

Senior Research Engineer in Siemens Digital Industries Software in Control Systems, ADAS and Autonomous Vehicle

Overview

Research engineer working in autonomous vehicle industry. Strong background in control system area with a proven track record from theory, designing, to implementation. Active in research and development activities such as collaborations, publishing, patenting, writing proposals, and supervising PhDs. Experienced project and team management in multicultural environments.

Highlights Siemens DF PL Invention of the Year Award.

Finalist of the AutoSens Award 2019 in Most Influential Research.

Project manager and execution of EU and Belgian R&D projects.

Published frequently to top journals and conferences: Automatica, IEEE Trans. on Automatic Control, ACC, CDC, IFAC World Congress, and industrial events: JSAE, AutoSens, TRA....

Collaboration with experts in control field: from KULeuven, MIT, EPFL, UTokyo....

Technical Committee and Conference Editorial Board of IEEE Control System Society.

EU Marie Curie Fellowship.

Education

Oct. 2016 **Ph.D. in Mechanical Engineering**, KULeuven, Leuven, Belgium.

Advisors: Prof. Jan Swevers, Prof. Goele Pipeleers

Feb. 2012 **M.S. of Research in Mechatronics**, GIST, Gwangju, South Korea.

Advisor: Prof. Hyo-Sung Ahn

Jun. 2009 **B.S. in Electrical Engineering**, HUST, Hanoi, Vietnam.

Invited Talks and Updates

May 2021 **Invited Seminar in Oxford Control Group, UK.**

<https://eng.ox.ac.uk/control/seminars/>

March 2021 **Invited Seminar in HyConSys Lab, TU Munich, Germany.**

<https://www.hyconsys.com/talks.html>

April 2021 **Invited Seminar in IROHMS, Cardiff University, UK.**

<https://www.cardiff.ac.uk/artificial-intelligence-robotics-and-human-machine-systems>

Jan. 2019 **2018 Siemens DF PL Invention of the Year Award.**

This is a yearly competition to recognize and award the most significant invention during the fiscal year from the Siemens DF PL business unit worldwide. The award includes cash prize and company announcement

Sept. 2019 **Finalist of the AutoSens Award 2019 in Most Influential Research.**

<https://auto-sens.com/awards-2019-finalists-revealed/>

June 2019 **PhD Jury Committee Member of Armin M. Steinhauser**, MECO Research Group, Dept. of Mechanical Engineering, KULeuven.

May 2019 **Presented in JSAE Annual Congress**, Yokohama, Japan.

Presented the developments of autonomous driving safety-critical control and scenario generation
<https://www.jsae.or.jp/2019haru/english/index.html>

May 2019 **Invited Seminar in Hori-Fujimoto Lab, University of Tokyo, Japan.**

<https://sites.google.com/edu.k.u-tokyo.ac.jp/hflab/home>

- Sept. 2018 **Invited Talk in AutoSens Conference**, Brussels, Belgium.
AutoSens is an autonomous vehicle event, participants are the world's leading minds in ADAS and autonomous vehicles: <https://auto-sens.com/speakers-brussels/>
- May 2018 **Invited Seminar in Automatic Control Laboratory, EPFL**, Lausanne, Switzerland.
<https://memento.epfl.ch/event/simulation-based-testing-and-validation-framework-/>
- May 2018 **Presented in JSAE Annual Congress**, Yokohama, Japan.
Presented the Siemens PLM developments on autonomous valet parking planning and control
<http://www.jsae.or.jp/2018haru/english/>
- April 2018 **Presented in Transport Research Arena**, Vienna, Austria.
Presented the Siemens PLM co-simulation testing and validation framework for ADAS developments
<https://www.traconference.eu/>

Experience

- 2016–Present **Senior Research Engineer**, Siemens.
Working on multiple European and Belgian research and development projects, with focus on control and ADAS and autonomous vehicle. Setup collaborations with academic institutes.
- Autonomous valet parking, highway pilot, green wave technology, intersection crossing
 - Optimal and model predictive control (MPC) developments with real-time implementations
 - Collision avoidance algorithm developments
 - Machine learning algorithms: deep learning, Gaussian process, imitation learning
 - Driving style classification
 - Mixed virtual-real testing for ADAS development process
 - Scenario generation
- 2016–Present **Project Management and Supervisor**, Siemens.
- Manage control and ADAS/AV projects: coordination, proposal writing
 - Supervise PhD, researcher, Master, and intern students in the R&D team
- 2012–2015 **EU Marie Curie ITN Training Programme**, EU FP7 IMESCON Project.
- EU Marie Curie scholarship to do PhD and training programs
 - Model identification and control design for the amplified piezo actuator, Cedrat Technologies (France).
 - Various trainings within the EU FP7 project scope.
- 2012–2016 **Advance Control Design for Mechatronic Systems**, KU Leuven, Belgium.
- Control theory: linear and nonlinear control, robust control, optimal control...
 - Design techniques: PID, loop-shaping, model-based control, H-infinity control, MIMO control, feedforward control, model predictive control (MPC)...
 - Optimization tools: convex optimization, LMI, optimization softwares
 - Experimentally validated on a lab-scale overhead crane and XY wafer stage setups.
- 2012–2016 **Iterative Learning Control (ILC)**, KU Leuven, Belgium.
- Main PhD research topic
 - Proposed a novel robust norm-optimal iterative learning control in time domain
 - Proposed and designed a multi-objective ILC problem in frequency domain
 - Developed multivariable ILC analysis and design
- 2010–2012 **Research Assistant**, GIST, South Korea.
- Did research in the Distributed Control and Autonomous Systems Lab. (GIST)
 - Developed multiple points tracking iterative learning control

