MODEL PREDICTIVE CONTROL · PYTHON EDITION · CARIMO DCMK KIT

MPC SPEED CONTROL

PYTHON EDITION · NO MATLAB

Real constrained-QP MPC with a Kalman observer, as a one-click Python desktop app. No MATLAB, no toolbox licence, on the same motor.

5 EXPERIMENT DASHBOARDS

The Kalman observer holds speed under a sudden load; without it, the motor droops



Real data behaviour on the DCMK speed loop: with the Kalman observer on, MPC quietly adds the effort to hold the target through a load disk; with it off, the same load drags the motor down.

IN ONE BREATH

MPC Speed Control now runs entirely in Python. A real constrained quadratic program (OSQP) plans every move, a Kalman observer rejects load disturbances, and the motor self-identifies its own model in about 15 seconds. One desktop app launches every experiment. No MATLAB, no Simulink, no toolbox licence, on the very same kit.

No MATLAB — no toolbox licence to buy

~15 s — the motor self-identifies

V1 + V2 — runs on both kit generations

How the app works, one demo flow

1 IDENTIFY
Self-ID the motor from a step, an FOPDT model in seconds.

2 PREDICT
A real QP plans the gentlest moves inside every limit.

3 REJECT
The Kalman observer holds speed under a sudden load.

4 TRACK
Follow staircase and trajectory setpoints, live.

Five experiment dashboards

1. Smoothness & prediction horizon
2. Constraint handling (PWM limits)
3. Kalman disturbance observer
4. Model mismatch
5. Rate limits & trajectory tracking

Why students win

No MATLAB
Real MPC without a MATLAB or toolbox licence to buy.

Self-identifying
The app fits the motor's own model before it controls.

Real hardware
Every result measured on a live spinning motor.

Industry method
MPC runs cars, aircraft, robots and process plants.

Open Python
Readable, editable Python source, inspect every block.

What you need

Software
MPC Python app · Python 3.11 · one-click launcher
No MATLAB, no toolbox.

System
Windows 10 or 11 · one free USB port. Runs on your own PC.

Hardware
CARIMO DC Motor Kit (V1 or V2) with magnetic load disk · **sold separately**

Real predictive control, no MATLAB required. Also available as a Simulink edition.

Part of the CARIMO DCMK control family, built on a 15-year teaching heritage at IIT Bombay

Request a demo or quote | www.carimotech.com | contact@carimo.tech | +91 90823 97027

Representative results measured on a reference CARIMO DCMK kit; figures vary with unit, load and PC. · © 2026 CARIMO Technologies Pvt. Ltd. · incubated at SINE, IIT Bombay.