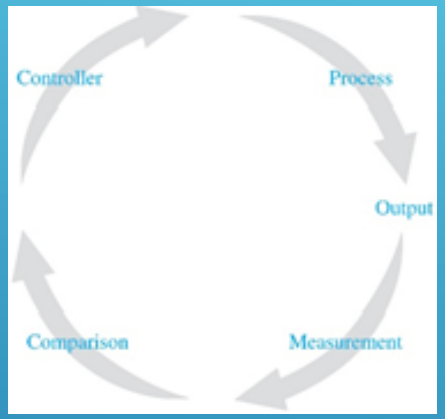
CONTROL SYSTEMS



Doç. Dr. Murat Efe

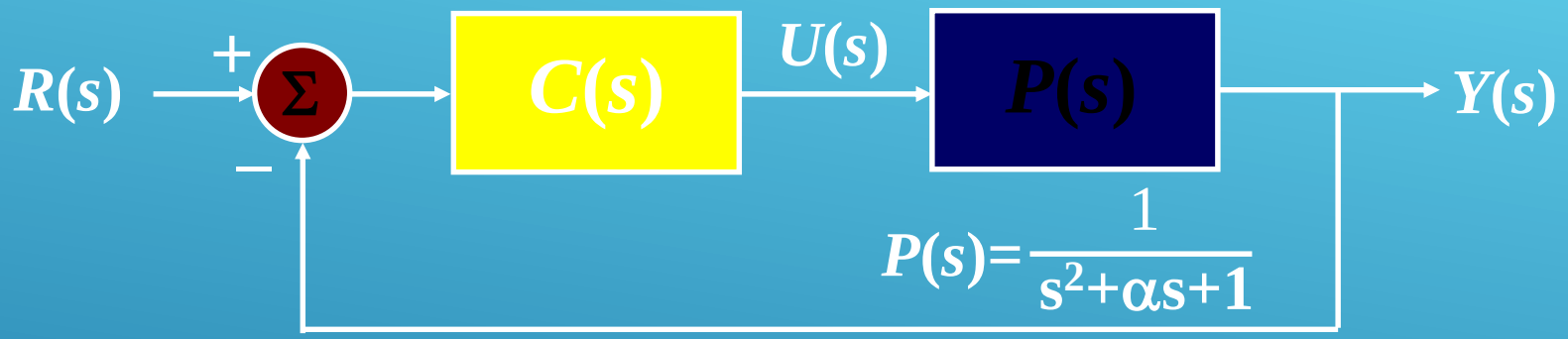
WEEK 14

This week's agenda

PART 10

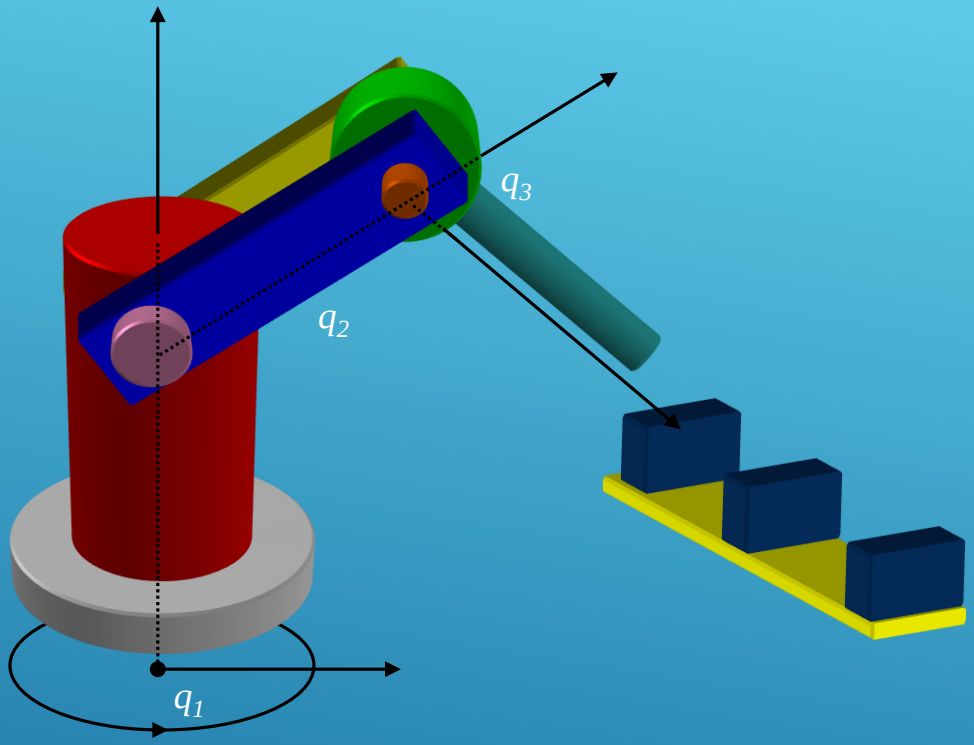
- Concept of Robustness
- Concept of Optimality
- Concept of Adaptive Systems
- Concept of Intelligence in Control

