Multi-agent architecture for distributed monitoring in flexible manufacturing systems (FMS)

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This paper appears in: **Robotics and Automation, 2000. Proceedings. ICRA '00. IEEE International Conference on**
On page(s): 2416 - 2421 vol.3
24-28 April 2000
2000
Volume: 3
ISBN: 0-7803-5886-4
IEEE Catalog Number: 00CH37065
Number of Pages: 4 vol. lxiv+4128
References Cited: 26
INSPEC Accession Number: 6683737

Abstract:
This paper describes an intelligent distributed monitoring architecture for flexible manufacturing systems (FMS) based on the multi-agent paradigm. The proposed approach models the FMS by a society of cognitive agents, which monitor a set of heterogeneous resources. These agents have sufficient knowledge for the decision-making and they co-operate together in order to achieve the FMS monitoring functions. The originality of this approach resides in the total distribution of the monitoring functions over the agents and the co-operation of these agents by the contract net protocol for the real-time supervision. These characteristics improve flexibility, extensibility, real-time running, autonomy, fast reaction to faults, and development cost. Experimental results developed in simulation show the feasibility and the potentialities of the proposed multi-agent architecture for distributed monitoring where concepts such us flexibility, co-ordination, reactivity and integration are involved.

Index Terms:
flexible manufacturing systems; distributed monitoring; flexible manufacturing systems; FMS; multiple-agent systems; cognitive agents; real-time systems; expert systems