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## Qualifications

National University of Singapore  
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## Employment

### Assistant Professor

Assistant Professor  
Electronic Systems  
Eindhoven University of Technology  
Eindhoven, Netherlands  
13 Nov 2013 → 21 Jul 2020

### Embedded Control Systems Lab

Eindhoven University of Technology  
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1 Jan 2014 → present

### Cyber-Physical Systems Center Eindhoven

Eindhoven University of Technology  
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### Assistant Professor

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### CompSOC Lab- Predictable & Composable Embedded Systems

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## Research output

### Delay-aware Multi-layer Multi-rate Model Predictive Control for Vehicle Platooning under Message-rate Congestion Control

Ibrahim, A. M. E., Goswami, D., Li, H. & Basten, A. A., 22 Apr 2022, In: IEEE Access. 10, p. 44583-44607

### CompROS: A composable ROS2 based architecture for real-time embedded robotic development

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**Design and management of image processing pipelines within CPS: Acquired experience towards the end of the FitOptiVis ECSEL Project**

Sau, C., Rinaldi, C., Pomante, L., Palumbo, F., Valente, G., Fanni, T., Martinez, M., van der Linden, F., Basten, T., Geilen, M., Peeren, G., Kadlec, J., Jääskeläinen, P., Bulej, L., Barranco, F., Saarinen, J., Säntti, T., Zedda, M. K., Sanchez, V., Nikkhah, S. T. & 7 others, Goswami, D., Amat, G., Maršik, L., van Helvoort, M., Medina, L., Al-Ars, Z. & de Beer, A., Nov 2021, In: *Microprocessors and Microsystems*. 87, 23 p., 104350.

**A Deployment Framework for Quality-Sensitive Applications in Resource-Constrained Dynamic Environments**

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**Reconfigurable pipelined control systems**

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**Hardware- and Situation-Aware Sensing for Robust Closed-Loop Control Systems**

De, S., Huang, Y., Mohamed, S., Goswami, D. & Corporaal, H., 16 Jul 2021, *Proceedings of the 2021 Design, Automation and Test in Europe, DATE 2021*. Institute of Electrical and Electronics Engineers, p. 1751-1756 6 p. 9474216

**Modeling, implementation, and analysis of XRCE-DDS applications in distributed multi-processor real-time embedded systems**

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**Multi-layer multi-rate model predictive control for vehicle platooning under IEEE 802.11p**

Ibrahim, A. M. E., Goswami, D., Li, H., Martin Soroa, I. & Basten, A. A., Mar 2021, In: *Transportation Research Part C: Emerging Technologies*. 124, 34 p., 102905.

**Adaptive predictive control for pipelined multiprocessor image-based control systems considering workload variations**

Mohamed, S., Saraf, N., Bernardini, D., Goswami, D., Basten, A. A. & Bemporad, A., 11 Jan 2021, *59th IEEE Conference on Decision and Control (CDC 2020)*. Institute of Electrical and Electronics Engineers, p. 5236-5242 7 p. 9303827. (Proceedings of the IEEE Conference on Decision and Control; vol. 2020-December).

**Matlab2Trace: A Matlab to Trace translator to visualise and analyse concurrent system activities and execution traces**

Mohamed, S., Goswami, D. & Basten, A. A., 2021. 1 p.

**Optimizing multiprocessor image-based control through pipelining and parallelism**

Mohamed, S., Goswami, D., De, S. & Basten, T., 2021, In: *IEEE Access*. 9, p. 112332-112358 27 p., 9508439.

**Design and management of image processing pipelines within CPS: 2 years of experience from the FitOptiVis ECSEL Project**

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**Firmness Analysis of Real-time Tasks**

Behrouzian, A., Ara, H. A., Geilen, M., Goswami, D. & Basten, T., Jul 2020, In: *ACM Transactions on Embedded Computing Systems*. 19, 4, 24 p., 26.

**Approximation Trade Offs in an Image-Based Control System**

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### **Parallel Implementation of Iterative Learning Controllers on Multi-core Platforms**

Haghi, M., Yao, Y., Goswami, D. & Goossens, K., 15 Jun 2020, *2020 Design, Automation & Test in Europe Conference & Exhibition (DATE)*. Di Natale, G., Bolchini, C. & Vatajelu, E.-I. (eds.). Institute of Electrical and Electronics Engineers, p. 1704-1709 6 p. 9116241

### **A scenario- and platform-aware design flow for image-based control systems**

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### **Performance Analysis of Embedded Platoon Controllers**

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### **Designing image-based control systems considering workload variations**

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### **A Performance Analysis Framework for Real-Time Systems Sharing Multiple Resources**

Nikkhah, S. T., Geilen, M., Goswami, D. & Goossens, K., Mar 2020, *Proceedings of the 2020 Design, Automation and Test in Europe Conference and Exhibition, DATE 2020*. Di Natale, G., Bolchini, C. & Vatajelu, E.-I. (eds.). Institute of Electrical and Electronics Engineers, p. 326-329 4 p. 9116514

