EECS192 Lecture 11
Apr. 5, 2016

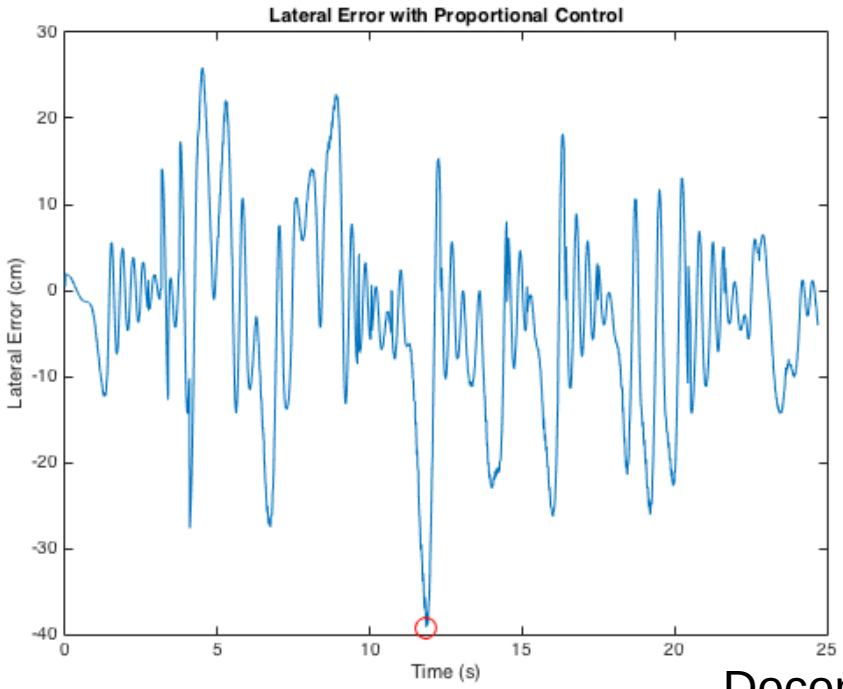
Notes:

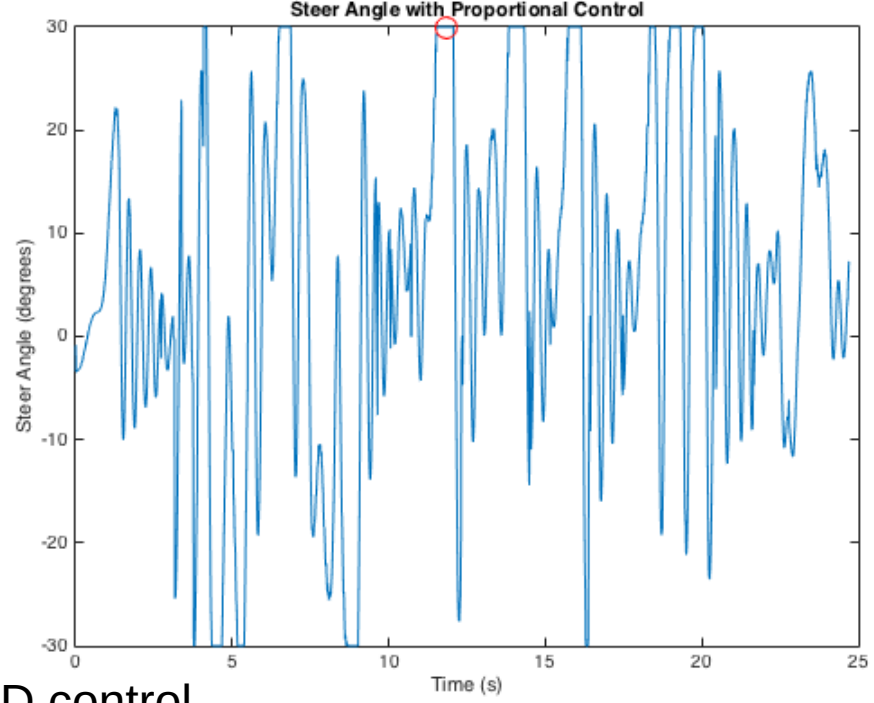
1. Progress Report due Tues 4/5 at beginning class
2. Check off 4/8: practice course, 5 min
3. Mon. 4/11: (430-530 pm) round 1
    1. 6.5 makes first turn
    2. 7 half track in < 5 minutes
    3. 9 track in less than 2 minutes

