EECS192 Lecture 10
Mar. 21, 2017

Notes:

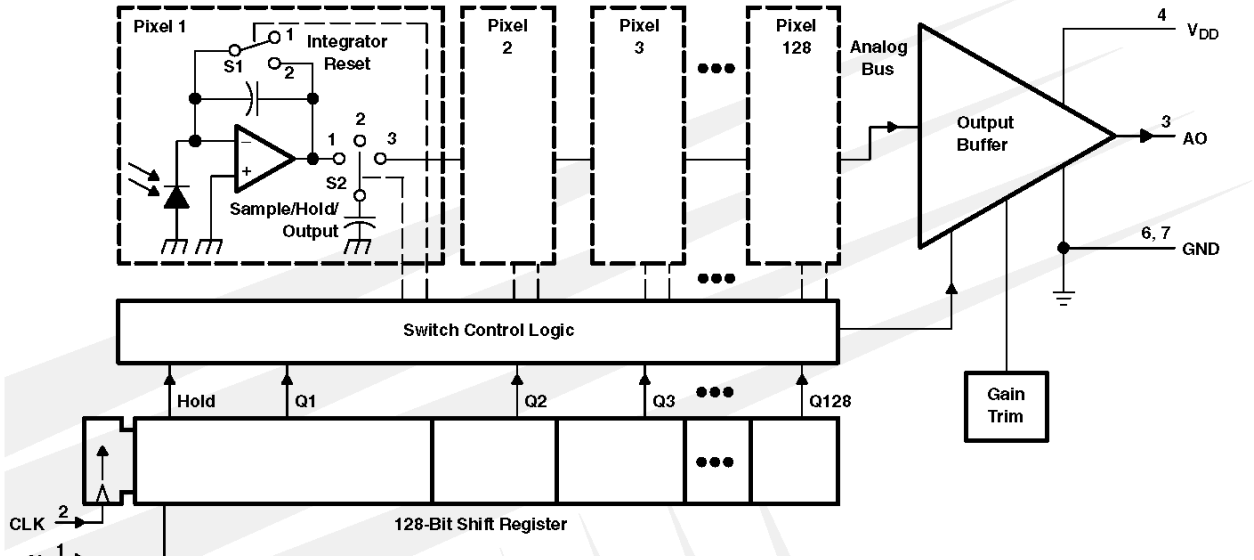
1. Check off 3/24: 3 laps 1 m/s ave with varying illumination .Turn in both the step response and sensor mechanical response plots digitally on bCourses.
2. HW 2 due Fri Mar. 24, 6 pm in bcourses
3. Progress Report due Tues 4/4 in class
4. Check off 4/7: practice course, 5 min
5. Mon. 4/10: (5 pm) round 1
6. CalDay Sat. April 22 @ UCB,
7. Quiz 4: SI timing, not CLK timing as long as >= 129 clocks

