



FAKULTÄT FÜR  
INFORMATIK

## Lehrstuhl für Simulation

### Introduction to Simulation

#### Assignment 7: Stochastic Petri Nets

In a factory producing solar panels, the wafers are combined with frames into panels, tested and then sorted according to their degree of efficiency. The exact process is described below:

The wafers arrive in random intervals in batches of 50, while the buffer holding them can hold up to 4 batches. The frames arrive singly, but also in random intervals in a buffer that can hold up to 10 frames at a time. A frame can hold 15 wafers.

Only when a frame and 15 wafers are available, does the assembly start. A robot places the wafer on the frame, one at a time. Placing one wafer takes a small but fixed amount of time.

The completely assembled panel is then advanced to the process that bonds the glue and thereby the wafers to the frame background, taking a fixed amount of time. There are two machines available for this process, which can hold one assembled frame each.

After bonding, the panels are tested one by one. This takes a fixed amount of time. The tester can have small power outages, which occur at random intervals. The test can be continued where it left off after such a power out.

Based on the test result, the complete panels are sorted into bins with high or low efficiency and then shipped out. 30% of all panels have only low efficiency.

Assume the following current marking: There are 30 wafers in the wafer buffer and two frames in the frame buffer. One frame is currently being assembled, and the robot has already placed ten of the wafers in the frame. There is only one frame currently being bonded. The tester is currently working and testing a panel, while two others are waiting to be tested.

1. Develop a stochastic Petri net model of this system. Give the places and transitions meaningful names.
2. Which timed transitions must be of type Race Age or of type Race Enable?
3. Which transitions are enabled in the current marking of the Petri net?