Son D. Tong

(+32) 484 07 3549
tong.duyson@kuleuven.be
https://tongduyson.github.io/

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 (Expected) **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.
Minor in Automatic Control

Experience

2012–Present **Advance Control for Mechatronic Systems**, KULeuven, Belgium.
- Control theory: linear and nonlinear control, robust control, optimal control...
- Design techniques: loop-shaping, model-based control, H-infinity control, MIMO control, feedforward control, model predictive control (MPC)...
- Numerical optimization: convex optimization, LMI, optimization softwares

2012–Present **Robust Iterative Learning Control (ILC)**, KU Leuven, Belgium.
- Developed robust norm-optimal iterative learning control (ILC)
  - Optimize a worst-case cost function, accounting for model uncertainty
  - Formulate as a convex problem, and can be solved efficiently
  - Equivalent to an adaptive control design
- Proposed and designed a multi-objective ILC problem:
  - Consider robustness, convergence speed, converged error, and input constrant 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

2012–2015 **Marie Curie ITN Training Programme**, EU FP7 IMESCON Project.
- Model identification and feedback control design for the Amplifed Piezo Actuator (APA500L) of Cedrat Technologies (France).
- Spent secondment in Cedrat Technologies company.
- Involved 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: theory and convergence analysis

Skills

Control: System identification, analysis, control implementation, and validation

Programming: MATLAB, Simulink, LaTeX, 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 exellent 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-objectivei 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
Katholieke Universiteit Leuven (KULeuven)
Department of Mechanical Engineering - Division PMA
Motion Estimation, Control & Optimization (MECO) Research Group
Celestijnenlaan 300 - box 2420
3001 Leuven, Belgium
Telephone: +32 16 32 2540
Mobile: +32 479 880 732
Email: jan.swevers@kuleuven.be

Professor Goele Pipeleers
Katholieke Universiteit Leuven (KULeuven)
Department of Mechanical Engineering - Division PMA
Motion Estimation, Control & Optimization (MECO) Research Group
Celestijnenlaan 300 - box 2420
3001 Leuven, Belgium
Telephone: +32 16 37 2694
Email: goele.pipeleers@kuleuven.be

Professor Hyo-Sung Ahn
Gwangju Institute of Science and Technology (GIST)
School of Mechatronics
Distributed Control and Autonomous Systems Lab (DCASL)
123 Cheomdangwagi-ro, Buk-gu,
Gwangju 500-712, South Korea
Telephone: +82 62 970 2398
Email: hyosung@gist.ac.kr