

Lab, Motion Planning Lab 16-311, S07

Lead TAs:
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Task

- Navigate from a start position to an end position
- Without contacting obstacles
- Without sensors
- Within size constraints from Lab 4

Why this Matters, the Big Picture

- Application of low-level base control (Lab 4)
- Motion Planning
 - Configuration space
 - Path planning (Wavefront algorithm)
- Sensors come next

Set up

- 2 Worlds, 4 obstacles each
- This time, we're nice and tell you what the worlds will look like (where the obstacles are, how big, etc)
- But you won't know which one you'll be assigned until the demo
- You also won't know the start and end locations until then either

A little More on Obstacles

- Two different worlds, same problems
 - 4'x8'
 - 6"x6" squares
 - 8 by 16 grid (units)
- Obstacles
 - 4 units long, 1 unit wide
 - Aligned to grid, can be anywhere
 - 4 obstacles per world

Best of All Possible Worlds..

```
{ { 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, X, X, X, X },  
  { 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, X, X, X, X, 0, 0, 0, 0, 0, 0, X, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0 } }
```

...Or Not

```
{ { 0, 0, 0, 0, 0, 0, 0, X, X, X, X, 0, 0, X, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0 },  
  { 0, 0, 0, X, X, X, X, X, 0, 0, X, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 },  
  { 0, 0, 0, 0, 0, 0, 0, 0, 0, X, 0, 0, 0, 0, 0, 0, 0 } }
```

Grading

- 3 attempts.
- 0 for the attempt if you hit an obstacle, driver off the world, or head in the wrong direction
- 70 % working software
- 30 % working hardware
- 30 pts if in goal sq, 20 if 1 away (L2 metric), 10 if 2 away(L2 metric), 0 otherwise

Code

- Unlike other labs, you will be turning in code
- You will reuse this code, sooner than you might think, so be careful
- We will read it..All of it
- There are an unspecified number of style points
- 80 character columns are a good thing
- Commenting is your friend, esp if robot does not work on demo day

Demo Times, Feb 21st

Run 0	Run 1	Run 2	Run 3
10:30	10:45	11:00	11:15
Team 16	Team 4	Team 3	Team 8
Team 1	Team 14	Team 12	Team 2
Team 7	Team 2	Team 15	Team 10
Team 13	Team 12	Team 11	Team 5

Demo Day

- Bring your Grading Sheet to Demo
- Bring a hardcopy of your group's code, with all 3 members names commented at the top, and stapled together
- Robot (with code loaded already) + charged battery
- Be 15 min early for your time slot

Tips

- If you have several paths, choose the one in front of you
 - Less turning = less error
- Make sure your feedback control loop works
 - If you can't go straight and turn correctly, you won't be able to go around obstacles.
- The error codes in the Handyboard manual might be worth looking at if you start to encounter strange errors
- Be careful with algorithm design.
- Handyboard != PC

Questions?
Comments?
Concerns?

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