ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

PNRR/HPC - TWINS4EE

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Dipartimento DET
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Context of the research activity	With the goal of governing and reducing CO2 emissions from software assets, tools and methods that provide a reliable and realistic estimation of energy consumption of applications and solutions are needed. The aim of the research is to investigate how the digital twin paradigm can be used to monitor the environmental impact of services and applications. Progetto finanziato nell'ambito del PNRR M4C2, Investimento 1.4 - Avviso n. 3138 del 16/12/2021 - CN00000013 National Centre for HPC, Big Data and Quantum Computing (HPC) - CUP E13C22000990001
Objectives	The goal of the research is to provide tools and methodologies to assess the environmental impact of applications running in the cloud and/or the edge, so as to enable the design of solutions that have a limited environmental impact. The complexity of today applications and services that rely on an ever increasing number of components, on network control and management solutions acting on different domains, calls for tools that can careful monitor the working conditions of the various components, predict their behavior, assess their environmental impact. In this context, the research aims to exploit the concept of Digital Twin and apply it to network and application monitoring so as to enable decisions that can make the operation energy-aware. On the one side, the energy consumption can be reduced by choosing the resources that are more energy efficient among the available ones; on the other side, emissions can be taken into account when there is the availability of energy sources with different carbon footprint. Digital twins of the system in operation can allow the assessment of what-if-scenarios and improve the decision making.
Skills and competencies	

competencies for the development of the activity	Knowledge on communications and networking. Programming skills. Competence on machine learning techniques.