



## Problem

ECU software functions typically consist of multiple sub-functions that exchange data. The end-to-end data-path (e.g. from sensor to actor) has to meet timing constraints mandated by the function. Otherwise, timely reaction to events or controller stability are compromised.

Understanding end-to-end timing at each design stage – from early estimation through final verification – is key. This requires understanding the combination of timing effects due to data-flow between tasks (under- or over-sampling) together with interrupts, task scheduling and blocking.

## Solution

SymTA/S determines—besides the scheduling of individual tasks and processes—also the interaction timing along signal paths, incl. under- and over-sampling effects, data loss, and dynamic task chaining.

SymTA/S calculates maximum end-to-end signal delays and visualizes critical situations.

SymTA/S thus clarifies if a specific implementation is likely to meet the constraints, and points out critical hot-spots along such timing chains.

The models can be used already during function design, gradually refined during PC-based and embedded prototyping, until design freeze. This saves testing time and guarantees timing correctness from early on, also for complex end-to-end questions.