Recent Advances in Semiconductor Factory Automation, Part 2: Equipment-Level Automation

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This is the second of two special issues that reports some recent research results and industrial applications of semiconductor factory automation technologies with an emphasis on new trends and innovations. The two issues are the result of an effort made by the Technical Committee on Semiconductor Factory Automation. See the Web site at http://tc-sfa.ee.ntou.edu.tw for more information about this technical committee.

The current issue focuses on equipment-level automation. “Scenario Normalization Techniques,” by Chung and Jeng, addresses the scenario normalization procedure for inline steppers (ILSs) and its implementation. The sequence diagram is used to highlight the operation details at the equipment level for modeling the operational scenarios of the stepper and track. Then, the overall operational scenarios are checked against the normalized operational flow to derive normalization rules, expressed in terms of “triggering rules,” before being implemented in an event-triggering programming platform as a coordinator between the equipment control system and the ILS. The design of an ILS coordinator for a real-world photolithographic cell controller is presented in detail.

“Speedy Delivery,” by Liao and Fu, presents a simulation-based, two-phase approach for effective dynamic overhead hoist transport (OHT) allocation and dispatching in large-scale, 300-mm automated material handling systems (AMHS) management. Numerical results based on realistic data from a local 300-mm mass production fab demonstrate that this simulation-based, two-phase approach performs well both in minimizing the averages and variances of carrier delivery times as well as in achieving the target requirements.

Joo and Lee, in the article “Virtual Control,” propose a virtual cluster tool for verifying a scheduler and a cluster tool controller. The authors explain the model architecture and modeling strategies. They also present the use of a formal model-based automatic error detection technique as well as experiences verifying a real cluster tool controller using the virtual cluster tool.

Finally, we would like to thank all the authors for their contributions and the anonymous reviewers for helping improve the articles. We would also like to thank the editor-in-chief, Prof. Kimon P. Valavanis, for approving the two special issues and Ms. Rosalyn Snyder for great editorial assistance.