

3 years PhD studentship Enactive learning of juggling at the University Montpellier 1

We are looking for a highly motivated applicant for the degree of PhD to study learning and transfer of perceptual and motor skills in virtual reality environments, in the context of the SKILLS Integrated Project of the European Commission (FP6-IST-2005-035005-IP). Specific interests in the lab involve multisensory integration, motor control and coordination in sensorimotor systems, based on coordination dynamics and enactive paradigms of interaction between the human operator and the interface system devoted to accelerate skill acquisition.

Contacts: Julien Lagarde (julien.lagarde@univ-montp1.fr) or Denis Mottet (denis.mottet@univ-montp1.fr).

Laboratory: Motor Efficiency and Deficiency, Montpellier 1 University, France.

www.edm.univ-montp1.fr

www.univ-montp1.fr

Funding: SKILLS Integrated Project of the European Commission (FP6-IST-2005-035005-IP) (www.skills-ip.eu), Resp. UM1 B. Bardy.

SKILLS IP partners involved: Systems and Technology Integration Laboratory CEA LIST, Fontenay-aux-roses, France; PERCRO Lab Sant'Anna Scool for Advanced Studies, Pisa, Italy; Queen University Belfast, Irelande.

Project

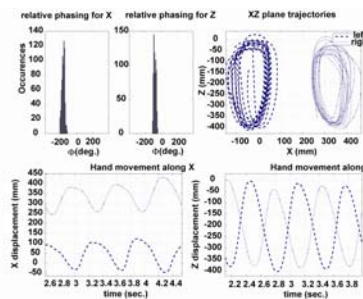
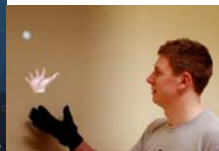
The main objective is to quantify to what extend a virtual reality interface which integrates force feedback (haptics) and vision improves learning and transfer of juggling skills. This includes: 1) measuring and analyzing the behavior of novices, intermediates and experts participants, 2) set up the training scenarios afforded by the interface, 3) testing the efficiency of the training scenarios for learning and transfer to real world.

Key words

Virtual reality, force feedback, learning, transfer, coordination dynamics, motor control, multimodal integration.

Detailed presentation

Virtual reality (VR) platforms attract a growing interest for multidisciplinary research. These new technological tools offer concrete solutions to modern challenges: robotic teleoperation, distant cooperation, workspace and task simulations etc. A very recent area of investigation and application of VR is the acquisition and transfer of skills. Available knowledge related to this last problem remains very limited. The European integrated project SKILLS (www.skills-ip.eu) aims precisely at a better understanding and development of multimodal training VR platforms. The present PhD project is embedded into the SKILLS research program. Juggling expertise has been targeted in SKILLS, among several challenging activities, to investigate fundamental and more applied learning and transfer problems in VR. This choice was conditioned by the appealing complexity of the underlying skills and the available literature in motor control, motor learning and expertise, showing how its acquisition can be captured and tracked by bimanual variables typically used in the coordination dynamics framework.



Left: INCA cables interface (CEA IIST – start up Haption) and PERCRO- QUB lightweight virtual juggling. Right: Frequency and phase coordination to measure bimanual skills in expert juggling from 3D kinematics (Lagarde et al. 2007).

Virtual reality affords flexible and versatile tools to improve learning: use of feedbacks, changes of the simulated physical properties of the situation, augmentation of the environment, guidance of the learner's movements with force fields etc. Others learning scenarios will be investigated to accelerate learning and allow transfer to real world performance. These objectives condition a two fold challenge when designing the VR: extracting critical features from the real world situation to be kept in the VR training while enabling smooth transfer back to real world performance.

Validation test of efficiency of multimodal VR interfaces are seldom based on a principled approach. Here we propose to focus on the stability of coherence of multimodal integration. VR platforms often only approximate synchronization or spatial collocation of senses stimulations (vision, tactile, haptic, sound), hence establishing the range of stability of multimodal integration between senses and movement is key to validate efficient interfaces.

The work will involve the 3D capture of novices, intermediate, and expert jugglers with a state of the art Vicon 8 camera Nexus system and force platforms, designing and test of VR learning scenario for the INCA force feedback cables interface.

The work will also include participation to the integration activities within the SKILLS project (Visits to partners, scientific meetings, and annual review).

Requirements

- Master Diploma in one of the following fields: Human movement science, Neuroscience, Computer Science, Engineering, Psychology.

Research interests and aptitudes

At least two in the following list : Design of human experiments, computer programming (Matlab), quantitative modelling, biological data processing, sensorimotor control, learning, coordination dynamics, biomechanics, computational neurosciences, enaction, haptics

Salary

Monthly salary will be 1650 €(net 1346 €/month) (Health care covered).

Applications

The position is open immediately for 1 year up to 3 years, and will be filled as soon as an appropriate applicant is identified. The latest starting date is First October 2008.

Interested candidates should send via email statement of research interests, and achievements, their CV, the names of two references, and cover letter to Julien Lagarde (julien.lagarde@univ-montp1.fr) or Denis Mottet (denis.mottet@univ-montp1.fr).

Laboratory Efficience & Déficience Motrices, Université Montpellier-1 700 Ave. Pic Saint loup 34090 Montpellier France.

Tel: +33 467 415 735 / Fax: +33 467 415 704.