**IFAC Pilot Industry Committee Member Survey: Impact of Advanced Control Technologies**

Thank you for agreeing to serve on the IFAC Pilot Industry Committee. As our first activity we ask you to complete this survey. We will review results with all of you and also summarize them for broader dissemination. Please identify yourself in case we need clarifications. However, your responses will be treated anonymously in reviews and summaries. Please return to secretariat@ifac-control.org by 22 May 2015.

If you have any questions on the survey please contact any of the following: Tariq Samad (tariq.samad@honeywell.com); Serge Boverie (Serge.Boverie@continental-corporation.com); Roger Goodall (R.M.Goodall@lboro.ac.uk).

*Your name:*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Your e-mail:*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Are you associated with industry (I), academia (A), or government (G):* \_\_\_\_

*Question 1: Assessment of advanced control technology impact (please select one check-box in each row; see below for explanations of terms)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | High impact—multiple sectors | High impact—single sector | Medium impact | Low impact | No impact |
| PID control | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Robust control | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Model-predictive control | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Adaptive control  | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Nonlinear control  | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Intelligent control  | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Hybrid dynamical systems | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Discrete-event systems | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Decentralized and/or coordinated control | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| System identification | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Fault detection and identification | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Soft sensing | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Process data analytics | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Other advanced control technology | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |

Explanation of “impact” terms:

* High multi-industry impact: Substantial benefits in each of several industry sectors; adoption by many companies in different sectors; standard practice in industry
* High single-industry impact: Substantial benefits in one industry sector; adoption by many companies in the sector; standard practice in the industry
* Medium impact: Significant benefits in one or more industry sectors; adoption by one or two companies; not standard practice
* Low impact: A few successful applications in one or more companies/industries
* No impact: Not aware of any successful deployed real-world application

Explanation of advanced control terms used:

* PID control: We do not consider PID control an “advanced control” technology but are including it here for calibrating advanced-versus-conventional control.
* Robust control: Includes H-infinity, mu-synthesis, LPV, and others
* Model-predictive control: All variations included
* Adaptive control: Includes model-reference adaptive control and iterative learning control
* Nonlinear control: Feedback linearization, dynamic inversion, sliding-mode, etc.
* Intelligent control: Includes neural networks, fuzzy logic, and evolutionary computing
* Hybrid dynamical systems: Or hybrid systems
* Discrete-event systems: Includes Petri Nets
* Decentralized and/or coordinated control: Includes agent-based control, consensus algorithms, cooperative control
* System identification: All flavors included
* Fault detection and identification: Includes fault-tolerant control
* Soft sensing: Includes virtual sensing, inferential sensing/estimation
* Process data analytics: Multivariate statistical process control, principal components analysis, partial least squares, etc.
* Other advanced control technology: Please identify the technology you are evaluating if you use this row. You can add additional rows if desired.

*Question 2: Challenges for industry applications of advanced control (please check one box in each row)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
| Industry lacks staff with the technical competency in advanced control that is required for high-impact applications | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Control researchers are much poorer than researchers in other fields at communicating their ideas and results to industry management | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| The maturity or readiness level of results of advanced control research is too low for attracting industry interest | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Advanced control has limited relevance to problems facing industries and their customers  | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| The conflict between industry deadlines and academic research timelines is worse in control than in related engineering fields | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Control researchers place too much emphasis on applied mathematics or advanced algorithms whereas successful industry applications require deep domain knowledge | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Control researchers place too little emphasis on plant/process modeling and model-development methodologies | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Control students (undergraduate and graduate) are not sufficiently exposed to industry problems | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| The academic control community is not seriously interested in collaboration with industry | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| There is no problem—advanced control is successful and appreciated in relevant industries | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |

*Question 3: General comments including suggestions for areas of focus for the Pilot Industry Committee (please enter any comments; optional)*

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Please return your completed survey to secretariat@ifac-control.org by Friday, 22 May 2015.