

# A Real-Time Interface for Xcos – an illustrative demonstration using a battery management system

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As part of an EU-funded research project, the Scilab based development tool LoRra (Low-Cost Rapid Control Prototyping Platform) was created. This allows the realization of the continuously model based and highly automated Rapid Control Prototyping (RCP) design process for embedded software within the Scilab / Xcos environment (cf. Figure 1). Based on the application battery management system (BMS), this paper presents a Real-Time interface for Scilab.

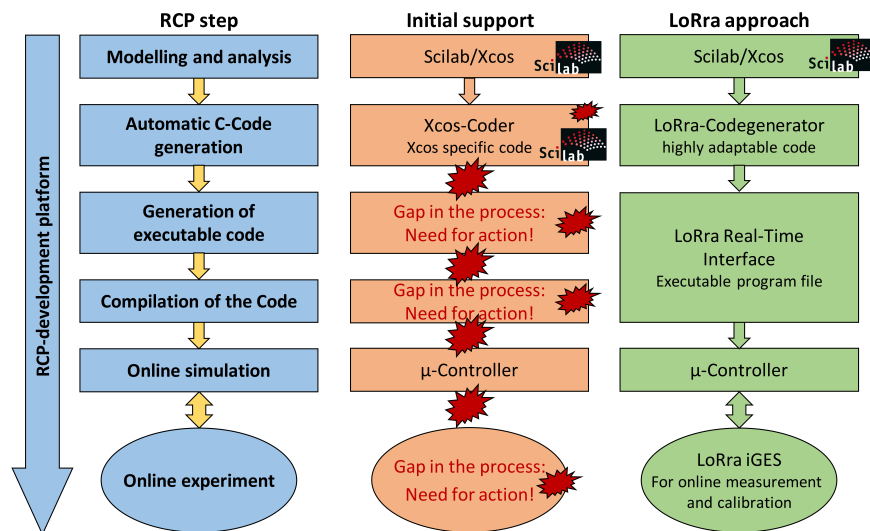


Figure 1: Initial supported RCP process compared with the LoRra approach

For modern batteries, BMS are used to avoid safety critical and battery life reducing conditions as well as to use the full battery capacity. The BMS, containing hardware and software functions, is a complex mechatronic system, which needs to be developed by a model based design process like RCP. It is highly linked with other embedded control units like the electric energy management, which increases the software complexity. In this talk, the design and online simulation of an Extended Kalman Filter for estimating the state of charge (SoC) is presented using Scilab / Xcos and a STM32 microcontroller for an illustrative demonstration.

The objectives of this publication are:

- Giving an overview of the Real-Time Interface and the associated functions, including the requirements, concepts, implementation approaches and handling.
- Presentation of the continuous RCP Process in Scilab 6 by designing an Extended Kalman Filter (EKF) for SoC estimation.
- Validating the functionality of the Real-Time Interface by using a HiL-Simulation of the EKF.