P-10 Concept of Robustness



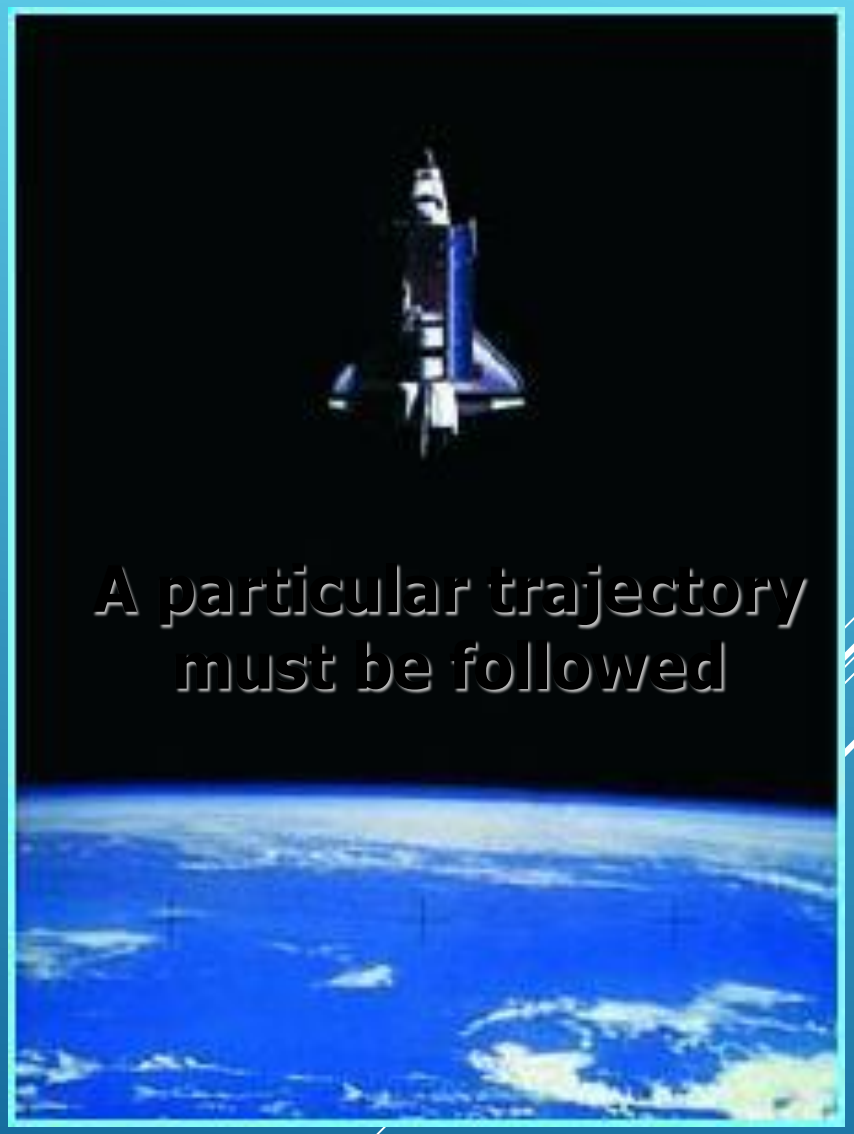
If a controller C(s) meets the design specifications for every α in a known range $\alpha_{min} \le \alpha \le \alpha_{max}$ then the controller is a robust controller, and the control system is robust against variations in α.