### **Approximation-Aware Design of an Image-Based Control System**

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### **Scenarios in the design of flexible manufacturing systems**

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### **Control of platooned vehicles in presence of traffic shock waves**

Ibrahim, A., Čičić, M., Goswami, D., Basten, A. A. & Johansson, K. H., Oct 2019, *2019 IEEE Intelligent Transportation Systems Conference, ITSC 2019*. Piscataway: Institute of Electrical and Electronics Engineers, p. 1727-1734 8 p. 8917389

### **Designing a controller with image-based pipelined sensing and additive uncertainties**

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### **Model-based processor-in-the-loop framework for composable multi-core platforms**

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### **Delay-based design of feedforward tracking control for predictable embedded platforms**

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### **IMACS: a framework for performance evaluation of image approximation in a closed-loop system**

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**Exploiting system dynamics for resource-efficient automotive CPS design**

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**Comparing platform-aware control design flows for composable and predictable TDM-based execution platforms**

Valencia, J., Goswami, D. & Goossens, K., 1 May 2019, In: *ACM Transactions on Design Automation of Electronic Systems*. 24, 3, 26 p., 32.

**The FitOptiVis ECSEL project: highly efficient distributed embedded image/video processing in cyber-physical systems**

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**Evaluation platform of platoon control algorithms in complex communication scenarios**

Zhu, S., Goswami, D. & Li, H., Apr 2019, *2019 IEEE 89th Vehicular Technology Conference, VTC Spring 2019 - Proceedings*. Piscataway: IEEE Press, 5 p. 8746477

**Bridging the controller design-implementation gap for image-based control systems**

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**Feasibility study and benchmarking of embedded MPC for vehicle platoons**

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**CReTS – Co-simulation Framework for Control, Communication and Traffic for Vehicle Platoons**

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**Modeling and analysis of FPGA accelerators for real-time streaming video processing in the healthcare domain**

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**CReTS--Co-simulation Framework for Control, Communication and Traffic for Vehicle Platoons**

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**DASA: an open-source design, analysis and simulation framework for automotive image-based control systems**

Mohamed, S., Zhu, D., Goswami, D. & Basten, T., 2019.

**Compositional dataflow modelling for cyclo-static applications**

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**Co-simulation framework for control, communication and traffic for vehicle platoons**

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### **Optimising quality-of-control for data-intensive multiprocessor image-based control systems considering workload variations**

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### **Robust co-synthesis of embedded control systems with occasional deadline misses**

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### **Firmness analysis of real-time applications under static-priority preemptive scheduling**

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### **OS-aware automotive controller design using non-uniform sampling**

Chang, W., Goswami, D., Chakraborty, S. & Hama, A., Aug 2018, In: *ACM Transactions on Cyber-Physical Systems*. 2, 4, 22 p., 26.

### **Scalable analysis for multi-scale dataflow models**

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### **Design and validation of fault-tolerant embedded controllers**

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### **NoC-based multiprocessor architecture for mixed-time-criticality applications**

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### **Hybrid automotive in-vehicle networks**

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### **Exploring the trade-off between processing resources and settling time in image-based control through LQR tuning**

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### **Memory-aware embedded control systems design**

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### **Checking metric temporal logic with TRACE**

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### **Analysis and visualization of execution traces of dataflow applications**

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### **Design and analysis of control strategies for vehicle platooning**

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### **Beyond traditional sampling strategies for enhanced performance and cost-effectiveness**

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### **xCPS: a tool to explore cyber physical systems**

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### **Multi-objective co-optimization of FlexRay-based distributed control systems**

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### **Resource utilization and Quality-of-Control trade-off for a composable platform**

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### **Automotive cyber-physical systems: a tutorial introduction**

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### **Reconfigurable pipelined sensing for image-based control**

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### **Sample-drop firmness analysis of TDMA-scheduled control applications**

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### **Tight temporal bounds for dataflow applications mapped onto shared resources**

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### **Reliable CPS design for mitigating semiconductor and battery aging in electric vehicles**

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### **Composable platform-aware embedded control systems on a multi-core architecture**

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### **Multi-constraint multi-processor resource allocation**

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### **Time series characterization of gaming workload for runtime power management**

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### **xCPS : a tool to eXplore cyber physical systems**

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### **Battery- and aging-aware embedded control systems for electric vehicles**

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### **Fault-tolerance embedded control systems for unreliable hardware**

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### **Fault-tolerant control synthesis and verification of distributed embedded systems**

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### **Platform-aware design of embedded controllers**

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### **Quantifying notions of extensibility in FlexRay schedule synthesis**

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### **Relaxing signal delay constraints in distributed embedded controllers**

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### **Task- and network-level schedule co-synthesis of Ethernet-based time-triggered systems**

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### **Characterizing feedback signal drop patterns in formal verification of networked control systems**

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### **Compositional analysis of switched ethernet topologies**

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### **Let's put the car in your phone!**

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