EE804 MODEL PREDICTIVE CONTROL 2 – 0 – 1 – 3

Pre-requisites: Numerical optimization. General concepts of Model Predictive Control (MPC). MPC based on quadratic programming. General stability properties. MPC based on linear programming. Models of hybrid systems: Piecewise affine systems. Multi-parametric programming and explicit linear MPC. Stochastic MPC: basic concepts, approaches based on scenario enumeration. Linear parameter- and time-varying MPC and applications to nonlinear dynamical systems. Lab Practice: Simulations on selected applications of MPC : helicopter, Solar plant.

TEXT BOOKS/ REFERENCES:

1. E. F. CamachoC. Bordons , "Model predictive control", 2nd edition, Springer 2007
2. James B. Rawlings, David Q, "Model Predictive Control: Theory, Computation, and Design", 2nd edition, 2009
3. A. Bemporad, M. Morari, V. Dua, and E.N. Pistikopoulos,"The explicit linear quadratic regulator for constrained systems", Automatica, vol. 38, no. 1, pp. 3–20, 2002
4. A. Bemporad, "A multiparametric quadratic programming algorithm with polyhedral computations based on nonnegative least squares", IEEE Trans. Automatic Control, vol. 60, no. 11, pp. 2892–2903, 2015.
5. A. Bemporad and M. Morari, "Control of systems integrating logic, dynamics, and constraints", Automatica, vol. 35, no. 3, pp. 407–427, 1999
6. F.D. Torrisi and A. Bemporad, "HYSDEL — A tool for generating computational hybrid models", IEEE Trans. Contr. Systems Technology, vol. 12, no. 2, pp. 235–249, Mar. 2004
7. D. Bernardini and A. Bemporad, "Stabilizing model predictive control of stochastic constrained linear systems", IEEE Trans. Automatic Control, vol. 57, no. 6, pp. 1468–