Cyber Physical Systems for PEdagogical Rehabilitation in Special EDucation

Project Acronym: CybSPEED
Project start 1.12.2017 and end date 30.11.2021
Type of MSC action, H2020 (ITN, IF, COFUND):
RISE (Research and Innovation Staff Exchange)
Budget: 1 386 000 €

1. The concept of Cyber-Physical Systems

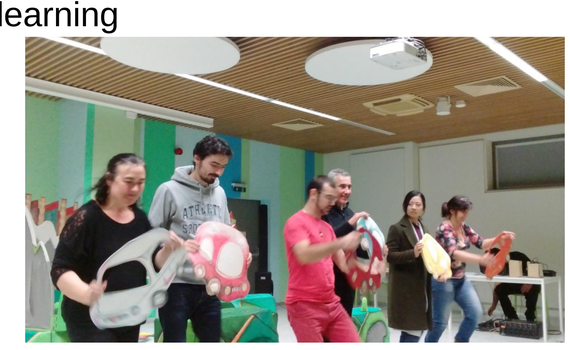
Defined by certain adaptive, sensing and reasoning abilities with a varying degree of autonomous behaviours within networked environment (i.e. internet-of-things) – with or without the human in the information and control loop

Nao telling a story to kids at school

Humanoid-robot interaction

2. The approach

CybSPEED promotes an approach to learning by designing human-robot situations (games, pedagogical cases, and artistic performances) and advanced interfaces (brain-computer, eye-gaze tracking and virtual reality) where children and students interact with the novel technology to enhance the underlying self-compensation and complementarity of brain encoding during learning



Performance with “Tsvete” Theatre

Child controlling robot movement

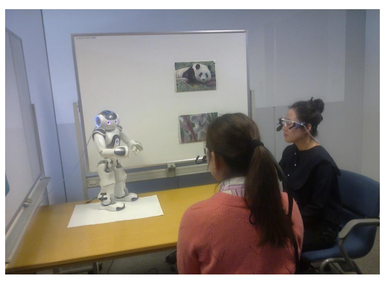
3. Global CybSPEED Aims

CybSPEED Action aims to create an international and inter-sectoral network of the participating organizations that will perform research advancing the novel framework for analysis, modelling, synthesis and implementation of Cyber-Physical Systems (CPSs) for pedagogical rehabilitation in special education.

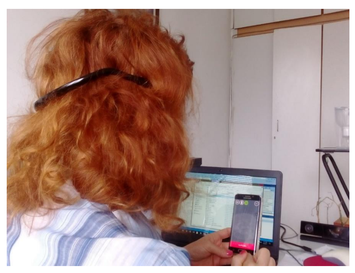
First meeting with NAO at DPkids

4. CybSPEED work based on novel human-robot interface

- Teaching robots express empathy by detecting the cognitive/social motivation of the learner…
- Providing smart feedback to users/children with minimal brain dysfunction to help focus attention…
- Empowering the learner by giving control over the learning process independently of physical or mental condition…
- Bridging communication with typically developing children…



Eye Gase Recording



Novel interfaces in brain-robot interaction - Emotiv

5. Actions, results and dissemination

Specific training during secondments towards cognitive biometrics

Setting electroencephalography (EEG), electromyography (EMG) and eye tracking (pupilometry) data experiments with novel mobile (or remote) interfaces led by partner **Kyutech** (Japan)

Design of Virtual Reality platform for sensations restoring in rehabilitation, led by **UGA** in collaboration with beneficiary **CHU** (France)

Synthesis of components of robotic systems for special education (humanoid and non-humanoid) led by **IR-BAS** (Bulgaria)

Computational modelling approaches to higher cognitive functions led by **UPV/EHU** and **CVC** (Spain), **EMaTTech** (Greece), ”rain-aware” robotics **Kyutech** (Japan), **UH2C** (Morocco) and **CEINE** (Chile)

6. Expected outcome

To achieve a shared culture of research and innovation that welcomes and rewards creativity and helps to turn research ideas into novel type of CPSs for the benefit of the society

7. Consortium

CybSPEED involves 4 organisations from the academic and 4 from the non-academic sectors (1 hospital, 2 SMEs and 1 NGO), based in Europe, a world leading partner in the multidisciplinary scope of the Action from outside Europe (Japan), as well as active research partners from Chile and Morocco

8. Contact

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