4. CalDay Sat. April 16 @ UCB, Freescale Cup at UC Davis
5. Lab share Tues 5-7 pm, all of April. Also two benches
6. Quiz 5 on 4/12 on steering control
7. Brushless motor snubbing

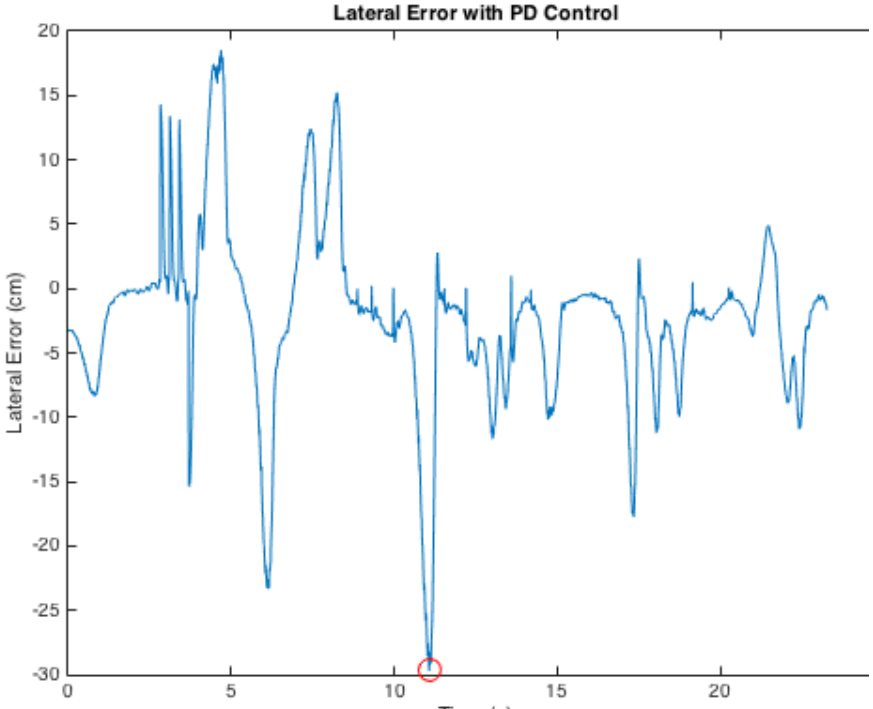
Topics

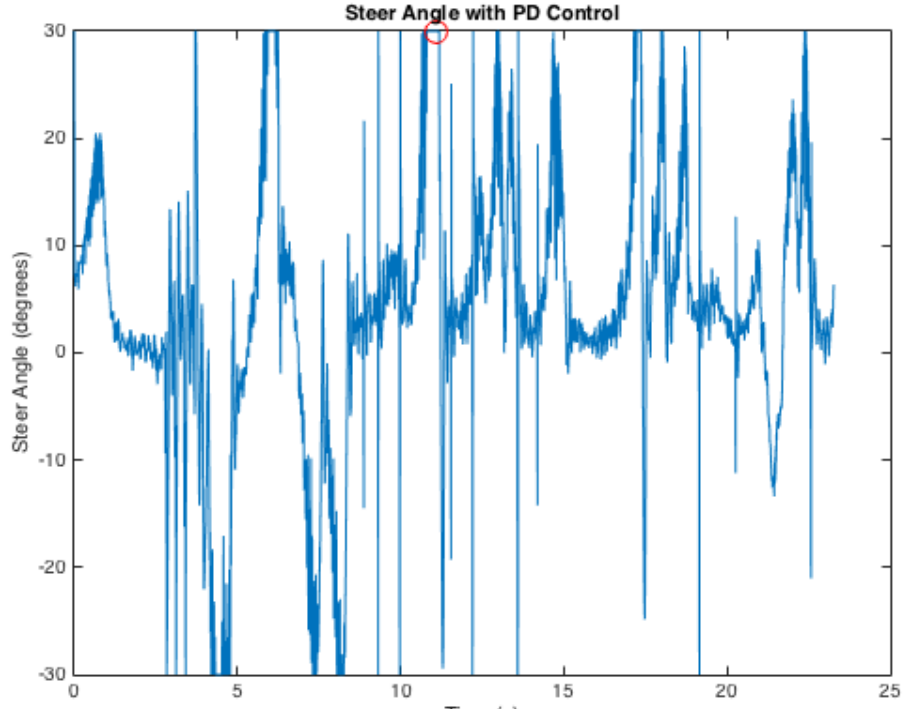
- Notes from HW2
- Discrete time control conclusion (with sampling rate)
- Step response and P.I.D. intuition
- Feedforward steering control

