

PhD Position

Wearable Sensing and Movement Analytics for the Monitoring of Operators in Manufacturing

Context :

The Centre for Robotics of MINES ParisTech is involved in several research projects on human motion pattern recognition applied to the Human-Machine Collaboration (Collaborative Robotics, Automated Guided Vehicle, etc.) in the Factory of the Future. The main objective of these projects is the development of novel methodologies and technological paradigms that improve the perception of the machine and allows for a natural collaboration between the robot and the operator.

Topic :

In the framework of an H2020 project on the Human-Robot Collaboration for the Factory of the Future, MINES ParisTech opens a PhD position on the Wearable Sensing and Movement Analytics for the Monitoring of Operators in Manufacturing. During everyday tasks, operators carry loads and execute ergonomically difficult and dangerous gestures that might cause injuries, such as Musculo-Skeletal Disorders (MSD). MSD is one of the main reasons for occupational diseases that have a direct impact on both the health of the worker and the productivity of the factory. Moreover, both operators and employers tend to be result-oriented, thus ignoring that a less experienced employee is exposed on high risks of temporary injuries, and in the worst case, to temporary or permanent disabilities. The prevention of such injuries becomes thus crucial. From an ergonomical point of view, the monitoring of the gestural performance of the operator can contribute to the prevention of potential injuries that are related to their postures, force application, etc.. Through the monitoring of the regular performance of the workers, meaningful information related to their motion behavior can be extracted and modelled based on machine learning. After the motion data acquisition, the student will propose a methodology for an analysis of these data based on pattern recognition methods. Wearable sensing, such as electromyography for muscle sensing and force sensing, will be used for measuring muscles activation and force application when a task is performed. Furthermore, quantitative evaluation of the muscular load that is associated to risks of MSDs will be done. Correlations between ergonomic peaks with important muscular load and motion parameters such as the motor task, time pressure, level of risk, emotional state and demographics will be explored. The student will deliver a prototype movement analytics platform that provides functionalities to ergonomists and production directors for understanding the motion performance of the workers and detecting dangerous postures that might be related to risks for injuries. Such analysis and monitoring aim at the ergonomics improvement and injury prevention in the workplace through quantitative assessment of occupational exposure in normal work activities.

This PhD will give the possibility to the student to work with other European researchers both in the project and in the wider academic community, as well as opportunities to work directly with industrial partners. Moreover, the student will acquire transferable skills that will enhance future employability through leading and contributing to highly interactive and collaborative work. Finally, the student will be autonomous and concentrated on his/her work and will contribute to the project management tasks, such as preparation of the project meetings (distance calls or physical meetings in different European countries – 3 per year), reports and deliverables.

Required skills:

Electrical, Mechanical or Computer Engineer, Degree in Applied Mathematics or Msc in Human Factors and Ergonomics or similar with the above degrees. More precisely, the student should have skills on:

- Machine Learning
- Signal processing
- Statistical analysis
- Programming : Matlab, Python, Php, C++, etc..
- The candidate must be proficient in both written and spoken English and possess excellent presentation and communication skills which will be needed for regular interactions with the project partners.

Funding:

The student will have a 3-years contract with a gross monthly salary of 2233€ (complementary activities to research, such as teaching or providing reports and deliverables, etc., are included into the salary)

How to apply or for further information:

Please send your CV and cover letter to Dr Sotiris Manitsaris
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For more information please visit the following links :

<http://caor-mines-paristech.fr/en/home/>

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