Concept of Robustness



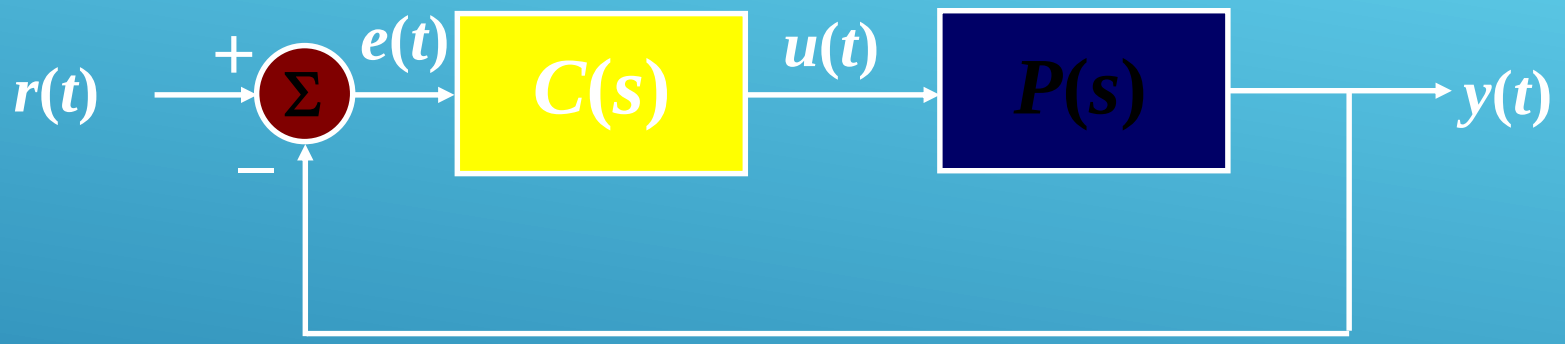
If this robot grasps a load, some parameters seen in its dynamical representation change. If a position control application is being executed, the controller must take this change into account to maintain precision.

P-10 Concept of Optimality



Define a cost function letting you balance the importance of these issues, and find a way to minimize it

