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Open Invited Track on
Adaptive User Interfaces for Industrial Applications

Organisers:

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Abstract: Nowadays manufacturing systems are increasing in sophistication and complexity, thus embodying always more complex human-machine interfaces (HMIs). In this scenario, human operators experience many difficulties to interact efficiently with modern automatic machines and robotic cells. In particular, elderly people, although having great experience in the industrial process, feel uncomfortable in the interaction with a complex computerized system. Additionally, a complex HMI creates a barrier to young inexperienced or disabled people preventing an effective management of the production lines. These problems can be tackled through the introduction of adaptive human-centred HMIs that complement the cognitive capabilities and emotional condition of users by compensating their limitations. This open invited track aims at bringing together and presenting the last innovative advances in the development of adaptive HMIs, ranging from methods to measure worker's capability and skills and profile users to solutions for adaptation.

IFAC technical committee for evaluation: TC4.5 - Human Machine Systems.

Keywords: Human centred automation, Modeling of human performance, Design methodology for HMS.

Detailed description: Modern automatic machines and robotic cells in production plants are becoming more and more complex because of higher demands for fast production rate with high quality. Over these basic functions, factories today need smarter machines that implement advanced functions, such as fault diagnosis and fast

recovery, fine-tuning of process parameters, and fast reconfiguration of the machine and robot parameters to adapt to production changes. Despite high levels of automation of machines and robots, human operators still work in close cooperation with them to control and supervise the basic and the advanced functions.

Human operators interact with machines and robots by means of human-machine interfaces (HMIs), which are inevitably becoming more and more complex as new functions are implemented by the production system. As a consequence, human operators experience many difficulties to interact efficiently with the machine. This is particularly true for elderly (and middle age) workers who feel uncomfortable in the interaction with a complex computerized system, despite having a great experience about the underlying process. On the other hand, complex HMIs linked to complex machine and robot functions create a barrier for an effective management of the production lines to young inexperienced or disabled people, who lack in experience in the industrial process or have physical or cognitive impairments that limit the use of complex automatic machines, respectively.

These issues call for new **adaptive human-centred HMIs that complement the cognitive capabilities and the emotional and physical condition of users** by compensating their limitations or by taking full advantage of the worker's experience. The goal of these user interfaces is to suitably adapt the information content and the presentation style, thus taking the charge of covering the gap between the user and the machine or robot and enabling elderly, disabled and inexperienced users to effectively use the machine or robot.

In this perspective, the main intention of the proposed open invited track is to collect the recent advances and work in progress on the development of adaptive HMIs. Topics of interest include, but are not limited to:

- users profiling,
- measurement of human capabilities,
- users modelling,
- computational models of emotion,
- methodologies for adaptation of user interfaces,
- affective human-machine/robot interaction.