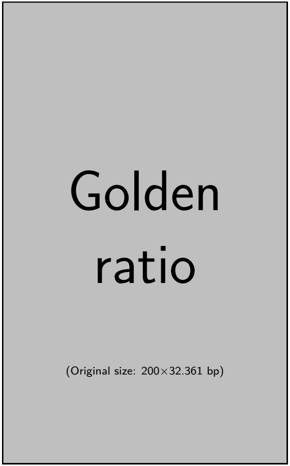
Receding horizon philosophy

- <u>At time t</u>: solve and optimal control problem over a finite future horizon of N steps:

$$
\begin{aligned}
\min_{u_t,\ldots,u_{t+N-1}} & \left\{ \sum_{k=0}^{N-1} \|y_{t+k} - r(t)\|^2 + \right. \\
& \left. \rho \|u_{t+k} - u_r(t)\|^2 \right\} \\
\text{s.t.} \quad & x_{t+k+1} = f(x_{t+k}, u_{t+k}) \\
& y_{t+k} = g(x_{t+k}, u_{t+k}) \\
& u_{\min} \leq u_{t+k} \leq u_{\max} \\
& y_{\min} \leq y_{t+k} \leq y_{\max} \\
& x_t = x(t), k = 0, \ldots, N-1
\end{aligned}
$$



- Only apply the firt optimal move $u^*(t)$
- <u>At time $t+1$</u>: Get new measurements, repeat the optimization. And so on...

Advantage of repeated on-line optimization: FEEDBACK!