Post-doc position « Manipulation in robotics with model-free model-based hybrid approaches »

PostDoc position at Institute of Intelligent Systems and Robotics, Sorbonne University, Paris,France, within the EU Project PILLAR-Robots (n. 101070381) in the topic of “Purposeful Intrinsically motivated Lifelong Learning Autonomous Robots".

Research activity

The goal of the PostDoc is to advance the state-of-the-art in robotic manipulation regarding industrial and agricultural applications in the context of EU projects PILLAR and EuRobin. The main objective will be to develop control strategies to accomplish manipulation tasks. For this purpose, we will explore hybrid approaches benefiting from both model-based (such as optimal control, model predictive control, and model-based RL) and model-free ones (such as learning from demonstration, and model-free RL). The majority of the research activity for this position will be dedicated to formulating, developing, programming, validating, and finally integrating such control strategies into the dedicated robotic platforms; i.e., integrating with perception, planning, natural language, and cognitive modules that are being developed in the EU projects. The robotic platform used for developing algorithms consists of two 7-axis Franka Emika collaborative arms. The manipulation capacities targeted in these projects are diverse: pulling/pushing sliders and drawers, opening/closing doors, cleaning and tidying up working stations, handing-over objects, using tools, probing, manipulating soft objects such as cables, etc.

The research activities will be supervised by Prof. Stephane Doncieux and Prof. Mahdi Khoramshahi in collaboration with the other researchers at ISIR involved in PILLAR-robots and EuRobin projects.

The position

This is a one-year full-time PostDoc position. A second-year contract will be granted upon completion of the first year and the satisfaction of both parties. The position will be paid according to the French salary regulations for postdoctoral scholars considering the level of experience of the candidate.

The required Skills
The applicants should ideally have:
1) a Ph.D. in robotics and Control Systems,
2) good experience with programming (C++, Python under ROS1 and ROS2), and experience with robotic simulation environments (e.g., Gazebo and Bullet) will also be appreciated,
3) a clear publication record in the major robotics conferences/journals (e.g., ICRA, IROS, RSS, RAL, TRO, IJRR),
4) Strong interest in scientific research: both theoretical (e.g., physical human-robot interaction, intention recognition, manipulation, and grasping) and experimental (design and implementation of experiments with integrated systems and robots),
5) Ability to collaborate with high autonomy and self-responsibility
6) Availability to travel to project meetings with partners.

The PILLAR-robots project
The EU-funded PILLAR-Robots project is developing a new generation of robots that can build on the experience acquired during the robots' lifetime to fulfil the wishes of their human designers/users in real-life applications. Researchers will operationalise the concept of "purpose," drawn from the cognitive sciences, to increase robot autonomy and domain independence during autonomous learning. The goal is to provide the robots with the knowledge and skills needed to operate under targeted applications. The project will use purposeful intrinsically motivated cognitive architecture in agri-food, edutainment, and unstructured industrial/retail field demonstrations.
https://cordis.europa.eu/project/id/101070381

euROBIN: A European network of excellence in robotics
The euROBIN (European ROBotics and AI Network) project is an initiative funded by the European Union to create a network of excellence in robotics and artificial intelligence (AI). This network brings together leading researchers, institutions, and industrial partners in the field of robotics and AI, to develop innovative European technologies and solutions. The vision of euROBIN is to create a European ecosystem of robots capable of sharing their data and knowledge, exploiting their diversity to jointly learn to perform an infinite variety of tasks in human environments. The euROBIN project aims to make significant progress in four key scientific areas: Interaction with the environment, Transfer of learned knowledge, Transferable knowledge representation, and Human-centred knowledge transfer. The euROBIN project will demonstrate the relevance of its scientific results in four promising areas of application: personal robots, industrial robotics, robotics for the circular economy, and robots for quality of life and well-being. The euROBIN network includes 31 partners from 14 countries, with leading research institutions. and industrial partners in the field of robotics and AI.
https://www.eurobin-project.eu/

ISIR

The position will be located in the Institute of Intelligent Systems and Robotics (ISIR, http://www.isir.upmc.fr), Paris, France. ISIR is located in the center of Paris, thus at walking distance from the Seine river, from other academic institutions (Ecole Normale Supérieure, La Sorbonne, Collège de France, Muséum d'Histoire Naturelle, Université Paris Descartes, Hôpital la Pitié Salpétrière), and from famous monuments (Notre Dame, Le Panthéon, le Théâtre du Châtelet, Institut du Monde Arabe). ISIR is under the dual supervision of Sorbonne University, which is a world-class multidisciplinary university, and the Centre National de la Recherche Scientifique (CNRS), which is one of the most prestigious research institutions in the world. ISIR supports its academic and industrial partners to strengthen their innovation capabilities and gain competitiveness in new markets opened by robotics and artificial intelligence in many sectors. With more than 800 m² dedicated to experimental activities, the ISIR maintains one of the largest robotic and AI centers in Europe.
https://www.isir.upmc.fr/isir/presentation/?lang=en

Speaking or understanding french is not required.

How to apply

Interested applicants can contact Prof. Mahdi Khoramshahi
[mahdi.khoramshahi@isir.upmc.fr] AND
Prof. Stéphane Doncieux [stephane.doncieux@sorbonne-universite.fr], with a subject including "[POSTDOC CANDIDATE]", providing their CV and a cover letter briefly describing their background and their career plans. The position remains open until a satisfactory candidate is found.