Concept of Optimality

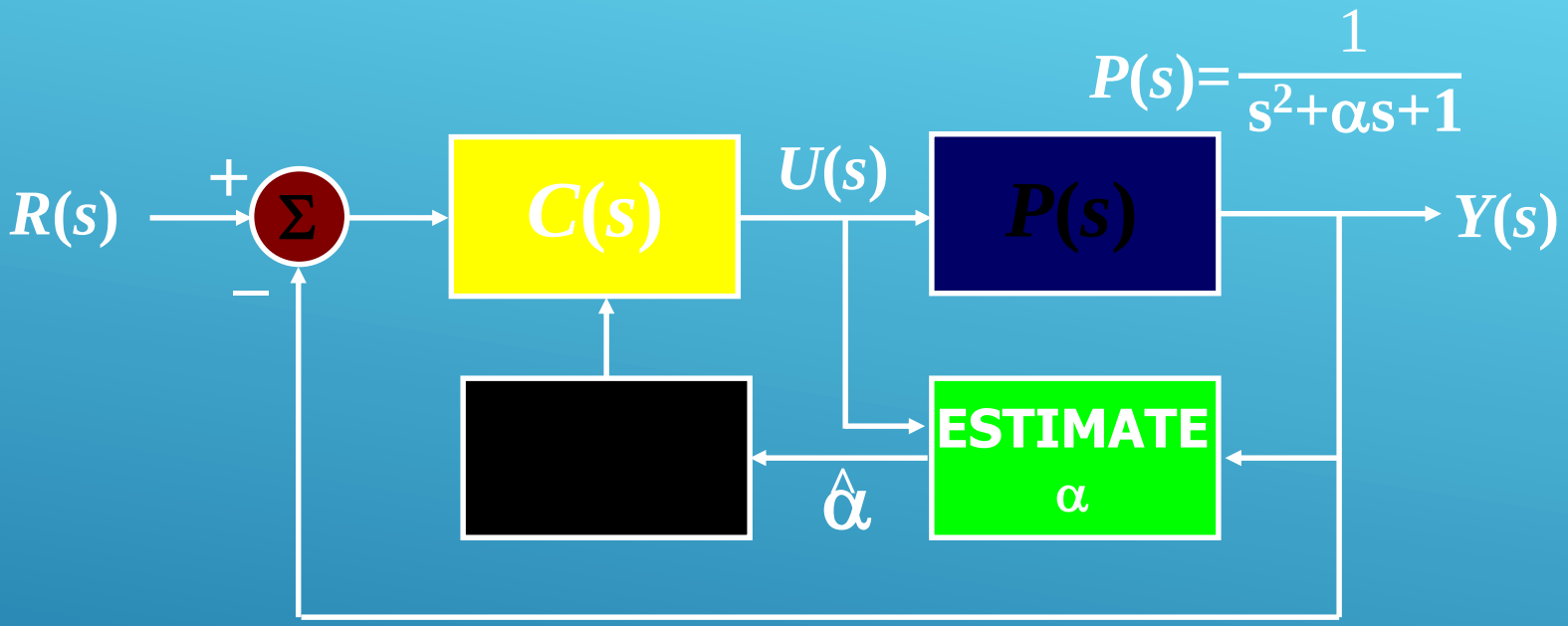


Design C(s) such that $J = \frac{1}{2}\int_0^\infty \{e^2 + \gamma u^2 + \lambda\} dt$ **is minimized**

Large γ increases the relative importance of fuel consumption

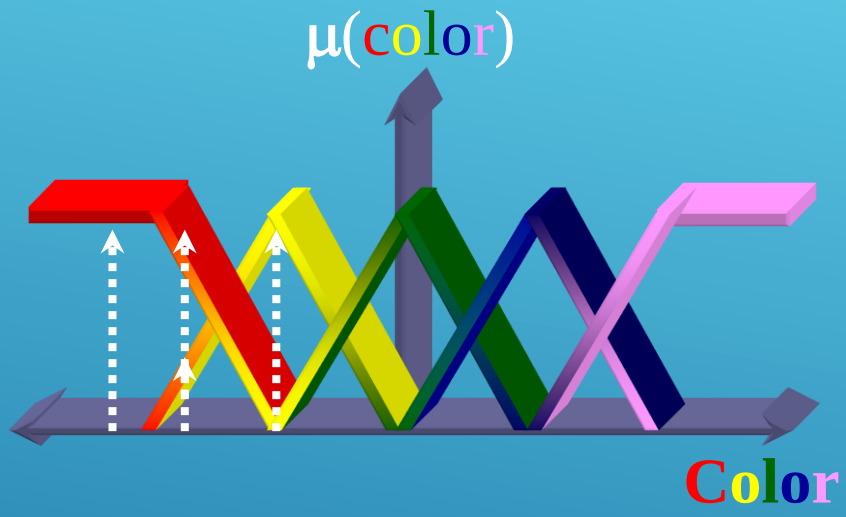
Large λ increases the relative importance of time

