

Post-doctoral grant

Pattern recognition and sensory feedback in virtual environment for gesture training

Supervisors:

- Sebastien Destercke (CR CNRS) : sebastien.destercke@hds.utc.fr, 33 (0)3 44 23 79 85
- Indira Thouvenin (ECC HDR) : indira.thouvenin@hds.utc.fr 33 (0)3 44 23 45 47

Context: This post-doctoral position is settled within the industrial project KIVA. KIVA aims at developing a virtual environment for Montupet (<http://www.montupet.fr>), with the help of Reviattech (<http://reviatech.com/>) and of Compiègne University of Technology.

Montupet S.A. is one of Europe's leading manufacturers of aluminum-based components for the automotive and other industries. Montupet designs and manufactures parts in cast aluminum for the automotive industry: cylinder-heads, cylinder-block, , structure parts, suspension and braking parts, tooling necessary to its production.

The major competence when one has to manufacture an aluminium part is a technical gesture based on implicit and experience based knowledge. Training for this kind of knowledge acquisition is time and resource consuming. An alternative to this traditional training are virtual reality systems.

An essential feature of virtual environment for training is to be able to guide the learner as she/he performs different tasks. This requires both to recognize quickly the intended task and to detect when this task is performed in a non-optimal way, so that the learner can be corrected and/or warned. Tackling these two issues will be the main task of the post-doctoral grantee.

Topic description: the topic concerns pattern recognition/machine learning problems. However, the setting contrasts with other usual machine learning situations, in the sense that the virtual environment for training is relatively well controlled (learners can only achieve a finite set of gestures, and the environment only displays a moderate variability) but that being able to explain the made decisions is essential to design the learning experience. In summary, from a machine learning perspective, the two main issues to be tackled are the following:

- Quick recognition: in order to provide the learner with real-time sensory feedbacks, it is essential to recognize her/his intended action as soon as possible.
- Explanatory capabilities and fault detection: once the action is recognized, the main issue is to detect that it is performed in a sub-optimal way that could be corrected, and then to provide the learner with appropriate information (sensory, textual,...) indicating him how to improve his gesture.

Candidate's profile: The candidate is expected to have strong skills in machine learning and in programming. Experience in gesture recognition problems is important. Past experiences in industrial applications would be a plus.

Practical details:

Income : about 2K€/month

Duration : two years



Location : Laboratory Heudiasyc UMR CNRS 7253
Université de Technologie de Compiègne (UTC)
Centre de recherche de Royallieu
BP 20529 Rue Personne de Roberval
60205 Compiègne cedex –France
www.hds.utc.fr