Design of Diagnosable Semiconductor Manufacturing Machines

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Abstract

This talk presents an approach using Petri nets for designing diagnosable discrete event systems such as complex semiconductor manufacturing machines. The concept is based on diagnosability analysis and enhancement. We interpret and formulate the diagnosability problem as a binary integer linear programming problem that may have a feasible solution. If the system is predicted to be non-diagnosable, the approach tries to add sensors to enhance its diagnosablity, i.e., to make the system diagnosable. The idea is to separate any two undifferentiated event cycles by changing their labels as a result of adding sensors. Our approach is under the assumption that the costs of sensors are not considered. This assumption is well justified in semiconductor manufacturing. We use a real-world Metal-Organic Vapor Phase Epitaxy (MOVPE) system to illustrate that our proposed approach is practically useful.