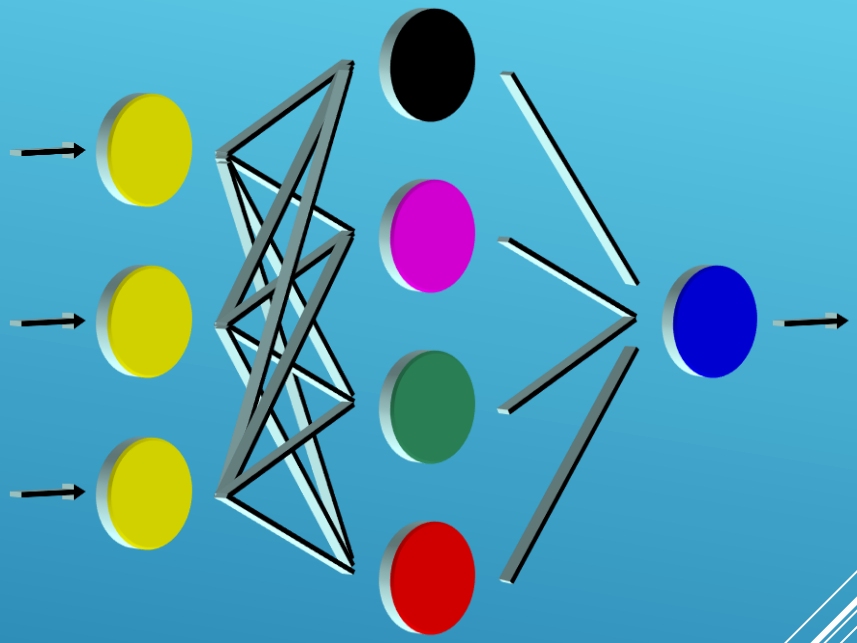
P-10 Concept of Adaptive Systems

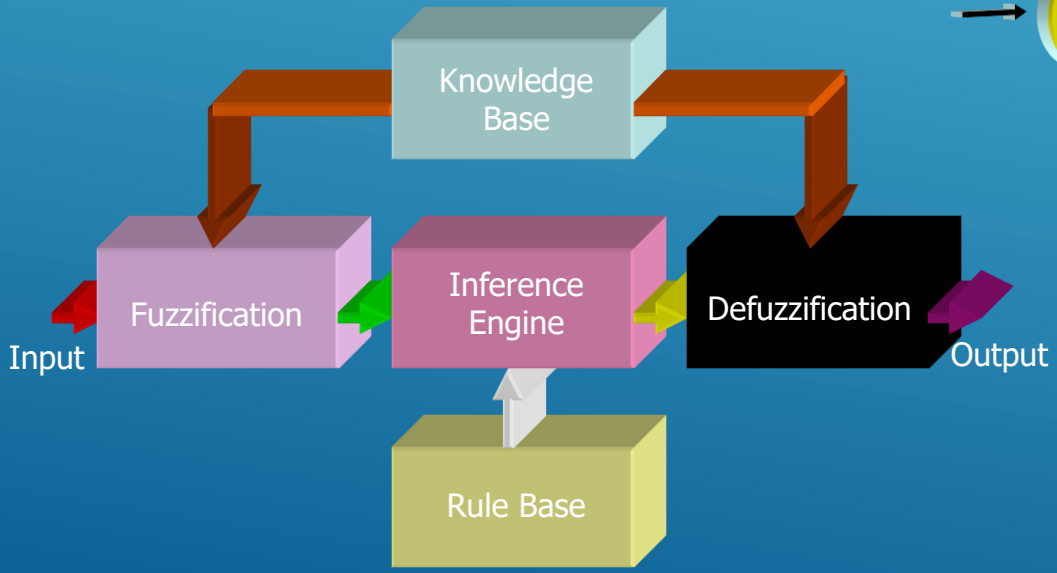


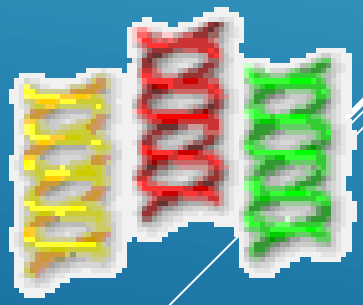
If α is unknown, we can devise an estimation scheme; and based on the estimated value $\hat{\alpha}$, we can perform the design, and operate the controller in the loop.

