

# Engineering Smart Cyber-Physical Systems

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IoT paradigm has revolutionized our daily routine life, connecting a plethora of smart devices, sensors, frameworks, intelligent systems and humans, in order to provide innovative solutions to everyday problems. With the advent of emerging technologies, Cyber-Physical Systems (CPSs) shown great potential in latest years in various application areas, such as healthcare, urban environments, agriculture, transportation, environment monitoring, home automation e.t.c. As they comprise of parts interacting with the physical environment and others having computing and communication capabilities, they constitute a prominent example of systems-of-systems, while the autonomous operation of their components should be ensured. Autonomous components should be smart enough to adjust in the environment they operate, while learning from their peers. The presentation targets at open issues in CPS engineering to promote their autonomy utilizing AI tools and methods and discusses ongoing projects on smart CPS in three different levels: 1) Smart aggregators to manage sensor and actuators and collaborate within each at the edge with no central control. The principles of developing a self-control management middleware for this purpose along with implementation results will be explored. 2) Service integration in a smart CPS environment ensuring the quality of complex services provided to users. A quality-aware event-based platform for the coordination of micro-services aiming at the development of CPS applications and the notion of event fabrication to manage missing events from sensors will be presented. 3) The integration of humans into smart CPS and their wiliness to become part of them. A multi-view design approach focusing on human concerns towards smart systems and the concept of human critically will be discussed. These efforts are presented in the context of specific case studies from prominent CPS domains, targeting smart building management, smart farm management and remote patient monitoring.

## Biography



Mara Nikolaidou is a Professor in the Department of Informatics and Telematics at Harokopio University of Athens, since 2007. Prior her appointment she worked as a computer engineer in the private sector and as IT consultant for the government. She currently serves as the Rector of the University (since 2016). She is appointed as the representative of Greek Universities in the European University Association (EUA) for 2023-2024. Her research focuses on distributed systems and complex system design. Over the last years she actively participated in numerous research projects funded by national, European and international agencies on system engineering, the Internet of Things, Cloud and Edge computing, Cyber-physical Systems and Smart Cities, emphasizing human-in-the-loop and autonomous systems. Recently, she explores responsible computing and ethical requirements in system design. She has published more than 200 papers in international journals and conferences and actively participates in the organization of international conferences in the area of software and systems engineering. She is a member of IEEE (SMC society) and Systems Council. She also participates in OMG, in the working groups for SysML and responsible computing.