Topics

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

Quiz 4 comments TSL 1401 line sensor

Functional Block Diagram



PARAMETER MEASUREMENT INFORMATION

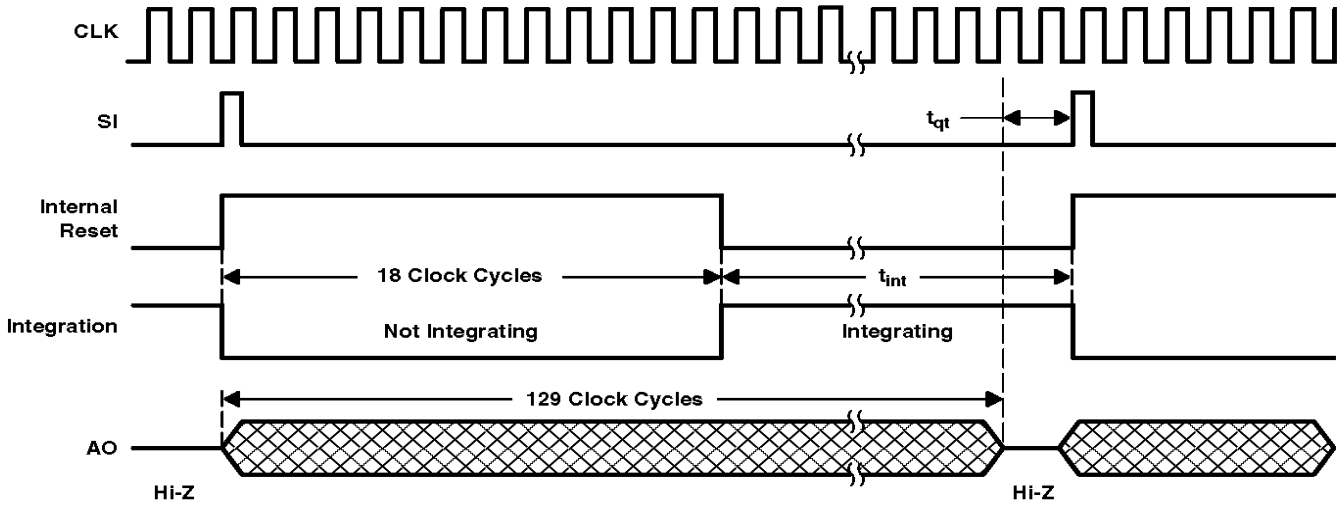
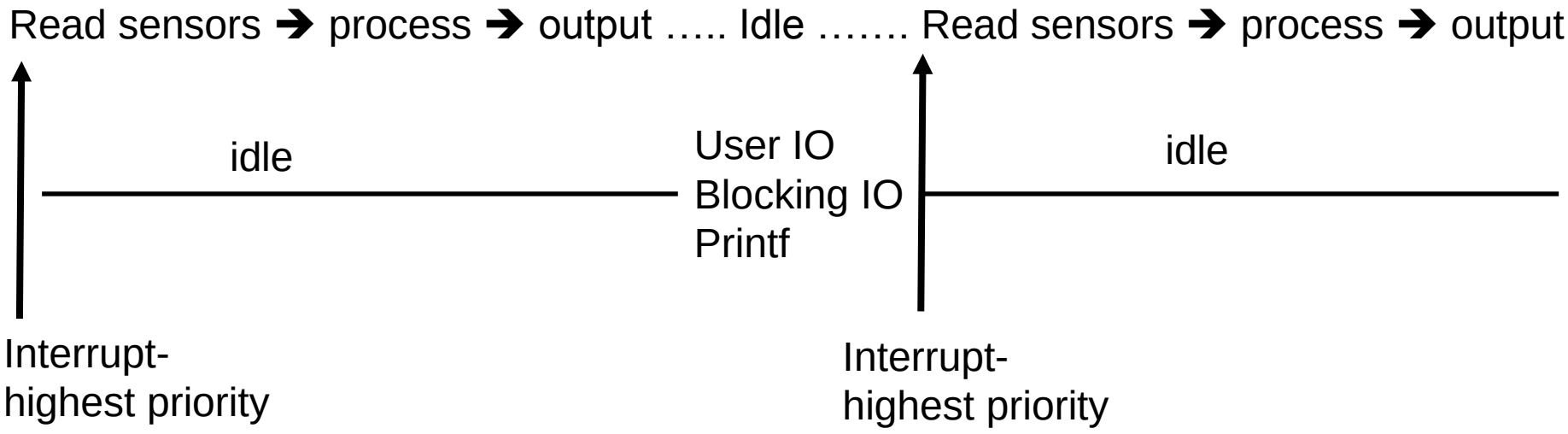
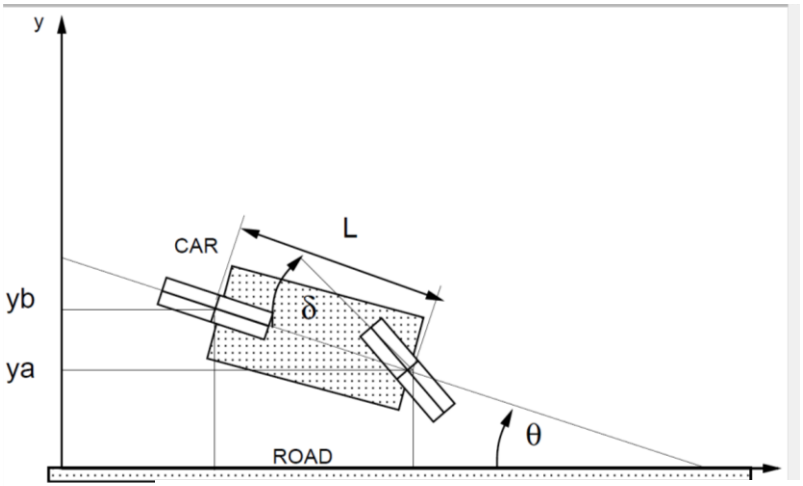


