

Course Map

LINEAR SYSTEMS THEORY & STATE SPACE APPROACH

- Vector-Matrix Algebra
- State Space Method
- Canonical Forms
- Linear Transformation
- State Non-uniqueness
- Solving LTI State-Space Systems
- State Transition Matrix
- Eigenvalues & Eigenvectors

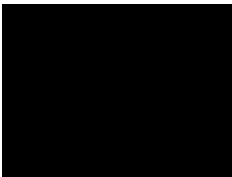
ADVANCED CONTROL SYSTEMS DESIGN IN CONTINUOUS-TIME DOMAIN

- Laplace Transform (Differential Equations)
- Controllability
- Observability
- State Observers & Reduced Order Observers
- Pole Placement & State Feedback
- Servoing and Integral Control
- LQR Controller
- Estimation + Kalman Filter

ADVANCED CONTROL SYSTEMS DESIGN IN DISCRETE-TIME DOMAIN

- Quantization & Digital Systems
- z - Transform (Difference Equations)
- Pulse Transfer Function & its Matrix
- Mapping between z -plane and s -plane
- Discretization of Continuous-time Systems
- Controllability & Observability
- Pole Placement and Observer Design

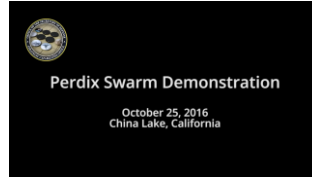
CONTROL DESIGN APPLICATIONS



Advanced Vehicular Suspension



Launch & Recovery of Rockets



Micro-UAV Swarming

1-D **DESIGN** Experience (State Space Control for Magnetic Suspension, Digital Control of Inverted Pendulum)

3-D Immersive **DESIGN** Experience (State-Space Modelling, Control Design and Scenario Implementation on Mini-UAV)