P-10 Concept of Intelligence in Control

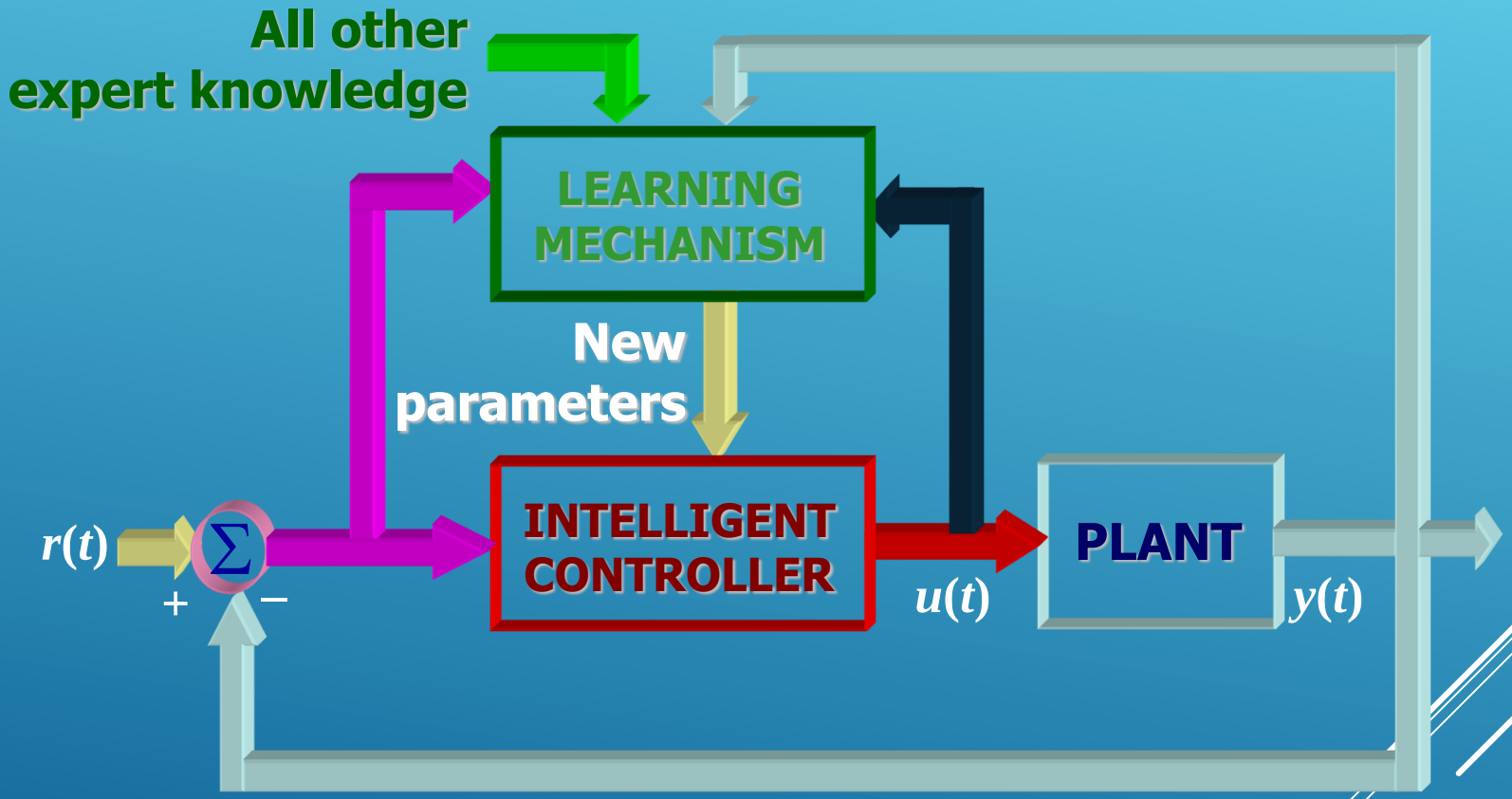








Concept of Intelligence in Control



Concept of Intelligence in Control