Research theme title: Sistemi Internet of Things abilitati dall' Edge-AI per smart environments

Description: Smart Enviroments refer to any space (private home, industrial plants, city areas, agricultural fields, etc.) augmented with Internet of Things (IoT) technologies and, therefore, featured by sensing, processing, communication and actuation capabilities aimed at the provision of context-aware, cyber-physical services. Smart City, in particular, can be considered as its most relevant example, being an ecosystem of highly heterogenous yet interacting subjects and things on different deployment scales, with an unforeseen degree of autonomicity. In particular, bringing the computation of data from remote servers (e.g., the Cloud) closer to the place where they were generated guarantees undoubted advantages in terms of privacy, data traffic and communication latencies, often essential requirements for Quality of Service (QoS) or of experience (QoE). However, such a migration of Artificial Intelligence (AI) models and techniques at the network edge (also referred as Edge AI or Edge Intelligence) poses relevant research challenges due to the intrinsic features of Smart Enviroments's devices, often very heterogeneous, battery-powered and supported featured by limited computational resources as well as intermittent connectivity.

In particular, the research activity connected to the PhD scholarship will include the study, analysis, (simulation based-)design and implementation of EI approaches within the Smart City scenario detailed above, the exploitation and/or customization of state-of-the-art frameworks and tools, and the application to real testbed in the context of both national and international funded projects, already active and lead by the SPEME Lab directed by Prof. Fortino.

References:

Hajjaji, Yosra, et al. "Big data and IoT-based applications in smart environments: A systematic review." Computer Science Review 39 (2021): 100318.

Kim, Tai-hoon, Carlos Ramos, and Sabah Mohammed. "Smart city and IoT." *Future Generation Computer Systems* 76 (2017): 159-162.

Fortino, Giancarlo, et al. "Middlewares for smart objects and smart environments: overview and comparison." *Internet of Things based on Smart Objects: technology, middleware and applications* (2014): 1-27.

Barbuto, Vincenzo, et al. "Disclosing edge intelligence: A systematic meta-survey." *Big Data and Cognitive Computing* 7.1 (2023): 44.

Deng, Shuiguang, et al. "Edge intelligence: The confluence of edge computing and artificial intelligence." *IEEE Internet of Things Journal* 7.8 (2020): 7457-7469.

Type of Scholarship: DM 118/2023 – Project on PNRR (Italy's Recovery and Resilience Plan)

Hosting University: University of Calabria

Study and research period outside the Hosting Institution: Visiting Research period at a US/UK/EU top-level university with which the prof. Fortino's group is collaborating.

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