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Software tests and simulations for realtime applications based on virtual time

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Unit and integration tests are powerful tools to ensure software quality. Writing such tests for realtime applications accessing hardware requires not only replacing the real hardware with a virtual implementation in software. Also time must be controlled precisely. For a number of reasons the time scale in the simulated environment should not be identical to real time: computations needed for a complex plant model might just be too slow for a real time simulation, or some long-term software behaviour should be tested in a short-running test. Communications with devices often require a specific timing which should be subject of a unit test. These examples demand using a virtual time scale in software tests.

We present the VirtualLab framework as part of the MTCA4U tool kit. It has been designed to help implementing such tests by introducing the concept of virtual time and combining it with an implementation basis for virtual devices and plant models. The framework is designed modularly so that virtual devices and model components can be reused to test different parts of the control system software.

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