

Cyber Physical Production and Resilience

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Plenary Talk Abstract:

Augmenting collaboration of distributed production and logistics through e-Work and robotics by effective cyber methods is becoming increasingly feasible. Now widely desired solutions to overcome obstacles in supply networks, manufacturing, transportation, agriculture, security, and more are becoming scientifically and technologically possible. Research and implementation of such cyber-augmented collaboration requires understanding of human and organizational augmentation needs for productive and effective cyber-physical production, coupled with brain models, machine learning, and intelligent control, on the way to achieving the production goals. At the heart of cyber-physical augmentation is the Collaborative Control Theory (CCT), guiding the design of interacting, distributed agents. CCT and its design principles have been developed and validated for this purpose, and are described and illustrated in this presentation with emerging intelligent production and logistics applications, collaborative robotics, and cyber-physical production. Recently developed protocols of best matching, error-and-conflict prevention, and dynamic lines of collaboration to overcome disruptions for resilience by teaming are reviewed. Open research challenges are also discussed on how we can proceed to extend solutions to current limitations through the science of production interactions.



Shimon Y. Nof, Ph.D., D.H.C., is Professor of Industrial Engineering, Purdue University, and held visiting positions at MIT and at universities in Chile, EU, Hong Kong, Israel, Japan, Mexico, Philippines, and Taiwan. He is Director of the NSF- and industry-supported PRISM Center (Production, Robotics and Integration Software for Manufacturing & Management; established 1991) linked with PGRN (PRISM Global Research Network); active in IFAC, (International Federation of Automatic Control), IFPR (International Federation of Production Research), IFIP and IISE (Institute of Industrial & Systems Engineers); Fellow of IFPR and of IISE; co-inventor of four cyber automation patents; Editor, ACES Springer Book Series (*Automation, Collaboration, and E-Services*); co-author and editor of fourteen books, including *Revolutionizing Collaboration Through e-Work, e-Business, and e-Service* (2015), and *Best Matching Theory & Applications* (2017).