2017-00198 - Post-Doc / Micro-data learning for legged locomotion

Level of qualifications required: PhD or equivalent
Fonction: Post-Doctoral Research Visit
Level of experience: Recently graduated

Context
The selected post-doc will work in the ERC project ResiBots (funded by the European Research Council, http://www.resibots.eu). The overall goal of the ResiBots project is to develop novel learning algorithms that make it possible for autonomous robots to quickly discover compensatory behaviors when they are damaged (e.g. a broken motor) or when they encounter an unforeseen situation.

Demonstrations: [ResiBots]

This post-doc is at the intersection of machine learning (data-efficient reinforcement learning for motor learning) and robotics (mainly legged locomotion).

Assignment
Impressive results have been achieved in legged robotics thanks to recent advances in optimal control and to the increase of computational power. In particular, we can now optimize whole-body motions in real time in complex, redundant robots (e.g., [1]). In parallel, the machine learning community (including our group) introduced several algorithms (e.g., [2,3]) that allow robots to learn new behaviors with a few trials.

The objective of this post-doc is to develop new learning algorithms for robot learning that take advantage of state-of-the-art algorithms for legged locomotion, in particular in the case of mechanical damage (e.g. a broken arm) and long-term changes of the body (e.g., a payload). The main experimental platforms will be our 6-legged robot with force sensors on the feet (see: http://www.resibots.eu/photos.html) and a new 4-legged robot with direct drive motors. Experiments will take advantage of our motion capture facilities.

See also: http://members.loria.fr/JBMouret & http://www.resibots.eu

Main activities

Main activities:
- Design new algorithms
- Implement and evaluate algorithms on the robots of the team
- Write scientific articles to be submitted to journals and conferences of machine learning and robotics

**Skills**

**Required skills**

- Strong knowledge of optimal control and/or machine learning are required, but we will definitely consider applicants who have expertise in only one of these two fields.
- A robotics engineer is dedicated to the project, but good C++ programming skills will be useful.
- Knowledge of ROS will be appreciated.

The official language of the team is English and most of the lab does not speak French. Good English skills are therefore required.

**Benefits package**

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

**Remuneration**

2653,00 € brut mensuel