent command
Russian	basic communication skills
Std. Chinese	basic communication skills

Interests

Research	sensor networks, fault tolerance, anomaly detection, artificial immune systems
Electronics	embedded systems, internet of things applications, home automation
Activities	running, swimming, hiking, sport climbing, fitness training, ballroom dancing