EECS192 Lecture 10
Mar. 29, 2016

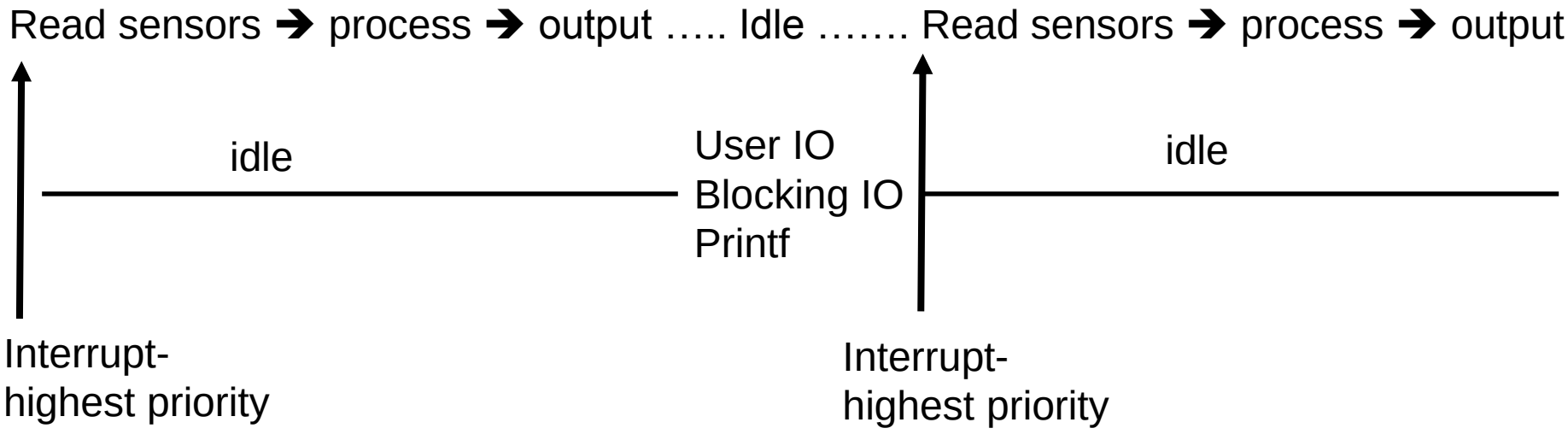
Notes:

1. PCB run #2- optional, returned after round 1…
2. Check off 4/1: 3 laps 1 m/s ave with varying illumination .Turn in both the step response and sensor mechanical response plots digitally on bCourses.
3. HW 2 due Fri April 1, 6 pm in bcourses
4. Progress Report due Tues 4/5 in class
5. Check off 4/8: practice course, 5 min
6. Mon. 4/11: (5 pm) round 1
7. CalDay Sat. April 16 @ UCB, Freescale Cup at UC Davis
8. Lab share Tues 5-7 pm, all of April. Also two benches
9. Quiz 4: SI timing, not CLK timing as long as >= 129 clocks

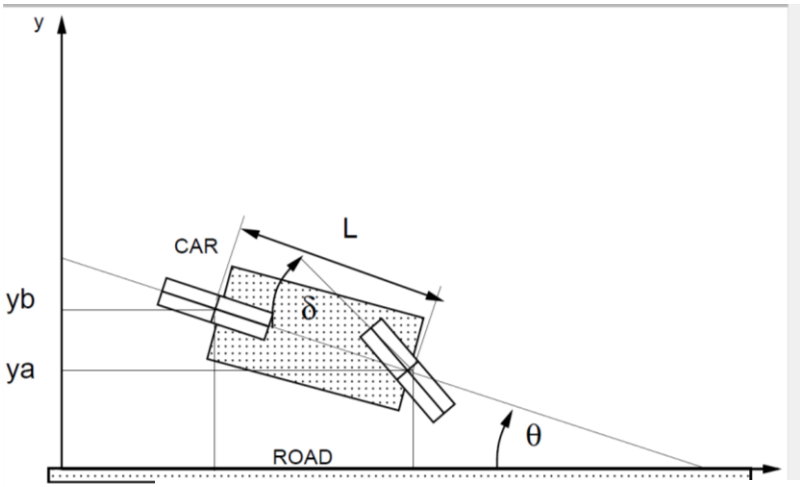
Topics

- Software notes for embedded control
- Steering step response
- Discrete time control