Figure 1. Timing Waveforms

Software Notes



Bicycle Steering Model



Proportional control:

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

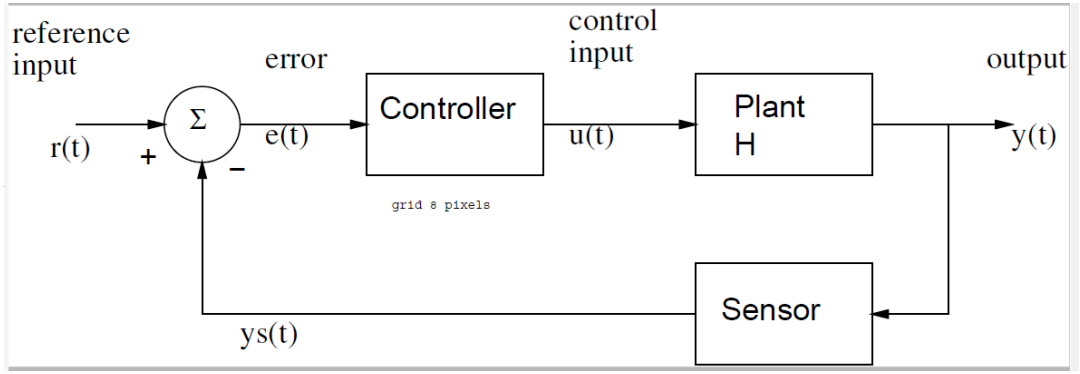
$$\ddot{y}_a + V k_p \dot{y}_a(t) + \frac{V^2}{L} k_p y_a(t) = 0.$$

Eigenvalues:

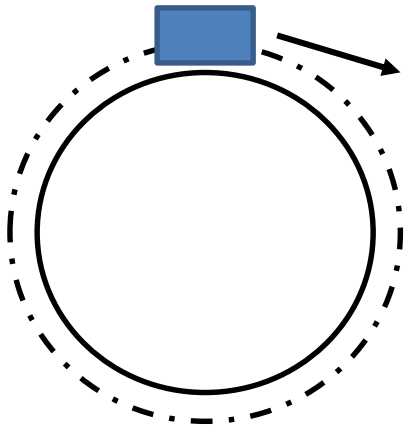
$$\lambda_{1,2} = \frac{V}{2}\left(-k_p \pm \sqrt{k_p^2 - \frac{4k_p}{L}}\right)$$

