

Assignment 4

Due: Tuesday, January 11, 2005, 11:45 pm

1 Workshops available

Don't forget to sign up on the sign up sheets in the 6th floor lab—certain workshops have limited space. The workshops run from 1 to 3 pm, and 7 to 9 pm. Each workshop lasts for an hour and begins on the hour.

- Workshop 5 – Servos, Sensors, and Shaft Encoders
 - When: January 10-11, 2005
 - Items to Bring: Handy Board with Expansion Board
- Workshop 6 – Advanced LEGO Techniques
 - When: January 10-11, 2005
 - Items to Bring: Legos!
- Workshop 7 – Advanced Code
 - When: January 10-11, 2005
 - Items to Bring: Questions for TAs and organizers!

2 Adding More Power

1. Solder and shrink wrap one battery pack.

- Ensure that the bottoms of your batteries are not rusted. Be careful not to short the batteries—you will feel a twinge of pain.
- Instructions for soldering the battery pack can be found online in the Study Materials section under “Assembly Instructions”. Examples of handsome-looking battery packs are by the office.
- We suggest for now that you juxtapose the batteries side by side and solder the leads. Don’t forget the shrink wrap, and don’t worry—we have plenty of extra shrink wrap if you decide later to reconfigure the way your batteries are soldered.
- Eventually you will make two battery packs. This will be handy come contest night.
- Checkoff: Show us the completed battery pack.

2. Solder the battery recharger.

- Instructions for soldering the battery recharger are found online in the “Assembly Instructions” section.
- If you have questions regarding soldering any of the PCBs do not hesitate to ask the staff. **We do not have extra PCBs, so if you screw up we may not be able to help you.**
- Checkoff: Show us the battery recharger, and show that it works with your battery pack.

3. Bring your handyboard, expansion board and charged hawker batteries to your meeting with your organizer and ta. We will show you how to make use of the new batteries to power your actuators.

3 Your Task: Now for the Hard Part

1. Analyze all aspects of the contest and the rules. Brainstorm possible designs and consider the positive and negative aspects of each. Come up with a preliminary idea for the final design of your robot. How are you going to reliably score points? How are you going to fend off the other robot? How are you going to find your way around the table? What drive mechanism are you going to use?
2. Write a brief description of your intended robot. Summarize your robot's general strategy. Explain how your robot will gather information regarding its surroundings, and how it will react to various stimuli. Tell us what strategies you think your robot will beat, but also describe weaknesses your robot will have that your opponent can exploit. Also, enumerate the possible errors the robot can face, and how you plan to deal with those errors. For example, how can the robot veer off from its intended course? What happens if it bumps into its opponent? Are there physical configurations that your robot could have that could give false readings to your Handy Board (like, a shaft encoder reading the number of rotations of a wheel that should be driving on the ground but is instead up in the air)?
3. Use the table schematic provided to sketch out the path of your robot during the round. Think about how long it will take your robot to cover that distance, and how accurately it can navigate the turns required. Have you thought about fail-safe techniques that will help your robot if it gets lost? Remember that your robot has to fend for itself for 60 full seconds, and if it gets stuck somewhere, you can't help it out.

4 Keep in Mind...

Everyone will try to have the “best” strategy, so don’t try to beat everyone else out. It’s hard to come up with the “perfect” strategy that will trump all others. It won’t necessarily work come contest night, and obviously a lot of luck will determine your robot’s success. The best strategies are often the most simple, and require the least amount of mechanical work. Also remember that engineering is 10% design and 90% testing and debugging. Plan your time well.

At the same time, though, don’t let these words discourage you from trying to create a robot that has a lot of novelty value. 6.270 is also a spectator sport—we would love to see some robots show off some really great features (like catapults, transmissions, dances).

Most importantly, don’t sacrifice your team’s morale for the sake of the contest. It’s not worth it. Have fun, and enjoy the chance to be creative.

5 Checkoff

Meet up with your Organizer and TA pair and discuss your strategy for your robot. Obviously this strategy won’t absolutely have to be the one that you will eventually implement, but we want to see that you have put enough thought into your robot’s plan of attack to begin building your robot. When you meet with your Organizer and TA, you will hand in the description and sketch. Be sure to email your Organizer and TA to set up a time.

