ICT PHD

Research project for a PhD curriculum in ICT – Computer Engineering and Science

**Tutor**: Prof. Roberto Vezzani

**(\*) Italian [Industrial] Co-tutor:**

**(\*\*) Foreign Co-tutor:**

**Proposed Title of the research:**

Computer Vision and IoT for Human Robot Interaction

**Keywords: (5)**

Human Robot Interaction, Computer Vision, IoT, Artificial Intelligence, Human and Robot behaviour

**Research objectives: --(max 10 rows)**

Robots are now entering society alongside humans. In industrial environments, collaborative Robotic Environments are characterized be the humans and robots sharing the same workspace, performing different object manipulation or generic tasks in a collaborative manner or just simultaneously. Moreover, social robots are increasingly present in domestic environments or in various types of receptions. Computer vision and artificial intelligence algorithms are key technologies for several robot tasks, as well as external tools to detect, model and predict the position and the behaviour of both people and robots, together with their mutual interactions.

**Proposed research activity -- (max 10 rows)**

The candidate will carry out the research activities within the AImageLab Group. Analysis of the literature on the topic will be done during the first year, implementing and testing baseline methods. Some approaches available to detect and estimate the pose of people will be adapted to perform the same task on robots. Then, instantaneous information on the robot and people poses will be used to model the continuous behaviour and interactions. Imitation learning will be used to transfer knowledge from humans to robots.

The research will be carried out in cooperation with industrial partners on real environments and using some robotic platforms available at the laboratory.

Particular emphasis will be laid on the adoption of depth and thermal cameras.

**Supporting research projects (and Department)**

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**Possible connections with research groups, companies, universities.**

- Prof. Stan Birchfield, NVIDIA, robotics.

(\*) optional

(\*\*) optional/to be completed on the second year