On board

Bicycle Steering Control- recap



Note steady state error: car follows larger radius

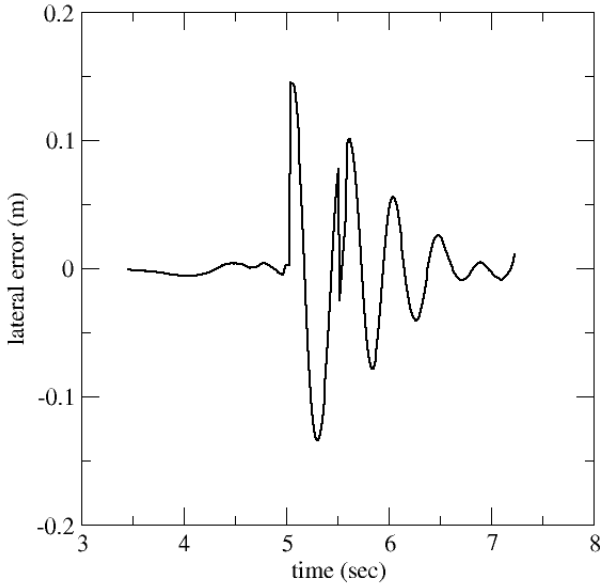


Proportional control:
r = 0 (to be on straight track)
δ=u = kp*e

Proportional+derivative

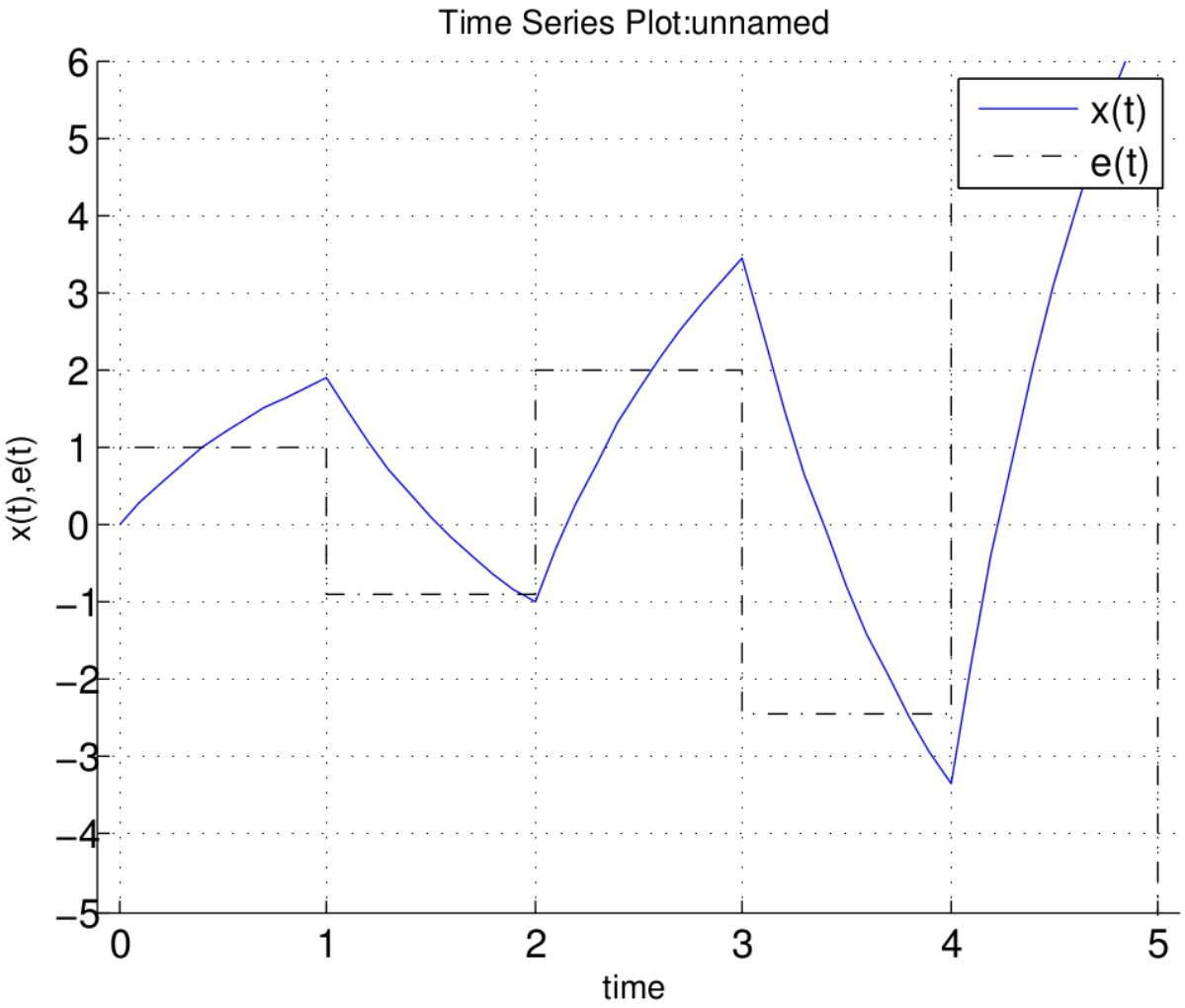
P+I+D

On board



Discrete Time Control

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



On board