**Peer Review Form and Instructions**

During the peer review process, you are responsible for downloading, installing, and running the source code and the Simulink models of the projects of the two groups you have to review. Then, you must assess the following scenarios and complete the Evaluation Table reported on the next page (complete the parts marked with red color). All the following parts (1 to 24) should be completed

Record the test

**Simulink models**

For the following experiments, consider these configuration parameters

1. Move the pacemaker into VOO mode (LRL = 120 bpm, VPW = 1ms, VA = 5V). Open heart view. **Check** that the heart is pacing at 120 bpm, the pulse width is 1ms, and the amplitude is 5V.
2. Change the mode from VOO to AOO and use the following configuration parameters for AOO (LRL = 60 bpm, APW = 5ms, AA = 1V). Open heart view. **Check** if the mode is dynamically changing and if the heart is pacing at 60 bpm, the pulse width is 5ms, and the amplitude is 1V.

For items 3 to 6, use heart rate (A and V) = 62, PW 1ms and contact the other group for their optimal sensitivities.

1. Change the mode from AOO to VVI and use the following configuration parameters for VVI (LRL = 120 bpm, VPW = 1ms, VA = 5V, VRP = 200 ms). **Check** the pacemaker should be pacing in the middle of the natural heart pulse.
2. Change the configuration parameters of the VVI mode to LRL = 30 bpm, VPW = 1ms, VA = 3V, VRP = 200 ms. **Predict** the expected output and **check** in heartview that the pacemaker is pacing correctly.
3. Change the mode from VVI to AAI and use the following configuration parameters for AAI (LRL = 120 bpm, APW = 1ms, AA = 5V, ARP = 200 ms). **Predict** the expected output and **check** in heart view that the pacemaker is pacing correctly.
4. Change the configuration parameters of the AAI mode to LRL = 30 bpm, APW = 1ms, AA = 3V, ARP = 250 ms. **Predict** the expected output and **check** in heartview that the pacemaker is pacing correctly.
5. Open the Simulink model. **Check** if you find any error in the Stateflow design.
6. Open the Simulink model. **Check** if the logic and the hardware management are handled in different Simulink Subsystems.
7. Each mode has some parameters that are needed. **Check** that all the variables required by each mode are configurable.
8. The model should be properly commented. **Check** that the authors add comments to their design.

**DCM**

1. **Check** if you can login and register (10 user max).
2. **Check** if the parameters are saved and able to display the previous parameters’ values.
3. Try to set values for the parameters that are outside their threshold limits or that violate cross-variable limits as well as their increments. **Check** that the system warns the users in these cases.
4. **Check** if you can echo back the data sent to the pacemaker.
5. **Check** if you can display egram.
6. **Check** if the DCM produced errors or crashes during all the previous steps.
7. **Check** if the code is commented.

**Optional + Bonus**

1. If rate adaptive is implemented, **check** if the logic is correct and all R mode is present. *[Optional 1 - Rate Adaptive modes]*
2. Set the mode to AOOR with a reaction time of 3s and all others as nominal values. **Check** for the correct output without shaking *[Optional 2.1 - Rate Adaptive]*
3. Now, shake the board. **Check** if the rate is getting faster and does not exceed MSR. *[Optional 2.2 - Rate Adaptive]*
4. Check if the requirement tables are present. **Check** if they are complete and consistent. *[Optional 3.1 - Testing]*
5. Check if Simulink test cases are present. **Check** if the test cases are reasonable. *[Optional 3.2 - Testing]*
6. Set the mode to DDD with all nominal values, **Check** if the logic and the output is correct, especially note that there should be a AV delay present *[Bonus 4.1]*
7. Set the mode to DDDR with all nominal values, **Check** if the logic and the output is correct, especially note that there should be a AV delay present *[Bonus 4.2]*

Note: The two groups will check all (optional if completed), in the demo we will ask you to demo 1 or 2 depending on the time left.

