CVDI YEAR 9 – IP Disclosure Information Sheet

PROJECT INFORMATION	
Project ID:	**9a.009.TAU**
Project Title:	**Advanced Machine Learning for Industrial Applications – Partially Supporting Measures Against COVID-19 (WP1, WP2, WP3, WP4, WP5 & WP6)**
Project Team:	Moncef Gabbouj, Evgeny Kucheryavy and TAU team

IP Description *(include language/technologies)* *25-150 words each*	**Key Concepts** *(provide concise description of what each PI does)* *10 – 50 words each*
No IP as such is ready, still under consideration, work not yet complete for IP unit. The achievements include machine learning tools for different applications as explained in the right column.	9a.009.TAU-WP1 - Computationally Efficient Multi-domain and Multi-task Learning for Edge Computing in Empathic Buildings -Stress analysis from facial images • Data collection and test trail/demo data collection completed with collaborating partners. • Experiments results for Graph Embedded Subspace Learning framework. 9a.009.TAU-WP2 - Early Anomaly Recognition System • We collected and analyzed 4 different databases with increasing complexity • Identify pitfalls in current anomaly evaluation metrics; • Detect people in videos and estimate their ground plane position using deep learning techniques. • Develop a top-view map that shows the location of detected people through time. 9a.009.TAU-WP3 - Efficient Single-Stage Framework for Object Detection, Distance and Pose Estimation • Experimental analysis for network pruning is performed using SPM in different network architectures. • The proposed single stage baseline is implemented using different network structures. 9a.009.TAU-WP4 – Deep learning confidence estimation for the color constancy problem • We developed a framework for estimating the confidence of existing deep learning-based illumination estimation models and aggregating them into one robust system following two steps:

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	○ First, we estimate the relative uncertainty of the existing CNN-based approaches using Monte Carlo dropout. ○ Then we Aggregate the different deep learning methods according to their output uncertainty. 9a.009.TAU-WP5– System for Early Myocardial Infarction Detection on the Left Ventricle Wall using Echocardiography • Creating the first multi-view echocardiography dataset for MI detection purpose, which consists of A4C and A2C view echocardiography recordings from 130 patients. • Extracting the LV wall on each frame of the echocardiography recordings by the proposed active polynomials method. • Tracking the extracted LV wall to form motion scores of each segment. • Merging the motion scores of A4C and A2C views (feature engineering) for each patient in the dataset. • Deep learning approach for automatic MI detection by transfer learning (trained on A4C views only). 9a.006.TAU (WP6) - Energy harvesting based long-lasting IoT sensor network for industrial construction monitoring • Power source ○ The current system uses cost-effective and efficient FPGA and SDR transceivers ○ HachRF or Blade RF solutions for the initial implementation of the system. Efficiency is maximized by SPM by discovering the importance of each synaptic connection in the network. • Radio interface ○ DASH7 protocol is considered for implementation for unlicensed and licensed bands.