IFAC TECHNICAL COMMITTEE (TC)

ANNUAL REPORT

Report covering period

(This report is provided in addition to the event list and statistics derived from the IFAC event data base, it addresses the workings of the TC, as provided by the TC Chair on recommendation of the TC)

TC Name	Human-Machine Systems
TC Number	4.5
TC Chair	Jianhua Zhang
e-mail:	jianhuaz@oslomet.no

TC Report	**yes**	**no**
(in 1st year of triennium)		
Have you nominated your TC vice-chair(s)?	√	☐

(*list all*)

- Name **Prof Frederic VANDERHAEGEN**
- E-mail frederic.vanderhaegen@univ-valenciennes.fr
- Name **Prof Tetsuo SAWARAGI**
- E-mail sawaragi@me.kyoto-u.ac.jp
- Name **Dr. Sven NÖMM**
- E-mail sven.nomm@ttu.ee
- Name **Dr. Tamsyn E. EDWARDS**
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- Name **Mr. Kenichi TANAKA**
- E-mail Tanaka.Kenichi@ah.mitsubishielectric.co.jp

Have you updated your membership roster?	√	☐

- Number of TC members 90

Have you sent your membership roster to the Secretariat?	√	☐
Have you updated your TC scope?	√	☐

scope: Safety, security, efficiency and effectiveness of HMS; Design, analysis, modeling, control, optimization, supervision and evaluation of HMS; Human-machine interfaces and brain-machine/computer interfaces.

Have you created/amended your TC website?	√	☐

- Address https://tc.ifac-control.org/4/5

List of Working Groups

- Name

- Focus
- Timeline
- Deliverables

Date and Place of Last TC Meeting July 10, 2017, Toulouse, France (during the 20th IFAC World Congress)

Is your TC contributing to a Milestone Report ? ☐ √

Congress Year Report only

- Number of Congress Papers Reviewed by TC

About 70 papers reviewed by TC4.5 for the 2017 IFAC World Congress (Toulouse, FR).

Events sponsored or co-sponsored by your TC:

The major event sponsored by the TC4.5 is the IFAC triennial Symposium on Analysis, Design and Evaluation of Human Machine Systems (HMS). The next one, 14th IFAC Symposium on Analysis, Design and Evaluation of Human Machine Systems (HMS 2019), will be held in Tallinn, Estonia, September 16-19, 2019. [URL: https://cs.ttu.ee/hms2019/index.php?page=cfp]

In addition, the following IFAC events are technically co-sponsored by the TC4.5:

1) 4th IFAC International Conference on Intelligent Control and Automation Science (ICONS), August 2019. Primary sponsor: TC3.2 on Computational Intelligence in Control; General Chair: Prof. Seán McLoone, Queen's University Belfast, UK; IPC chair: Thierry Guerra, University of Valencienne, France.

2) 9th IFAC International Symposium on Advance in Automotive Control (AAC2019), Orleans Conference Center, France, 24 - 27 June 2019. IPC Chair: Lars Eriksson; NOC Vice Chair: Guillaume Collin.

3) 2019 IFAC Workshop on Control of Smart Grid and Renewable Energy Systems (CSGRES 2019), Jeju Island, Korea, June 10 – 12, 2019. Prof Kwang Y. Lee (IEEE Fellow, Chair of IFAC TC 6.3), Baylor University, USA. Main sponsor: TC 6.3.

4) 18th IFAC Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing, South Africa, 2019. NOC Co-chairs: Dr Kevin Brooks, Blu ESP (Pty) Ltd.

5) 2nd IFAC Conference on Cyber Physical and Human Systems (CPHS2018), Miami, Florida, USA, Dec 14-15, 2018. IPC Chair: Prof Sandra Hirche, TU Munich, Germany.

6) 12th IFAC Symposium on Robot Control (SYROCO 2018), Budapest, Hungary, August 27-30, 2018.

Plans for TC?

The recent plan is to publicize and organize the 14th IFAC Symposium on Analysis, Design and Evaluation of Human Machine Systems (HMS 2019), Tallinn, Estonia, September 16-19, 2019.

Another plan is to organize a Special Issue for the international journal Cognitive Neurodynamics (Springer; https://link.springer.com/journal/11571) to attract research work on novel models and substrates for the emergence of learning and cognition in artificial and natural systems, with a special focus on bridging the gap between theoretical research and practical applications (URL: http://www.nichele.eu/ICDL-EPIROB_NSM/ICDL-EPIROB_SNM.html).

In the long run, the traditional scopes of the TC will be expanded to reflect the emerging areas and to make the TC more inclusive to draw researchers from the fields of neuroscience, artificial intelligence, machine learning, etc. On the other hand, the TC Newsletter will be published online regularly to inform the HMS community of the latest events and developments in the field.

Problems - especially any that require TB attention?

None

What is the long-term outlook for the scientific topics of your TC?

Please describe likely future major developments within the scope of this TC

We identify the following long-term topics within the scope of this TC:
- Brain-Machine Interactions
- Neurocomputing and neuroengineering
- Physiological computing
- Affective computing (emotion recognition and analysis)
- Cognitive computing
- Adaptive automation (or adjustable autonomy)
- Computational neuroergonomics (a combination of neuroscience and human factors engineering)
- Human-machine hybrid/augmented intelligence
- Human-robot interaction

The above topics have become increasingly important in industries, such as transportation (e.g., autonomous driving, aerospace), defense (e.g. autonomous mobile robots, unmanned systems), healthcare (e.g., service robots, surgical robots, neural rehabilitation, precision medicine), precision agriculture, and smart/intelligent manufacturing (e.g., petrochemical plant, nuclear power plant).

Recommendation

Please provide recommendations relevant to TC operation such as potential new Working Groups, recommendations to merge this TC with another TC, new trends within the technical field covered by the TC that suggest future changes in IFAC scope or activities, etc.)

An outstanding feature of this TC is its cross-disciplinary nature and increasingly important and ubiquitous role in real-world safety-critical complex systems. We need to expand the traditional scopes of the TC to reflect the latest developments and trends in human factors in control systems.

In order to improve the visibility of human-machine systems within and beyond control systems community, we recommend that the international journal Cognition, Technology & Work (Springer; EiC is Prof F. Vanderhaegen, a Co-Chair of TC4.5) be developed into an IFAC-affiliated journal.

In order to reconcile theoretical research and practical applications, we also recommend to organize symposium panel discussions or special sessions to encourage the participation of practitioners in relevant industry.