Early-Stage Researcher (ESR) n. 2

**Object and People Recognition for Personalized Interaction**

**OBJECTIVES**: The aim of the project is to research new algorithms for people recognition, that effectively scale to real-world data. This project will research and design novel algorithms for human body pose estimation during interactions by effectively mix convolutional networks for body part location with regression network for 3D pose estimation in conjunction with differentiable rendering techniques capable of projecting parametric body model on the scene and optimizing the pose estimation process through plain back-propagation. The objective will be to provide real time pose estimation algorithms and exploiting the extracted 2D and 3D body poses for classifying and eventually predicting actions. A possible research line will be the exploitation for the latter task of generative recurrent models trained for both action classification and intention prediction. This task has been effectively applied to pedestrian trajectories, but a very limited number of pioneering works deal with complex full-body human actions and are limited to surveillance scenarios.

**EXPECTED RESULTS**: State of the art algorithms for real time body pose estimation that can be used by the robot for planning and deciding the proper strategy for the HRI. Generative models for action classification and intention prediction in order to potentially generate multiple futures and provide the robots several hypotheses on which the planning and control can be based. In synergy with concurrent European projects (MOVECARE, WISER), we will test the recognition of typical home objects (glasses, remote controllers, keys, etc.) which exhibit different point of manipulation and interaction modalities.