Iterative Control

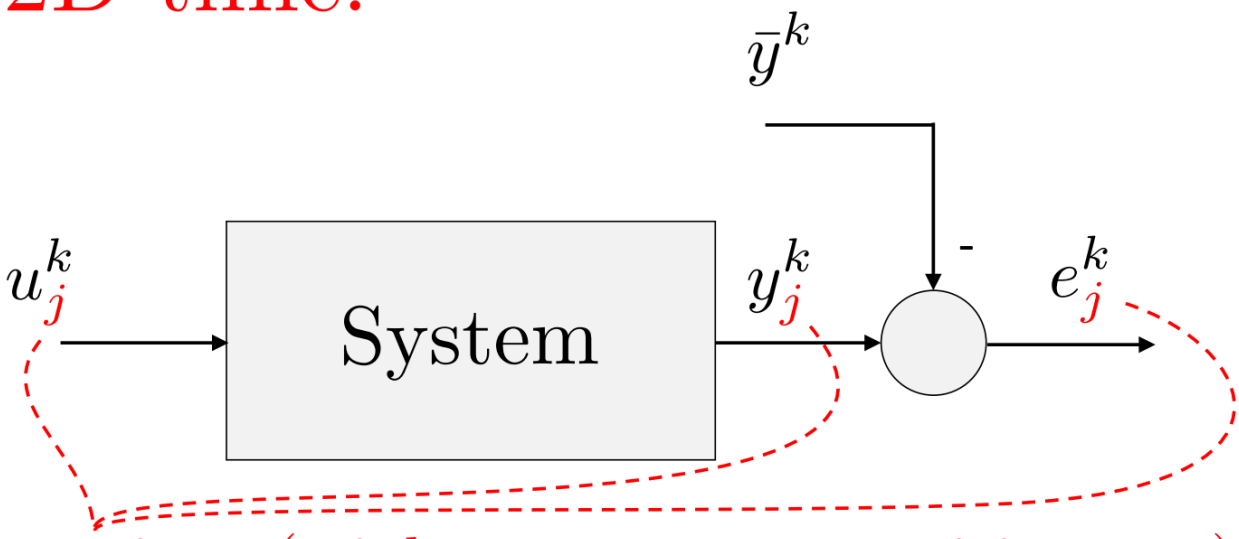
1. Background (Intuition)

Simple Repetitions imporve performance in prototypical motions

2. Introduction

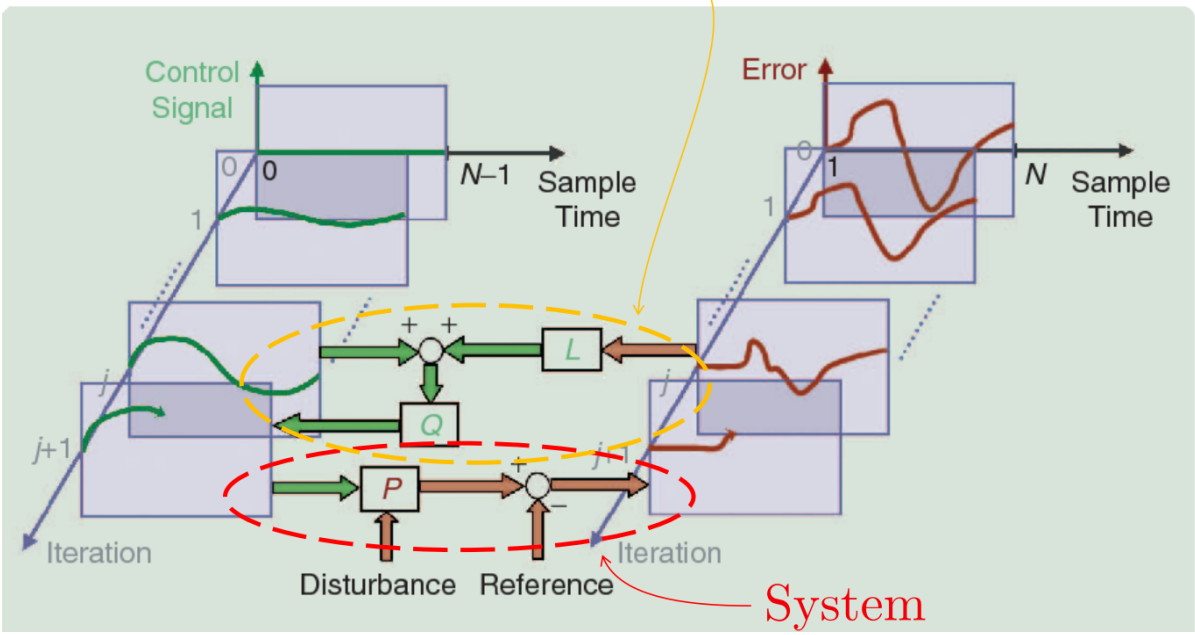
Architecture

2D time!



Iterations (trials, attempts, repetitions, ...)

Iterative Learning Control (ILC)



Model

Given **Desired Trajectory**: $\bar{y} : \{1 \dots N\} \to \mathbb{R}^m$

Find a **Learning Rule**: $u_{j+1}^k = F\left(u_j^k, e_j^k\right)$

s.t.:

If

- (dynamic model):

$$x_j^{k+1} = A(k)x_j^k + B(k)u_j^k$$
$$y_j^{k+1} = C(k+1)x_j^{k+1} + D(k+1)u_j^{k+1}$$

And

- (same initial condition)

$$x_j^0 = x_{j+1}^0, \quad \forall j$$

Then (**Asymptotically perfect execution**)

$$\lim_{j\to\infty} y_j^k = \bar{y}^k, \quad \forall k \in 1 \dots N$$