Software Notes



Bicycle Steering Model



Proportional control:

$$\delta(t) = k_p y_a(t)$$

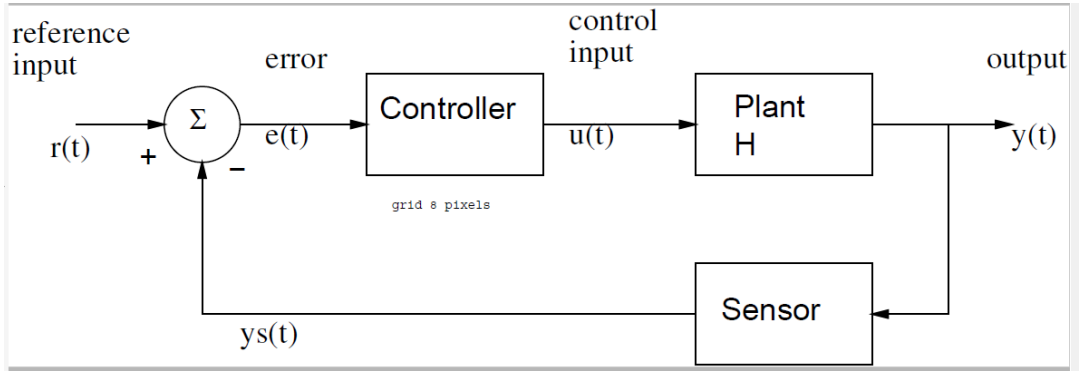
$$\ddot{y}_a + V k_p \dot{y}_a(t) + \frac{V^2}{L} k_p y_a(t) = 0.$$

Eigenvalues:

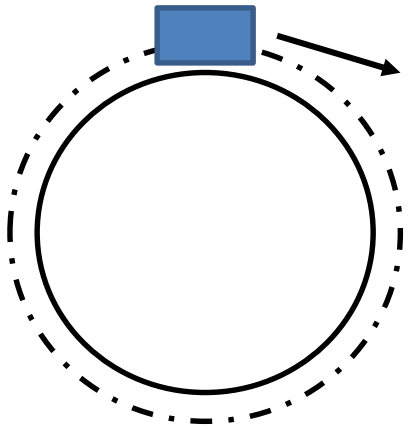
$$\lambda_{1,2} = \frac{V}{2}\left(-k_p \pm \sqrt{k_p^2 - \frac{4k_p}{L}}\right)$$

On board

Bicycle Steering Control- recap



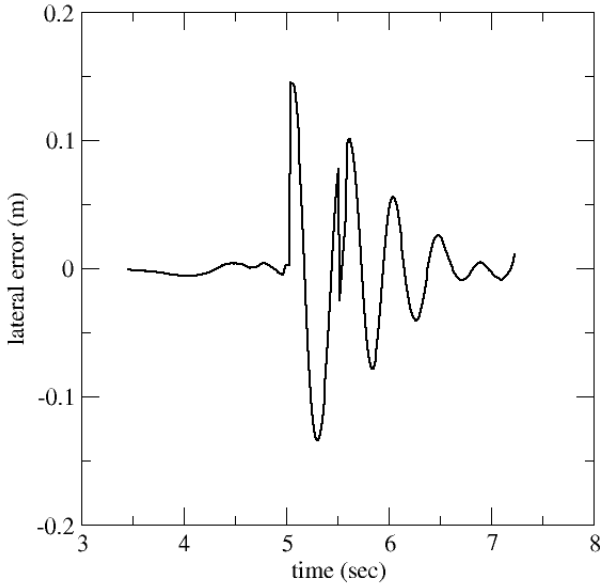
Note steady state error: car follows larger radius