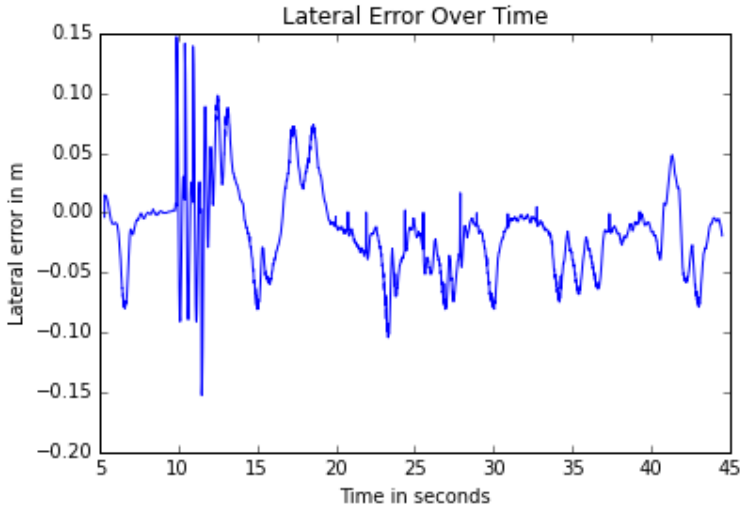


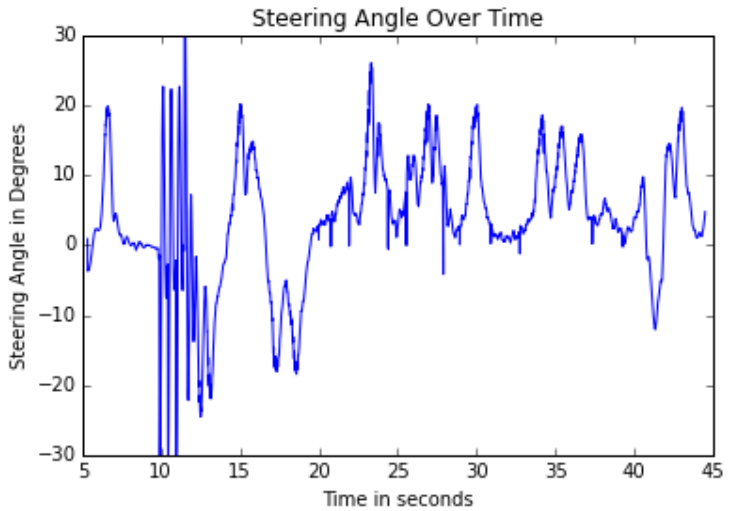


Decent PD control

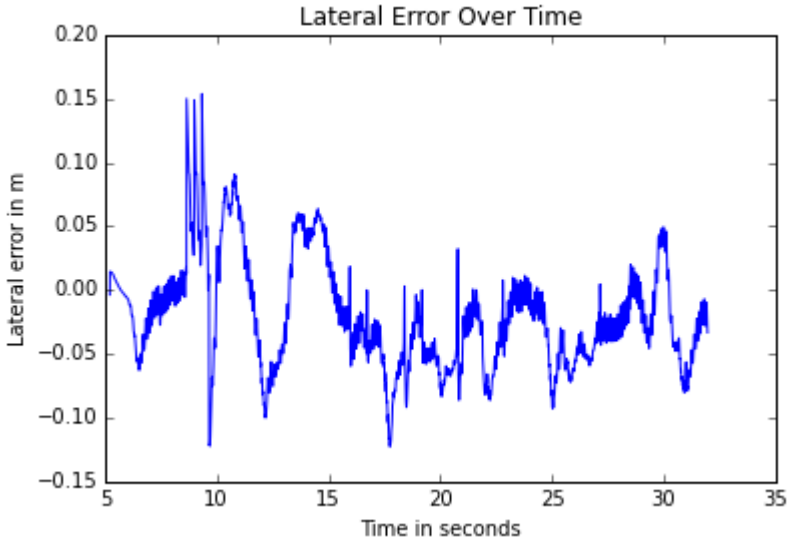


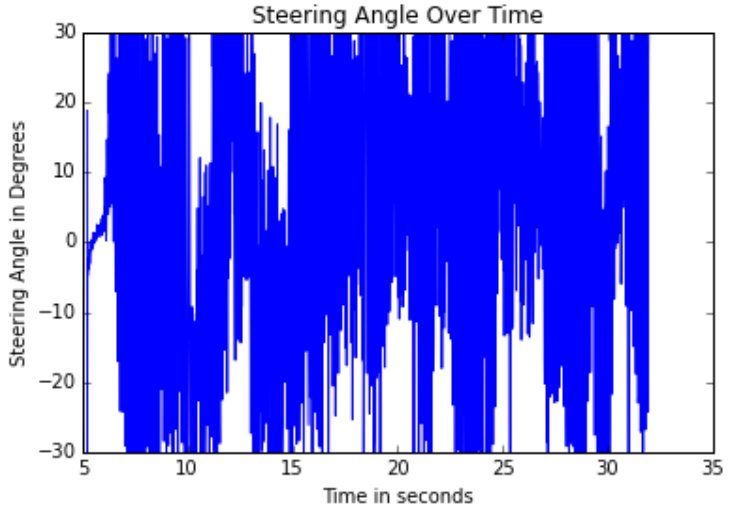






