

ELECTIVE - A3 : INTRODUCTION TO ROBOTICS

UNIT 1: INTRODUCTION

Concepts of robot arm kinematics and dynamics - manipulator trajectory planning and motion control - robot sensing - programming and intelligence.

ROBOT ARM KINEMATICS: The direct kinematics problem; links - joints and their parameters - kinematics equations for the manipulators - The inverse kinematics problem; solution by inverse transform techniques - geometric method of solution.

UNIT 2: ROBOT ARM DYNAMICS :

Lagrange - Euler formulation; motion equations for a manipulator and a mal control problems - LQG optimal control problems; Stochastic dynamic programming and the separation principle - Time - invariant LQG optimal control problems.

UNIT 3: Adaptive stochastic control - Model reference adaptive control - on-line system identification via recursive least squares - System prediction of ARMA models closed-loop system parameter identification.

UNIT 4: CONTINUOUS TIME LINEAR STOCHASTIC CONTROL SYSTEMS :

Continuous - time markov processes - markov diffusion processes - stochastic distributions of markov processes. Deterministic dynamic programming and LQ optimal control problems.

UNIT 5: Optimal control of continuous - time linear stochastic systems; stochastic dynamic programming - Innovation processes and the kaiman - Bucy filter - optimal prediction and smoothing - The separation principle - stability considerations for stochastic systems.

REFERENCES :

1. G. CHEN ET AL : Linear stochastic control systems, CRC Press 1995.
2. M.H.A.DAVIES : Linear estimation and stochastic control, chapman & Hall, 1977.
3. P.E.CAINES: Linear stochastic systems, Wiley, 1988.
4. R.F.STENGEL: Stochastic optimal control, Wiley, 1993.

* * * * *