Son D. Tong

(+32) 473 33 4016
duyson.hut@gmail.com
https://tongduyson.github.io/

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

Overview

Research engineer working in autonomous vehicle industry sector. 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, reviewing, supervising PhD/Master students. Experienced project management and communication skills in multicultural and dynamic environments.

Highlights
- Siemens DF PL Invention of the Year Award.
- Finalist of the AutoSens Award 2019 in Most Influential Research.
- Published frequently to top journals and conferences: Automatica, IEEE Trans. on Automatic Control, ACC, CDC, IFAC World Congress....
- Project manager and execution of EU and Belgian R&D projects.
- Collaboration with experts in control field: KULeuven, MIT, EPFL,....
- 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.

(Recent) Updates

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-/

June 2018 **Invited Talk in REM2018**, Delft, Netherlands.
The 19th International Conference on Research and Education in Mechatronics: http://www.rem2018.nl/

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 PLM, Belgium.
Working on different European and Belgian research and development projects, with focus on control and ADAS and autonomous vehicle domains. Setup collaborations with academic institutes.

- Applications: 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 based control design: Deep learning, Gaussian Processes, imitation learning
- Driving style classification
- Virtual testing and validation of ADAS co-simulation system development framework
- Driving scenario generation
- Optimize control performance of autonomous vehicles through machine learning
- HEV optimal control
- Publishing journals, conferences, patents and white papers

2016–Present **Project Management and Supervisor**, Siemens PLM, Belgium.
- Manage control and ADAS/AV projects: administration, proposal writing, collaborating with partners
- Supervise PhD, 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 research/training programs in EU
- Model identification and control design for the amplifed piezo actuator, Cedrat Technologies (France).
- Visited Cedrat Technologies company for doing model identification.
- 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
  - An optimization problem accounting for system uncertainty
  - Guarantee global optimal solution, and can be solved efficiently
- Proposed and designed a multi-objective ILC problem in frequency domain
  - Robustness, convergence speed, tracking error, and input energy objectives
  - Efficient computation
- 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 of American Control Conference 2020

	Technical Committee On Automotive Control and Smart Cities in IEEE Control System Society
Reviews	Transport Research Arena (2018, 2020)
	IEEE Transaction on Automatic Control (2014, 2015)
	IEEE Transaction on Control System Technology (2017)
	International Journal of Robust and Nonlinear Control (2018)
	Control & System Letters (2015)
	Mechatronics (2015, 2016, 2017, 2019)
	International Journal of Control (2017)
	IET Control Theory & Applications (2015, 2016)
	IEEE Conference on Decision and Control (2013)
	American Control Conference (2019, 2020)
	IFAC Adaptation and Learning in Control and Signal Processing (2013)
Menberships	IEEE Control System Society, IEEE Robotics & Automation

Teaching and Supervision

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

Skills

ADAS	Trajectory planning, tracking control, machine learning, vehicle dynamic simulation, environment simulation, test generation and automation, verification and validation of control algorithms
Control	System identification, analysis, control implementation, and validation
Programming	MATLAB, Simulink, Python, ROS, dSPACE, LabVIEW
	PreScan, Vires VTD, Imagine Amesim.Lab, Imagine Embedded Software Designer, LaTeX, 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., Bhave 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-objectivei 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.**, Bhave 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