Too aggressive PD control



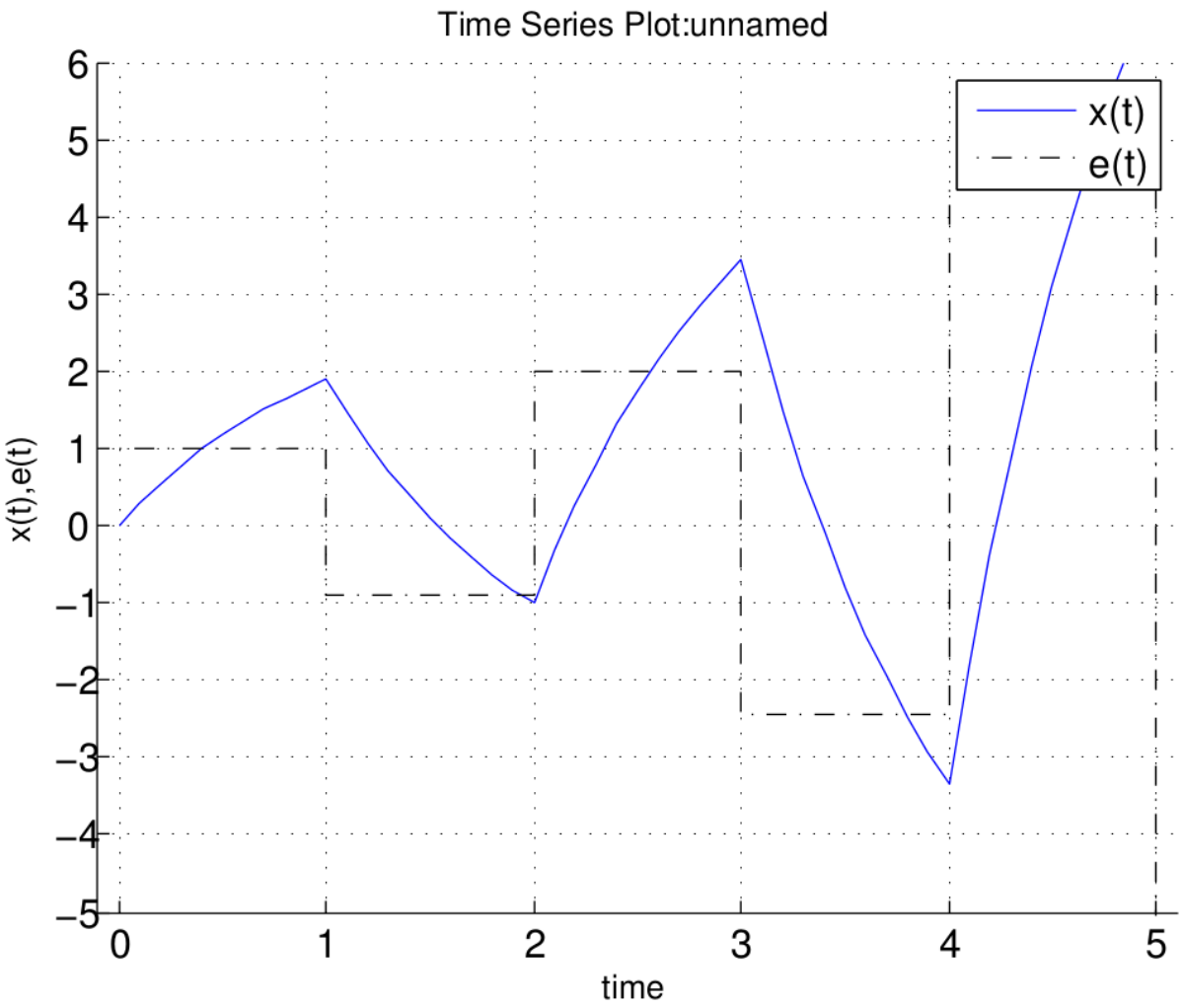


Simulation notes

- What are other line tracking errors in addition to 128 pixel quantization?
- What are some practical limits on steering control?

