Industrial Processes Automation

MSc in Electrical and Computer Engineering
Scientific Area of Systems, Decision, and Control

Winter Semester 2011/2012

2st Laboratory Assignment [1]

Handling Faults in Keyboard Reading

This laboratory assignment aims at studying Discrete Event Systems (DESs) in the aspects of modeling, analysis of properties and synthesis. Synthesis will be based on a recent methodology in the framework of supervised control. This assignment further develops the previous assignment in the keyboard reading component by introducing fault handling mechanisms.
The tools to be used in this work are MATLAB and a Petri Net editor. In the last part of the work the Schneider PLCs will be used once more to validate the proposed methodologies.

Part A

DES modeling:

Using as a base guideline the work done in the first laboratory assignment, it is now desired to model the process of reading one keyboard key as a DES. In particular is supposed to develop a Petri Net that describes the events and the state evolution of the key reading system. Complementing the formal definition of the Petri Net, it is desired also to obtain the corresponding incidence matrix.

Note: in order to obtain a Petri Net as simple as possible (less than 20 places), the rejection of multiple keys (assignment 1, part B) should not be included now; the rejection of multiple keys will be subject of formal analysis in part C of this assignment.

Note2: see in the course webpage tools helping this part of the assignment, namely the graphical editor "pmedit" which allows creating models to import with the Matlab toolbox "tpn5". Both tools are compressed in a single ZIP file "PN_editor_MATLAB_sim_and_Manual.zip".

[1] 2008-2010 original guide by Prof. Paulo J. Oliveira, 2011 rev. by Prof. José Gaspar

Q1: Write the list of events of the DES you are proposing.

Event	Identifier	Description

Q2: Write the list of conditions of the DES you are proposing.

Condition	Identifier	Description

Q3: Write the table of pre and post conditions for each of the events.

Event	Pre-Conditions	Post-Conditions

Q4: Draw the corresponding Petri Net.

Q5: Obtain the incidence matrix of the proposed Petri Net.

Q6: Comment about the temporizations implemented in the first assignment and which are not currently included in the proposed DES.