

46.A Cloud-Integrated, Multi layered Agent-Based Cyber-Physical System Architecture

Abstract—

Advances in digital electronics have led to a significant increase in the number of systems that couple the digital (cyber) systems with the physical world, namely what have become known as the Cyber-Physical System (CPS). The design of CPS requires a significant amount of reasoning with respect to unique challenges and complex functional, reliability, and performance requirements. This paper presents the suitability of Multi-Agent System technology towards resolving some challenges in the design of CPS. In the proposed method, challenges that are common to most CPS design and the attributes and behaviour characteristics of agents in MultiAgent System to tackle such challenges are outlined. The correctness of this approach is shown from the perspective of Agent-Oriented Programming (AOP) with Java Agent Development (JADE) Platform where agents exhibit autonomous and interactive behaviour. The capability of agents in MAS to interact with one another and with their environments; their flexibility and freedom to monitor, control and change their behaviours are considered appropriate solutions to the prominent CPS design challenges.