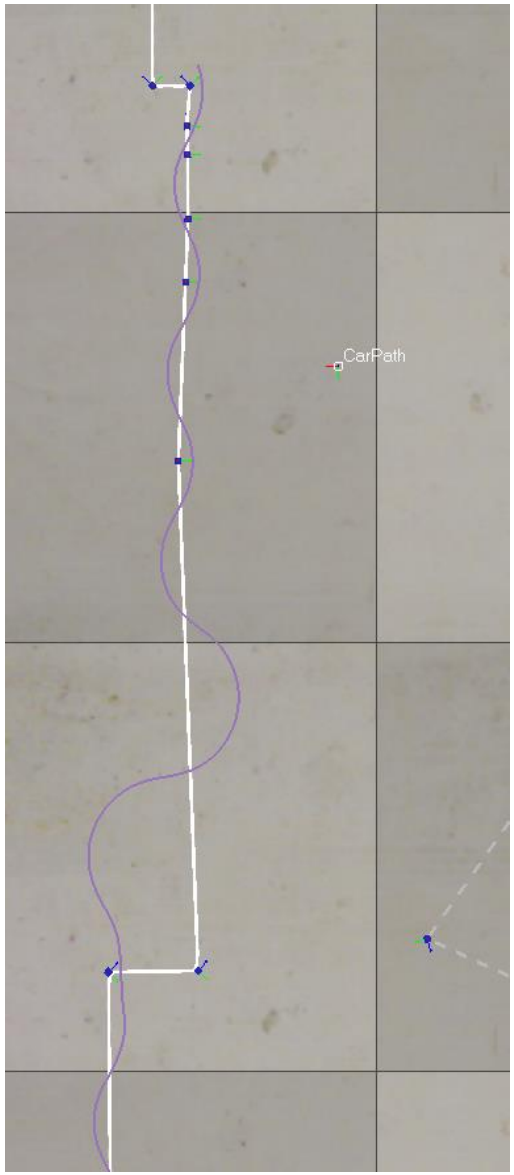
Discrete Time Control

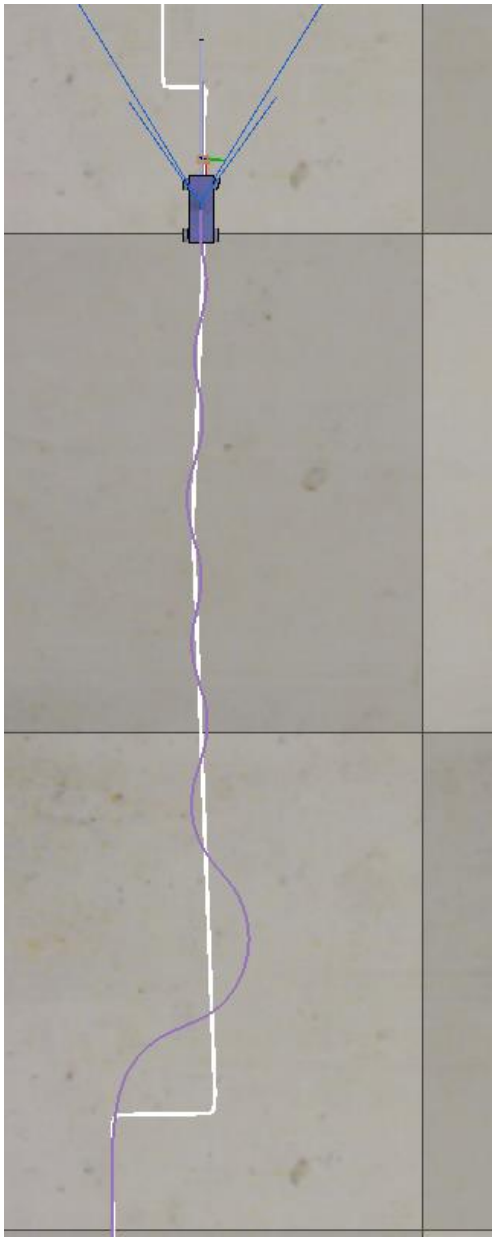
u[n] = kp*(r[n]-y[n])



On board

Step response example

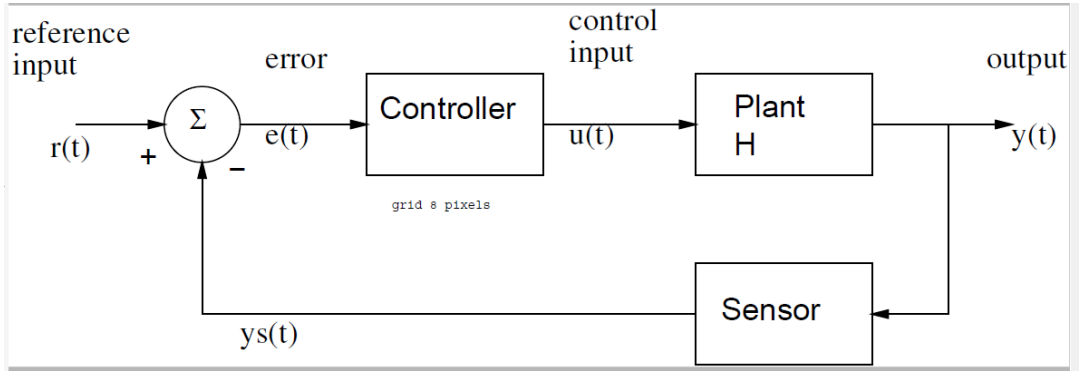




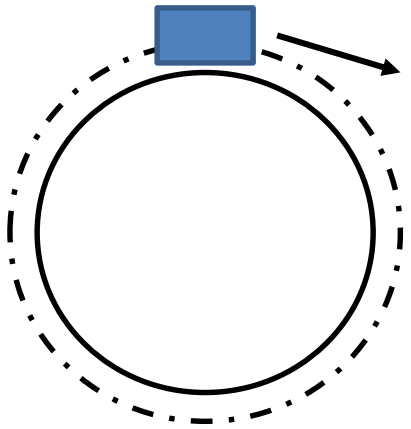
2 ms/s, boom 0.1 m, kp=1500 deg/m

2 ms/s, boom 0.1 m, kp=500 deg/m

Steering Control- feedforward



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