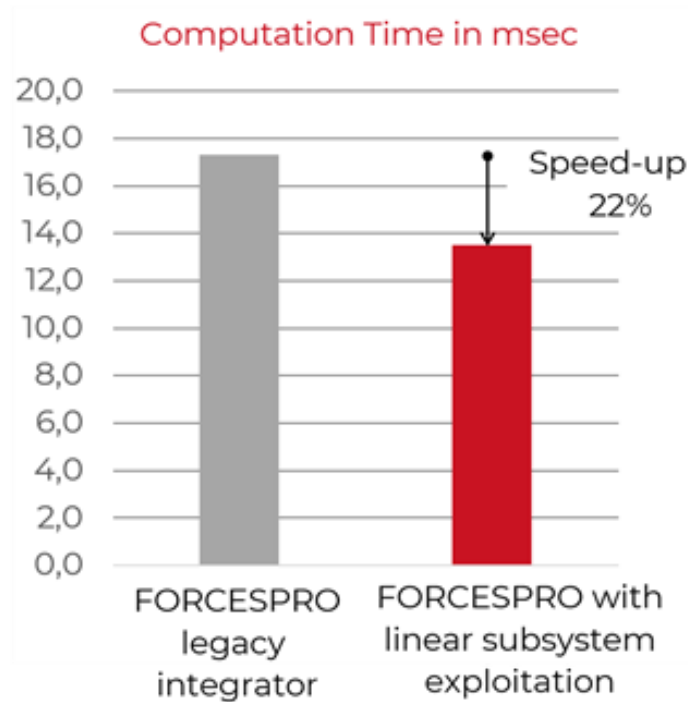


FORCESPRO 4.4 Release

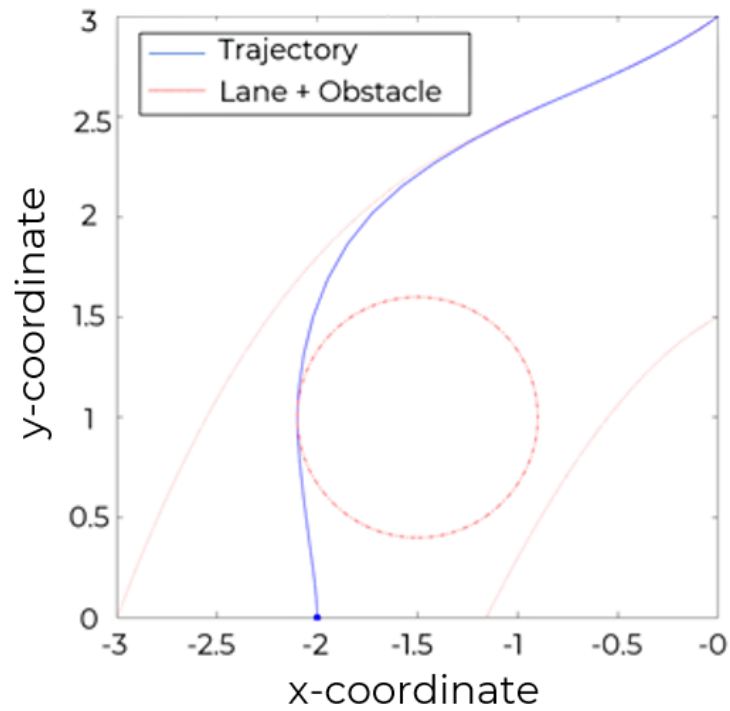
FORCESPRO

Increased Speed on Embedded Systems, Handling of Look-up Tables & SCALEXIO Support

- **Exploitation of linear subsystems:** Nonlinear systems often contain a linear subsystem, e.g. in vehicle dynamics where double integrators exist for the relation between acceleration and position. The new FORCESPRO release automatically detects the existence of linear subsystems and exploits them for the Runge-Kutta 4 integrators within the Nonlinear Programming (NLP) and the Mixed-Integer NLP solver. This reduces the computation time, particularly on embedded systems. The **computation time is reduced by 22%** for a Nonlinear Model Predictive Control algorithm of an automated crane running on a Raspberry Pi while achieving the same closed-loop **control results.**



- **Improved implicit integrator:** FORCESPRO 4.4 comes with an improved implicit Runge-Kutta 2 integration scheme for model discretization that can be used within the NLP solver. The code size and the computation time are significantly reduced such that even complex optimization problems can be solved on heavily resource-constrained embedded targets in real-time. For a **robotic arm application** that is run on a Raspberry Pi, the **code size is 12 times smaller and the computation is conducted 7 times faster** than before.
- **Handling of look-up tables and splines:** Splines are often used for data-based modeling. The newest FORCESPRO release simplifies setting up optimization problems that include splines within the constraint functions or the system model. Additionally, it allows **automatic fitting** of data points, for instance, given as a look-up table with a spline. The release is shipped with a hands-on **application example** for motion planning where the boundaries of the lane are modeled as splines:



- **Support of dSPACE SCALEXIO:** FORCESPRO now also comes with support for **dSPACE SCALEXIO**. Generated solvers can be easily deployed on this target. See **FORCESPRO Features** for a full list of supported hardware.



You can find a list of all algorithmic improvements in the [Release Notes of FORCESPRO 4.4.](#)

Existing users can easily switch to the new version by using our [auto-update function.](#)

Alternatively, you can use the new server at: <https://forces-4-4-0.embotech.com/>

You can find a list of settings for maintaining code options of old FORCESPRO versions in the [legacy list.](#)

Note: Version 3.1.0 will go offline as of July 15, 2021.

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