MBSD Lab #4 A.Y. 2023/24

# Purposes

* Integrate the one-pedal controller into a simulated Arduino Uno[[1]](#footnote-1) microcontroller (μC), resorting to SimulIDE[[2]](#footnote-2).
* Interact with the μC through its digital and analog interfaces.

# Instructions

For instructions on how to use SimulIDE and the Platform Support Packages, follow the instructions provided by Prof. Violante in the lectures.

The delivery shall contain:

* The controller Simulink model is used to generate the firmware binary file (plus all the accompanying files needed to make it possible to generate the code again, like .m files containing initializations)
* The firmware binary file to be loaded into the simulated Arduino in SimulIDE
* The SimulIDE project file.
* The PDF or Microsoft Word version of the report.

Is available an example based on a Tank level controller in the folder

The deliverable has to be provided as a . ZIP file up to **June 23rd at 23:59. It shall also contain a brief report explaining the** integration process using the following template. It is sufficient that only one of the group members uploads it.

# Model-Based Software Design, A.Y. 2023/24

# Laboratory 4 Report

## Components of the working group (max 2 people)

* Name Surname, student ID

# I/O interfaces

*[Please describe the I/O interfaces to interact with the one pedal controller through the electrical interfaces of the Arduino]*

*[Screenshot of the controller model ready for the code generation]*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Unit** | **Type[[3]](#footnote-3)** | **Conversion formulas** | **Min[[4]](#footnote-4)** | **Max** |
|  |  |  |  |  |  |

# Code generation for Arduino

*[Please describe the steps to generate the Arduino firmware using the Simulink Support Package for Arduino Hardware]*

*[screenshot of the controller model instrumented with the blocks of the Support Package for Arduino Hardware]*

# Harness

*[screenshot of the harness implemented in SimulIDE]*

## Test stimuli

*[Provide a brief description of the stimuli set chosen to test the controller functionality] Due to the limitations of the SimulIDE, provide stimuli to check the function of the one pedal controller without the whole physical model*

1. Arduino Uno Board Anatomy <https://docs.arduino.cc/tutorials/uno-rev3/BoardAnatomy>, last visited on 16/05/2022. [↑](#footnote-ref-1)
2. SimulIDE, https://www.simulide.com/p/home.html, last visited on 16/05/2022. [↑](#footnote-ref-2)
3. Digital Input (DI), Digital Output (DO), Analog Input (AI).

   For AIs, provide the conversion formula from input voltage to the measurement unit data (indicating also how to perform the conversion from the raw reading of the ADC). [↑](#footnote-ref-3)
4. The Min/Max values that can be handled due to the conversion formula shall be expressed in the measurement unit specified in the Unit column. [↑](#footnote-ref-4)