

1. Title

4th International Workshop in Cybernics
- New Perspectives of Cognitive Systems Engineering

2. Organizers

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3. Abstract

We propose a full-day workshop containing research presentations (oral and poster) and open discussions for Cybernics. Cybernics is a new interdisciplinary field for studying technologies that enhances, strengthens, and supports physical and cognitive functions of humans, based on the methodology of functional, organic, and sociological fusion of human, machine and information systems. Firstly, several technical presentations are addressed by world-leading professionals specialized in the cognitive systems engineering and assistive technology. Then, there will be ample discussion slots where participants can share their opinions with speakers. They will provide the workshop unique and valuable perspective with the reliable and up-to-date knowledge from industry.

4. Motivation and objectives (less than 300 words)

One of several important perspectives in Cybernics is the design of a seamless interface for interaction between the inside and outside of the human body. Thus the study of human-robot interaction in diverse aspects such as physical, neuro-physiological, and cognitive levels is a central theme. We believe that Cybernics will play a significant role to cope with aging society on state-of-the-art technologies. However, considering the final goal to contribute to people and society, we have to get down to wide range of issues besides technological aspects. Therefore, it is very important to promote inter-relations between medicine, engineering and humanity, and thus we incorporate broad expertise such as ethics, legislation, security and human society.

In March 2008, we held an international workshop for Cybernics at Amsterdam. We will also have the second workshop meeting in this November. The inter-relations among different fields and approaches have been discussed so far in a series of workshops for Cybernics. This time at IFAC HMS2010, we will put emphasis on the technological aspect in the field of Cognitive systems engineering. We will provide crucial issues and problems for broader participants based on the experience and accumulation of the past three events. The goal of the workshop is to explore new ideas based on sharing common knowledge and realistic issues with broad IFAC participants across different application domains. We consider this opportunity invaluable since the workshop will lead to the main conference whose theme we see as the analysis, design, and evaluation of human-machine systems.

5. List of topics

Cognitive systems engineering, Human machine interface, Cyborg studies, Rehabilitation Robotics (life support, assistive technology, human support, wearable robots), Neuroscience/Brain machine interface, Vital sensing technology, Life support technology for elderly people, Physical/Cognitive Human-Robot interaction

6. List of presenters with affiliations and status of confirmation

- Toshiyuki Inagaki (University of Tsukuba, Japan) [*organizer*]
 "*Grand challenge of Cybernics and Cognitive Systems Engineering*"
- Henrik Hautop Lund (University of Southern Denmark, Denmark) [*under negotiation*]
 "*Cognitive approach by Modular Robotics in Rehabilitation*"
- Isabelle Viaud-Delmon (IRCAM, France) [*under negotiation*]
 "*Auditory Feedback and Rehabilitation*"
- Kevin Warwick (University of Reading, UK) [*under negotiation*]
 "*Cyborg Technology*"
- 2 Oral Presentations
- 8 Poster Presentations
- * We plan to call for papers after this workshop is confirmed.

7. Intended audience

The workshop is designed to attract scientists and students having background in robotics or computer science and interests in cognitive systems engineering, assistive technology and rehabilitation. In addition, the scope of workshop is also of interest to clinicians or physical therapists having some experience in assistive technology.

8. Tentative schedule and agenda [Tentative]

10:00-10:05	Opening (Yoshiyuki Sankai)
10:05-10:30	Special talk (Toshiyuki Inagaki)
10:30-12:00	Technical Presentation 1-3
12:00-13:30	Lunch break
13:30-14:00	Technical Presentation 2
14:30-15:00	Poster Session
15:00-16:00	Panel and Wrap-up meeting (All presenters and organizers)

9. Contents of the workshop / tutorial proceedings

- Handout or printed materials of extended abstract
- Online archive of the workshop

10. Relation to the previous workshops/tutorials.

The series of workshop on Cybernics began at Amsterdam in March 2008 (invitation only, about 20 scientific presentations and more than 60 participants), and then the second workshop meeting at Tsukuba, Japan, in November 2009 (about 15 scientific presentations and more than 50 participants). We have also organized a workshop in conjunction with IEEE ICRA2009 at Kobe, Japan in May 2009.