## Reference Governor for Constrained Data-Driven Control of Aerospace Systems with Unknown Input-Output Dynamics

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This talk considers the design of a reference governor to satisfy pointwise-intime output and control constraints in the setting of data-driven control of aerospace systems with unknown input-output dynamics. This unknown dynamics lumps together the combined effects of unknown internal (state space) dynamics, disturbance forces and torques, and unknown internal (mass/inertia) parameters. The unknown dynamics are modeled by a control-affine ultra-local model (ULM) in discrete time. The reference governor is an add-on scheme that enforces the output and control constraints by modifying, when required, a reference command to the system with unknown input-output dynamics. The reference command is determined on the basis of constraint admissible sets constructed in a data-driven setting and exploiting our ULM. Lyapunov analysis is carried out to ensure that the output of the reference governor-based control system converges to a desired output trajectory that meets the constraints. Numerical simulation results for aircraft longitudinal flight control are reported with this reference governor-based data-driven control scheme, which demonstrate the performance of the controller and the enforcement of the constraints.

**Bio:** Abhijit Dongare is a Ph.D. candidate in Mechanical and Aerospace Engineering at Syracuse University. He received his bachelor's degree in Mechanical Engineering from University of Mumbai in India. He received his M.S. in Mechanical and Aerospace Engineering in 2019 from Syracuse University. His current research interests include nonlinear and geometric control, systems subjected to constraints, predictive control, autonomous unmanned systems and astrodynamics.