Son D. Tong

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Senior R&D Researcher in Siemens PLM, emphasis in
Control Systems, ADAS and Autonomous Vehicle

Overview

Highly motivated research engineer working in autonomous vehicle and advanced driver assistance systems (ADAS) industry sectors. Strong background in control system area with a proven track record of research and development from designing to implementation. Experienced project management and communication skills in multicultural and dynamic environments.

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.

Experience

2016–Present   **Senior RTD Researcher**, Siemens PLM, Belgium.

Enable-S3 Project: an European project (74 partners) about European Initiative to Enable Validation for Highly Automated Safe and Secure Systems. www.enable-s3.eu

- Work in the valet parking, highway pilot, and intersection crossing use cases
- Virtual testing and validation of the trajectory planning and control algorithms
- Develop verification and validation tool from Siemens PLM
- Collaborate with different partners in the work packages and projects

RoFaLC Project: Robust and Fast Learning Control (website)

- Develop learning control algorithms to virtual vehicle models
- Optimize fuel consumption on the HEV model
- Optimize control performance of autonomous vehicles through data learning
- Roles as both technical execution and project management

EMDAS Project: Environmental Modelling for Automated Driving and Active Safety (website)

- Co-simulation of LMS Imagine.Lab (vehicle dynamic) and PreScan (environment) for automated driving control development
- Development of model predictive control (MPC)
- Adaptive cruise control application
- Green wave technology application
- Roles as both technical execution and project management

AVCON Project: Avoidance of Collisions and Objects on Narrow Lanes (website)

- Project administrator and proposal writing
- Obstacle (pedestrians, other vehicles) avoidance planning and control algorithm developments

2016–Present   **Project Management and Supervisor**, Siemens PLM, Belgium.

- Manage several control and ADAS projects
- Supervise several PhD, Master, and intern students in the RTD team
- Responsible of a miniature race car setup for control development and demonstration

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 feedback control design for the Amplifed Piezo Actuator of Cedrat Technologies (France).
- Visited Cedrat Technologies company for doing model identification.
- Attended various trainings, meetings within the EU FP7 project.

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–Present **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 and straightforward computation of trade-off curves between objective indices. Help control engineers to choose their desired controller w.r.t. these compromises
- 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

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

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

Teaching

2012-2015 **Master course in KULeuven:** Control Theory Exercise Sessions

2012-2015 **Master course in KULeuven:** System Theory Exercise Sessions

Professional Services

Journal reviewer International Journal of Robust and Nonlinear Control (2018), IEEE Transaction on Automatic Control (2014, 2015), IEEE Transaction on Control System Technology (2016), Control & System Letters (2015), Mechatronics (2015, 2016, 2017), International Journal of Control (2017), IET Control Theory & Applications (2015, 2016)

Conference reviewer IEEE Conference on Decision and Control (2013), IFAC Adaptation and Learning in Control and Signal Processing (2013)

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. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Multi-objectivei iterative learning control using convex optimization", ***European Journal of Control***, Jan. 2017

3. **Son, T.D.**, Pipeleers, G., and Swevers, J., "Robust monotonic convergent iterative learning control", ***IEEE Transactions on Automatic Control***, Issue 99, Jul. 2015

4. **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

5. 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 (AMC2018)*, Tokyo, Mar. 2018

6. **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 (IECON2017)*, Beijing, Nov. 2017

7. **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

8. **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

9. **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

10. **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

11. **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

12. **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

13. **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

14. **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

15. **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