Professional Services

- IEEE CSS Conference Editorial Board: American Control Conference 2020, 2021; IEEE Conference on Decision and Control 2020, 2021

	Technical Committee On Automotive Control and Smart Cities in IEEE Control System Society
Reviews	Transport Research Arena, IEEE Transaction on Automatic Control, IEEE Transaction on Control System Technology, International Journal of Robust and Nonlinear Control, Control & System Letters, Mechatronics, IEEE Conference on Decision and Control, American Control Conference, IFAC conferences
Memberships	IEEE Control System Society, IEEE Robotics & Automation

Teaching and Supervision

- 2016- **Supervising PhD and Master thesis students** from KULeuven, EPFL, Linköping Univ., PoliTo, UTokyo, Grenoble INP, Delft Univ...
- 2012-2015 **Master course in KULeuven:** Control Theory Exercise Sessions
- 2012-2015 **Master course in KULeuven:** System Theory Exercise Sessions

Skills

- ADAS Motion planning, control, digital twin, machine learning, vehicle dynamic, environment simulation, test generation and automation, XiL verification and validation
- Control System identification, analysis, control implementation, and validation
- Programming MATLAB, Simulink, Python, C, C++, ROS, dSPACE, LabVIEW
PreScan, Vires VTD, Imagine Amesim.Lab, Imagine Embedded Software Designer, L^AT_EX, HTML

Awards

- 2018 Siemens DF PL Invention of the Year
- 2012-2015 Marie Curie Early Stage Researcher Fellowship
- 2011 Best Presentation in Session Award, 2011 American Control Conference
- 2010-2012 GIST Scholarship for Master student
- 2009 International Internship Scholarship in South Korea

Selected Publications

1. **Son, T.D.**, Awatsu L., Hubrechts J., Bhawe A., and Van der Auwerier H., “A simulation-based verification and testing framework for ADAS development”, *Transport Research Arena*, Vienna, 2018
2. Diwale S., **Son, T.D.**, Jones C., “Manifold learning and optimal control for obstacle avoidance in autonomous driving”, *submitted*, 2018
3. **Son, T.D.**, Pipeleers, G., and Swevers, J., “Multi-objective iterative learning control using convex optimization”, *European Journal of Control*, Jan. 2017
4. **Son, T.D.**, Pipeleers, G., and Swevers, J., “Robust monotonic convergent iterative learning control”, *IEEE Transactions on Automatic Control*, Issue 99, Jul. 2015
5. **Son, T.D.**, Ahn, H.S., and Moore, K., “Iterative learning control in optimal tracking problems with specified data points”, *Automatica*, Issue 5, May 2013
6. **Son, T.D.**, Quan N., “Safety-critical control for non-affine nonlinear systems with application on autonomous vehicle”, *58th IEEE Conference on Decision and Control*, Nice, Dec. 2019
7. **Son, T.D.**, Lanh, N., and Van der Auwerier H., “Learning control applications for autonomous driving in extreme maneuver scenarios”, *submitted*
8. **Son, T.D.**, Bhawe A., and Van der Auwerier H., “Simulation-based testing framework for autonomous driving development”, *IEEE 2019 International Conference on Mechatronics*, Ilmenau, Germany, Mar. 2019

9. Steinhauser, A., **Son, T.D.**, Hostens, E., and Swevers, J., "ROFALT: An Optimization-based Learning Control Tool for Nonlinear Systems", *The 15th International Workshop on Advanced Motion Control*, Tokyo, Mar. 2018
10. **Son, T.D.**, A., Pipeleers, G., and Swevers, J., and Van der Auwerier H., "A Generalized Frequency Domain Learning Control Design with Experimental Validation", *The 43rd Annual Conference of the IEEE Industrial Electronics Society*, Beijing, Nov. 2017
11. **Son, T.D.**, Steinhauser, A., Pipeleers, G., and Swevers, J., "Robust performance iterative learning control : Analysis, synthesis and experimental validation", *The European Control Conference (ECC16)*, Denmark, Jul. 2016
12. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Robust analysis and synthesis with unstructured model uncertainty in lifted system iterative learning control", *2015 American Control Conference (ACC15)*, Chicago, USA, Jun. 2015
13. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Experimental validation of robust iterative learning control on an overhead crane test setup", *The 19th World Congress IFAC 2014*, Cape Town, South Africa, Aug. 2014
14. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Robust optimal iterative learning control with model uncertainty", *The 52nd IEEE Conference on Decision and Control (CDC13)*, Florence, Italy, Dec. 2013
15. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Optimal iterative learning control design with trial-varying initial conditions", *The European Control Conference (ECC13)*, Zurich, Switzerland, Jul. 2013
16. **Son, T.D.**, Ahn, H.S., "Optimal iterative learning control with uncertain reference points", *The 2012 IEEE Multi-Conference on Systems and Control*, Dubrovnik, Croatia, Oct. 2012
17. **Son, T.D.**, Ahn, H.S., "Iterative learning control for optimal multiple-point tracking", *The 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC 2011)*, Orlando, USA, Dec. 2011
18. **Son, T.D.**, Ahn, H.S., "An interpolation method of multiple terminal iterative learning control", *The 2011 IEEE Multi-Conference on Systems and Control (MSC 2011)*, Denver, CO 80202, USA, Sept.. 2011
19. **Son, T.D.**, Ahn, H.S., "Terminal iterative learning control with multiple intermediate pass points", *The 2011 American Control Conference (ACC11)*, San Francisco, USA (**The Best Presentation in Session Award**), Jun. 2011