Automated Verification of Cyber-Physical Systems
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Project Description

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1 How to Send It

You must send by email to `igor.melatti@univaq.it` a single file `AVCPS_2023_2024_StudentId.zip` (in case the project is a group project, you should write all student ids separated by underscores _), which must contain a single directory `AVCPS_2023_2024_StudentId`, with the following content:

- a PDF file `description.pdf` with:
  - name, surname, student id (matricola number) for each student in the group;
  - a description of how the project was designed and implemented;
- a PDF file `slides.pdf`, containing slides to present the project;
- a directory `project` with all implementation files, with a suitable sub-directory organization.

You may speak and share opinions with other students not in the group. However, each group must present a distinct solution.

2 Project Description For 3-Students Groups

1. Use a suitable controller generator (e.g., QKS from http://mclab.di.uniroma1.it/site/index.php/software/38-qks-intro) to synthesize a controller for the multi-input buck DC/DC system with robustness on R and V_i (see paper `all_buck.pdf`).
2. Use a suitable simulator (e.g., Modelica) to model the same multi-input buck DC/DC system of point 1 with random disturbances on R and V_i.
3. Add the controller returned in step 1 to the model written in step 2, so as to obtain cyber-physical system.
4. Implement a statistical model checking algorithm using the simulator obtained in step 3.
5. Perform an automated verification using the algorithm in step 4. The desired property is that the goal is reached within a suitable amount of time. Furthermore, compute the estimated value for the KPIs "minimum time to reach the goal" and "maximum stabilizing time".

3 Project Description For 2-Student Groups

Do not consider the two further KPIs in step 5.

4 Project Description For 1-Student Groups

Do not consider the two further KPIs in step 5. Do not model the robustness in step 1.