200 YEARS GHENT UNIVERSITY

INDUSTRY-DAY @ IFAC PID18

WHERE: Holiday Inn Ghent Expo Hotel **WHEN**: Wednesday 9th May 2018

Registration deadline 27 April: 200 EUR / day www.pid18.ugent.be/registration.html

Take the questionnaire PID Control for Industry 4.0: www.pid18.ugent.be/Quest.html

Program at a glance:

9:00 – 10:00 Kevin STARR – ABB, USA
Industrial Loop Tuning in the Digital Age

10:10:30 Coffee Break

10:30-12:30 PID Technical Sessions

12:30-13:00 Stijn Derammelaere – UAntwerpen
Take the fast lane: sophisticated yet accessible motion control techniques

13:00 – 13:30 Jan Verhasselt – YAZZOOM
A practical approach for integrating and maintaining computational models in control

13:30 – 14:30 Tao Liu – Dalian University of Technology, China
New PID designs for sampling control and batch process optimization

14:30-15:00 Coffee Break

15:00- 17:30 Debate

Chaired by: Karl-Johan Åström, Lund University, Sweden
New perspectives in industrial PID control

Overview: Ramon Vilanova (UAB, Spain)

Panelists:

Davide Colombo (Gefran, Italy)
Rafael Gonzalez (Repsol, Spain)
Alf Isaksson (ABB, USA)
Jan Verhasselt (YAZZOOM, Belgium)
Sigurd Skogestad (NTNU, Norway)
Yongduan Song (Chongqing University, China)
Massimiliano Veronesi (Yokogawa, Italy)

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Contact us: pid18@ugent.be

Kevin Starr, ABB, USA: Industrial loop tuning in the digital age

In the industrial world automation expansion has grown at a rate that has passed even the best loop tuner. Plant personnel are being tasked with everything from hard networking, drive space management, control platform stability, loop tuning, field instrumentation, and now even cyber-attacks. The result is spotty maintenance coverage an alarming trend towards control loops being turned off, out of range, or inducing variability. Plants that once had a few 100 wall mounted devices now have 1000's of embedded controllers. The result is the loss of production, quality, and in increase in the cost to produce of industrial clients. Tuning in the digital age means being able to have the right person, at the right time, with the right solution. One cannot guess and check or tune by feel. Expanding the circle of influence of our loop tuners and process control personnel is of key importance. Solutions in the automation space that enable data to be converted to information at the asset and function level are crucial, but we can't stop there, these KPI's need consolidated in heads up dashboards that enable demonstrated proficiency so that answers to are you safe, reliable, and optimized are defined in a systematic manner. Now as plants are being joined around the globe, fleet and enterprise solutions that finally enable the linkage of loop performance at plants and process areas can be linked to production, quality, and cost to produce. The need for loop tuners that can manage 100's or even 1000's of loops in the time we use to tune 1 to 10 loops are required. We can't expect the same growth trajectory in the digital age by doing what we use to always do.

Tao Liu, Dalian University of Technology, China:

New PID designs for sampling control and batch process optimization

Owing to overwhelming development of digital control technologies in modern industrial engineering and manufacturing, advanced PID designs have been widely appealed for implementation in sampled control systems. In this lecture, a few up-to-date PID designs for practical applications subject to operating constraints and measurement noise will be presented, based on our research results explored in the past years. For industrial batch processes and periodic systems, by using historical cycle data, iterative learning type PID control system designs will be introduced to realize perfect tracking of the set-point profile against unknown process uncertainties and repetitive load disturbances, along with robust tuning methods to accommodate for time-varying uncertainties or disturbances from cycle to cycle. Finally, some perspective and challenges on PID design are pointed out, hoping to draw more attentions by scholars and engineers in the field of control engineering.

Jan Verhasselt, YAZZOOM, Belgium:

A practical approach for integrating and maintaining computational models in control

It is well known that computational models can bring significant improvements to control, for example when used as a virtual sensor, or for real-time production optimization.

Nevertheless, the adoption of these techniques by industry is limited. One of the reasons is fear of the lack of understanding and maintainability of the so called "black-box" models that are learned from historical data using machine learning techniques. But also when the mathematical model is "white-box", i.e. written by a human expert, adoption is slow for another reason: one needs a programmer to implement and integrate the model in a robust fashion with the control layer of the factory.

In many cases the human experts that understand the production process and/or the business very well and hence can develop the mathematical model in a spreadsheet like Excel, are not programmers and do not wish to learn a new dedicated development environment. At the same time many production companies struggle to find and keep good programmers. Moreover, there is risk that bugs are introduced when an Excel model is translated into a programming language.

In this talk, we demonstrate a novel solution to this problem: the automatic translation of an Excel model into a robust live mathematical model that communicates with the control layer and databases using OPC communication and SQL queries. We also show how with one simple addition to Excel it becomes easy to create dynamic models and introduce time delays, which are often useful in practical applications. We illustrate this with practical use cases from industry.

Stijn Derammelaere, UAntwerpen, Belgium:

Take the fast lane: sophisticated yet accessible motion control techniques

We provide the necessary tools to achieve a high-performance setting of a motion controller (both PID and advanced torque feedforward). We explain all these using demonstrations on cases as well as utilizing a handy workflow. Participants receive a digital version of this workflow with the necessary calculation tools, best practices and instructional videos. In this way, we want to guarantee the practical usability!

We start by studying a cascade control unit, which is standard frequently used in a motion application. In addition, we introduce rapidly applicable techniques to identify dynamic characteristics of the driveline. These measurements (Bode plots) provide a reference for the judicious setting of the PID control parameters. Finally, Digital Twins are used to determine the settings of torque and speed feedforward.