2021-2022 CMES exam

Final exam – you must come (be present) to the final exam in order to compute the grade!

1) Tasks for 500 XP – Please upload the Solutions in Assignment Exam_TakeHome before the scheduled exam.
    a. Individual Work – solutions given by handwritten (no on computer)!
        i. 25 XP – Dixit card
            1. Format: 12cmx8cm (not electronic, but drawn by you on paper)
            2. Add a description (1-2 paragraphs) of the content of the card, i.e. the incapsulated notions that could be used as CMES notions.
            3. To do: 1 pdf file containing the picture of the Dixit card + description.
        ii. 25 XP – Short question
            1. Handwritten!
            2. Short Question – one paragraph
            3. Select one concept from the list:
                a. Model checking
                b. Synchronous model of computation
                c. Asynchronous model of computation
                d. Finite State Machines (FSM)
                e. Petri nets (PN)
                f. Timed models
                g. Hybrid systems
                h. Dynamical systems
        iii. 50 XP – Long question
            1. Handwritten!
            2. Long Question – maximum one A4 paper
            3. Select one item from the list:
                a. Linear time properties: safety properties, liveness properties
                b. Synchronous vs Asynchronous model of computation
                c. FSM vs. PN
                d. PN - boundness and conservation
                e. PN - coverability tree
                f. Continuous time models
                g. Security testing in ES

b. Team work or Individual work
    i. Embedded Systems
    ii. 300 XP
    iii. To be added later (at 20:00 17 January 2022)

Problem solved with all (Model checking, FSM, PN)

Team members: 2 to 6 members

Problem Description: A factory (ProductionDepartment) can produce 3 types of toys: car, doll, musical instrument. On each day the factory can produce a specific number of toys #toysToProduce. The factory receives continuously what toys to produce (car, doll, musical instrument) from the RequestDepartment. When the number of #toysToProduce is reached, the Production Department sends to the RequestDeparment the STOP message for that day.

Example: #toysToProduce=12

RequestDepartment: doll, train, musicInstrument, train, doll, doll, musicInstrument, train,doll,musicInstrument,doll, train, train, doll.

The ProductionDepartment produces the following toys: doll, train, musicInstrument, train, doll, doll, musicInstrument, train,doll,musicInstrument,doll, train. After that sends the STOP message to the RequestDepartment.

Model the above problem using:

a) Model checking (check the ltlSafe: #toysProduced<=#toysToProduce; check the ltlLive: eventually toysProduced==toysToProduce)
b) FSM
c) PN

Turn in: A pdf file with all 3 solutions (model checking file.pml, FSM, PN). Please state the name of the members.

Bonus points if you Deliver this task and if you fill in the questionnaire: 100XP

https://forms.gle/XUwW3FYtJ3pie5jw7

c. Individual (anonymous) work
    i. 100XP
    ii. Feedback on the CMES activities
    iii. Link for the questionnaire:
        1. Please answer 1 day before the exam!
        2. https://forms.gle/zMMvquRLqhtVM24b8

2) A1b, A2b, A3b – 900 XP - Oral exam
    a. To be presented by the team during Examination session
    b. Please upload the Solution in the corresponding Assignment in Teams before the scheduled exam.
    c. Schedule yourself as a team in the excel file in Teams! – General channel → Files