

Holonic Intelligence: A Paradigm Shift

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Centralized systems are unsuitable for large-scale integration because of their high reliance on centralized communication, high complexity, lack of scalability, and high cost of integration. The use of Holonic Intelligence technologies avoids these weaknesses. Holonic intelligence is used to build distributed systems with physical and software components that operate autonomously to independently handle specialized tasks and cooperate to achieve system-level goals and a high degree of flexibility in dynamically changing, networked environments. Holonic systems establish a peer-to-peer environment to distribute the logistical and strategic requirements of a system, and improve robustness and scalability.

This lecture presents an introduction to distributed intelligent systems and an overview of the technologies and applications of holonic intelligent systems that have been developed by the presenter and his company, students, and colleagues, in cooperation with the Holonic Manufacturing Systems Consortium, and members of the Technical Committee on Distributed Intelligent Systems of the IEEE SMC Society. The presentation will contrast the differences between centralized and distributed systems, outline advances in the technology, and describe recent applications of holonic intelligence including shop floor control in manufacturing automation, distributed scheduling, RFID-based personnel and object tracking, and resource management of distributed energy systems.