

Architecting Cyber-Manufacturing Systems

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Abstract:

Multi-faceted systems of the future will entail complex logic and reasoning with many levels of reasoning in intricate arrangement. The organization of these systems involves a web of connections and demonstrates self-driven adaptability. They are designed for autonomy and may exhibit emergent behavior that can be visualized. Our quest continues to handle complexities, to design and operate these systems. The challenge in Complex Adaptive Systems design is to create an organized complexity that will allow a system to achieve its goals.

These complex adaptive systems have dynamically changing meta-architectures. Finding an optimal architecture for these systems is a multi-criteria decision making problem often involving many objectives in the order of 20 or more. This creates “Pareto Breakdown” which prevents ordinary multi-objective optimization approaches from effectively searching for an optimal solution; saturating the decision maker with large set of solutions that may not be representative for a compromise architecture selection from the solution space. Possible approaches that can be adapted in overcoming this difficulty in architecting cyber manufacturing systems will be discussed.

Presenter Bio:

Dr. Dagli is a Professor of Systems Engineering and Engineering Management and also a Professor Computer and Electrical Engineering. He is the founder of Missouri S&T’s Systems Engineering Graduate Program. Dr. Dagli is also the Intelligent Systems Design Area Associate Editor for the International Journal of General Systems and the director of the Smart Engineering Systems Lab (SESL) at the Missouri S&T. He is Senior Investigator in DoD Systems Engineering Research Center-URAC. Dr. Dagli is a fellow of International Council of Systems Engineering INCOSE 2008 and Institute of Industrial and Systems Engineers IISE 2009. He received B.S. and M.S. degrees in Industrial Engineering from the Middle East Technical University and a Ph.D. Engineering Production from the University of Birmingham, United Kingdom, where from 1976 to 1979 he was a British Council Fellow.

