

# ACCM Toolbox for Model Identification and Controller Design

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## 1 Goal

The goal of this thesis is the implementation of an extensible environment for model identification and controller development at the Institute for Design and Control of Mechatronical Systems under the lead of Prof. Luigi Del Re and is funded by the ACCM.

## 2 Motivation

Due to the rapid progress in this academic field, a centralized platform is needed to increase the maintainability and usability of the resulting procedures. As they are currently developed independently and in a rather isolated fashion (e.g. in the course of diploma theses), the subsequent use of these procedures tends to be highly complicated.

The toolbox addresses this issue by providing a standardized interface for the development and application of such procedures, featuring a graphical programming environment for creating more complex system identification and controller development workflows, where the procedures can be combined by connecting the corresponding blocks.

## 3 Outline

The toolbox will mainly consist of three parts.

### 3.1 Math Engine

In order to perform the necessary mathematical computations, a reasonably fast and flexible math engine is required. We chose to use the Matlab® Computing Engine as the backend, not only due to its speed but also because it provides us with the possibility of using the Matlab® language for the implementation of blocks.

### 3.2 Core Framework

The core of the toolbox will be a C++ framework, offering the necessary interfaces for extending the built-in set of blocks as well as their instantiation and application. The basic set of blocks will consist of three classes:

- *Data*: contains required input/output data for models and systems.
- *Models*: representing the different mathematical models and controllers.
- *Tools*: as the operators, implementing the aforementioned procedures.

### 3.3 User Interface

Inspired by e.g. Simulink, Max/Msp, Pure Data, etc., a graphical programming environment will be incorporated, enabling the user to setup the targeted workflow in a very intuitive manner.

## Supervision by:

Dr. Herbert Prähofer