

Fiche de projet tutoré / Project form

Ergonomie du mouvement : campagne d'annotation

Encadrement / Supervisors

- encadrant principal / main supervisor

Serena Ivaldi Equipe Larsen-Loria serena.ivaldi@inria.fr

- autres encadrants / other supervisors

Pauline Maurice Equipe Larsen-Loria pauline.maurice@inria.fr

Adrien Malaisé Equipe Larsen-Loria adrien.malaise@inria.fr

Description / Description

This project is linked to our ongoing research in the AnDy project (www.andy-project.eu). We would like to create algorithms that can automatically compute the quality of a human movement from the point of view of ergonomics criteria. We are using standardized ergonomics evaluation sheets as reference, such as EAWS, where each movement is analyzed from the point of view of postures, actions, interaction with weights etc. A score is computed at the end of each movement : depending on the score value, one movement can be classified as ergonomically acceptable, mildly dangerous or seriously dangerous for the human health. This kind of evaluations is particularly important for the ergonomic assessment of workstations in industry, where workers are often executing repetitive tasks that increase the risk of musculo-skeletal diseases.

In this context, we are creating an annotated database of human motions, recorded with several sensors : motion capture cameras, wearable sensors suit (Xsens MVN), force plates, video-cameras, contact gloves. The annotation is necessary to identify elementary actions that are usually evaluated using different ergonomics criteria.

The goal of this project is to :

- Increase our current database by recording new tasks, new motions
- Annotate the recorded motions using elementary actions relevant for ergonomics assessment, identifying semantics and transitions between tasks, or compositions of tasks, or anticipatory signals of tasks

A difficulty of the project is to provide a coherent annotation by naive annotators that are not necessarily experts in ergonomics. A validation of some annotation by ergonomics experts will be necessary.

Informations diverses : matériel nécessaire, contexte de réalisation /

Various information: material, context of realization

The annotation campaign will be realized using an open-source software for annotation of videos and sensory flux. The data collection will make use of the sensors in our team (Xsens MVN, contact glove, Qualisys cameras, EMG, etc). Software for data collection from these devices is already available in our team.

Livrables et échéancier / Deliverable and schedule

- November – January : bibliography on human movement and ergonomics evaluation
- February : getting started with the equipment and previous data collections
- March : Data collection
- April – May : Annotation
- May : analysis and report

Bibliographie / References

Ivaldi, S.; Fritzsche, L.; Babic, J.; Stulp, F.; Damsgaard, M.; Graitmann, B.; Bellusci, G.; Nori, F. (2017) Anticipatory models of human movements and dynamics: the roadmap of the AnDy project. Proc. International Conf. on Digital Human Models (DHM).

Maurice, P. (2015) Virtual ergonomics for the design of collaborative robots. PhD Thesis.

D Kulić, G Venture, K Yamane, E Demircan, I Mizuuchi, K Mombaur (2016) Anthropomorphic movement analysis and synthesis: a survey of methods and applications
IEEE Transactions on Robotics 32 (4), 776-795

DB Chaffin, G Andersson, BJ Martin. Occupational biomechanics. Wiley

DB Chaffin (2009) The evolving role of biomechanics in prevention of overexertion injuries
Ergonomics 52 (1), 3-14