ICT PHD

Research project for a PhD curriculum in ICT –Industrial Applications of ICT

**Tutor**: Simone Calderara

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

**Proposed Title of the research:** Continual Federated Learning for industry/Apprendimento continuo e federato per l’industria.

**Keywords: (5) continual learning, federated learning, anomaly detection**

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

The objective of the work programme is advancing the studies on a continual Deep learning (CL) solution for visual defect detection and classification, with particular focus on decentralization and privacy-guaranteed training. In details, the objective is to study and research decentralized privacy preserving solution for distributed training of AI models in the online incremental regime (Continual Learning). While, distributed training has been studied under the Federated Learning paradigm, the online refinement of AI models is definitely a novel and understudied research topic. Such a technique will be investigated with a particular focus on industrial application that may include, visual inspection, anomaly detection and production monitoring.

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

Indeed the objective of the research are: - Improve and integrate an online learning system to prevent prediction drift and increase resilience to data distribution shifts for long deployment periods.  
- Design, setup and prototyping of a federated learning solution, allowing for the improvement of the deployed models without the need to share client-side data.

**The candidate is spending 6 month in Tetrapak spa and 6 month in a prestigious European University.**

**Supporting research projects (and Department) Department of Engineering Enzo Ferrari**

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

**Tetrapak spa**

**Lund University Sweden**

(\*) optional

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