

Son D. Tong

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Ph.D. student at KULeuven, emphasis in control system

Research Vision

Control theory, optimal control, robust control, with applications on energy systems, autonomous vehicle and mechatronic systems.

Education

- Jun. 2016 **Ph.D. in Mechanical Engineering**, KULeuven, Leuven, Belgium.
(Expected) 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

- 2012–Present **Advance Control for Mechatronic Systems**, KULeuven, Belgium.
- Experienced various control system topics:
 - Control theory: linear and nonlinear control, robust control, optimal control...
 - Design techniques: loop-shaping, H-infinity, MIMO, feedforward control...
 - Optimization tools: convex optimization, LMI
 - Developed robust norm-optimal iterative learning control (ILC)
 - Optimize a worst-case cost function, accounting for model uncertainty
 - Formulate as a convex problem
 - Proposed and designed a multi-objective ILC problem:
 - Robustness, convergence speed, converged error, and input constraint objectives
 - Efficient and reliable computation of the global optimum and straightforward computation of trade-off curves
 - Developed robust multivariable ILC analysis and design
 - Experimentally validated on a lab-scale overhead crane setup
- 2012–Present **Marie Curie ITN Training Programme**, EU FP7 IMESCON Project.
- Model identification and feedback control design for the Amplified Piezo Actuator (APA500L) of Cedrat Technologies (France).
 - Spent secondment in Cedrat Tech. for model identification.
 - Attended various trainings, meetings within the project.
- 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

Control System identification, analysis, control implementation, and validation
Programming MATLAB, Simulink, L^AT_EX, HTML
dSPACE, LabVIEW

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
2005 HUST scholarship for excellent students

Teaching

2012-2015 **Master course: Control Theory Exercise Sessions**
Mathematical modelling, properties of systems, stability of feedback systems, design of SISO controllers, design of compensators using state feedback, lab sessions: Kalman filtering and state feedback for two-wheel drive robot
2012-2015 **Master course: System Theory Exercise Sessions**
Simulation diagrams, state space equations and system response, Fourier transform and system discretization, bode diagrams, energy dissipation, controllability

Professional Services

Journal reviewer IEEE Transaction on Automatic Control (2014, 2015), Control & System Letters (2015), Mechatronics (2015, 2016), 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.**, Pipeleers, G., and Swevers, J., “Robust monotonic convergent iterative learning control”, *IEEE Transactions on Automatic Control*, Issue 99, Jul. 2015
2. **Son, T.D.**, Ahn, H.S., and Moore, K., “ Iterative learning control in optimal tracking problems with specified data points”, *Automatica*, Volume 49, Issue 5, May 2013
3. **Son, T.D.**, Pipeleers, G., and Swevers, J., “Multi-objective iterative learning control using convex optimization”, *European Journal of Control (in review)*, Feb. 2016
4. **Son, T.D.**, Steinhauser, A., Pipeleers, G., and Swevers, J., “Robust performance iterative learning control : Analysis, synthesis and experimental validation (accepted)”, *The European Control Conference (ECC16)*, Denmark, Jul. 2016

5. **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
6. **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
7. **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
8. **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
9. **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
10. **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
11. **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
12. **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

References

Professor. Jan Swevers

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Professor Hyo-Sung Ahn

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