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - the test does not pass - a failure is present - to 1 the test passes - no failure detected) \*\*\*Note, there is an error with pulse width which may be present in some of the tasks. Take this into account when conducting tests for different modes using the model.  Pass |
| 1 | Expected Result (Textual Description):  The heart is pacing at 120 bpm, the pulse width is 1ms, and the amplitude is 5V. |
|  | Actual Result (Textual Description):  Heart is pacing at 120, output of graph matches the input parameters (PW is 1 ms and amplitude is about 5V) | |
|  | Problem Description (Textual Description):  None | |
|  | Heart view Screenshot: | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - the test does not pass - a failure is present - to 1 the test passes - no failure detected)  Pass |
| 2 | Expected Result (Textual Description):  The mode is dynamically changing and if the heart is pacing at 60 bpm, the pulse width is 5ms, and the amplitude is 1V. |
|  | Actual Result (Textual Description):  Pacing at 60 bpm, the pulse width is 5ms, and the amplitude is 1V. | |
|  | Problem Description (Textual Description):  None | |
|  | Heart view Screenshot: | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - the test does not pass - a failure is present - to 1 the test passes - no failure detected)  Fail |
| 3 | Expected Result (Textual Description):  The pacemaker should be pacing in the middle of the natural heart pulse. |
| Actual Result (Textual Description):  No pulse is found |
| Problem Description (Textual Description):  No pulse is found in the middle of the natural pulse |
| Heart view Screenshot: |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - the test does not pass - a failure is present - to 1 the test passes - no failure detected)  Pass |
| 4 | Expected Result (Textual Description):  No interference from pacemaker, therefore just natural heart |
| Actual Result (Textual Description):  Matched the expected, only hearbeat |
| Problem Description (Textual Description):  None |
| Heart view Screenshot: |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Fail |
| 5 | Expected Result (Textual Description):  It should pace between atrium signals |
|  | Actual Result (Textual Description): no pace between atrium signals | |
|  | Problem Description (Textual Description):  It does not work, no pace found between atrium signals | |
|  | Heart view Screenshot: | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 6 | Expected Result (Textual Description):  No interference from pacemaker, only natural heartbeat according to parameters |
| Actual Result (Textual Description):  Only the heartbeat displayed, should not pace |
| Problem Description (Textual Description):  None |
| Heart view Screenshot: |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 7 | Errors:  The overall state flow is correct, all the transitions have different conditions to get in which means there are no non-deterministic behaviour. |
|
|
| Stateflow Screenshot:  Diagram  Description automatically generated |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 8 | The logic and the hardware management are handled in different Simulink Subsystems? Comments  The logic and the hardware management are handled in the different Simulink subsystems. All the modes are in one subsystem, all the algorithm for the rate adaptive are separated from other subsystem and all the inputs and outputs are listed in different subsystem |
|
|
| Screenshot of the model containing the subsystems  Diagram, engineering drawing  Description automatically generated |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 9 | Errors (e.g., parameters that were not considered).  All the parameters that are needed for the testing, mode, accelerometer is considered in the model. Some of the parameters are not used but also included such as URL. And by changing values in the left side block we can modify or change inputs**.** |
|  | Screenshot of an example of parameters that were considered or are not supported:  Diagram  Description automatically generated | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 10 | Comments: There are comments explaining each subsystem and block  Comments are added in the subsystems and the block for the rate adaptive blocks which are clear to understand, as well as describing each mode |
|  | Screenshot of comments within the model  Graphical user interface  Description automatically generated with medium confidence |
|  | Diagram  Description automatically generated |
|  | Diagram  Description automatically generated |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 11 | Assessment:  All user data is stored in json, once the json file contains 10 different users, an error will pop up if try adding an 11th user. |
|  | Screenshot of login/registration: | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 12 | Assessment: The system will store the data in a json file and read it if you login to that specific user. The json’s file name is in  the format “username.json” |
|
|
| Screenshot of login/registration: |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 13 | Assessment (description of the test - and assessment):  From the DCM. spin boxes with the states set to read-only therefore the user can only scroll through a limited range of data (this avoids getting a value outside the threshold limit). The range of data was taken from the PACEMAKER pdf. PVARP is also disabled as the Simulink part did not require that parameter (it's always set to 0) |
|
|
| Screenshot of the loading of previous parameters |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 14 | Assessment (description of the test - and assessment): Able to echo back the data sent to the pacemaker |
|  | Screenshot of the echo back | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 15 | Assessment (description of the test - and assessment): Data can be collected from the board however we could not implement the proper data into the e-gram. Therefore, the egram is implemented using dummy data. |
|  | Screenshot of the egram | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 16 | Assessment (description of the test - and assessment): No crashes noticed when running the GUI |
|  | Screenshot of the crash | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 17 | Assessment (description of the test - and assessment): Well documented and commented code |
|  | Screenshot (example) | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 18 | Assessment (description of the test - and assessment):  **The rate adaptive modes are implemented with correct changes from the old modes from assignment 1. The rate is changed from LRL to the rate that is tested from accelerometer.** |
|
|
| Screenshot  Graphical user interface  Description automatically generated with medium confidenceDiagram  Description automatically generatedGraphical user interface, application  Description automatically generatedDiagram  Description automatically generated |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 19 | Assessment (description of the test - and assessment): no shaking |
|  |  | |
|  |  | |
|  | Screenshot | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 20 | Assessment (description of the test - and assessment):  Using monitor and tune with a scope, it can be seen that the accelerometer is functioning correctly. The pacing steadies itself at a constant, reflected by the input parameters (in this case, lrl = 60, msr = 120, amplitude = 4, PW = 1, threshold = 4, reaction = 3, RF = 8, recovery = 5) |
|
|
| Screenshot of the comments |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 21 | Assessment (description of the test - and assessment): Table is present and complete |
|  | Screenshot | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected)  Pass |
| 22 | Assessment (description of the test - and assessment): Test cases are present in the excel sheet, demonstrating realistic scenarios for each mode. |
|  |  | |
|  |  | |
|  |  | |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected) |
| 23 | Assessment (description of the test - and assessment):  **DDD mode is not implemented** |
|
|
| Screenshot |

|  |  |
| --- | --- |
| **Task** | Result (Pass/Fail) or Degree of success (from 0 - problems are detected - to 1 - no problems detected) |
| 24 | Assessment (description of the test - and assessment):  **DDDR mode is not implemented** |
|
|
| Screenshot of the comments |