Proportional control:
r = 0 (to be on straight track)
δ=u = kp*e

Proportional+derivative

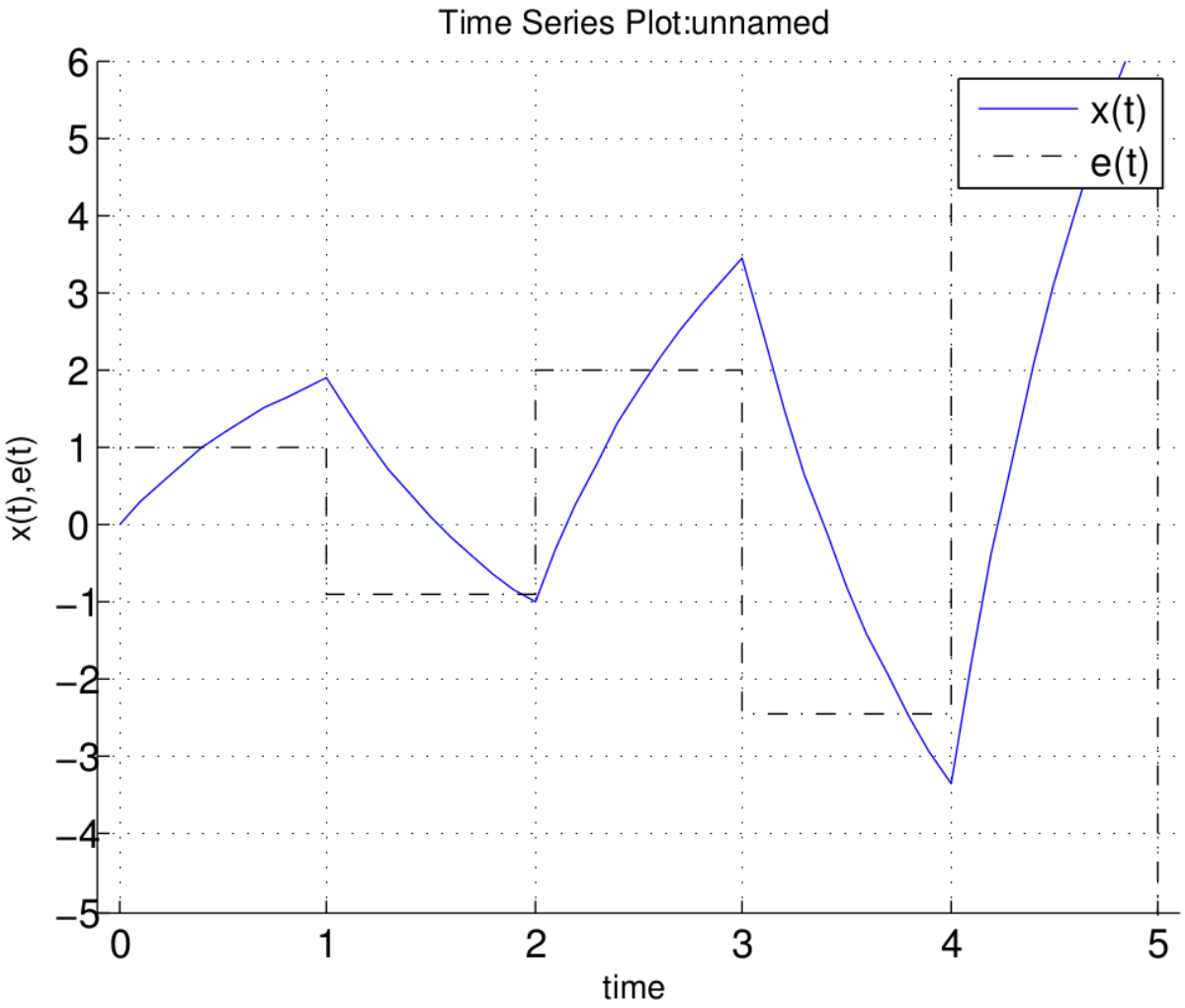
P+I+D



On board

Discrete Time Control

u[n] = kp*(r[n]-y[n])



On board