Assignment 1
Due: Tuesday, January 4, 2005 (Tomorrow!), 11:30 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 1 – Basic LEGO Structure and Bracing

  - When: January 3–4, 2005
  - Where: 34-302
  - Items to Bring: All of your LEGOs

- Workshop 2 – Motor Mounting and LEGO Gearboxes

  - When: January 3–4, 2005
  - Where: 34.301
  - Items to Bring: All of your LEGOs

2 Your Task: Diving into 6.270

1. Read every word of this assignment. There are a lot of details you should know, and every year we find contestants making the same mistakes. And also note that if you are taking this course for credit and EDPs, in order to pass the class you have to complete these assignments.

2. Know your TA and Organizer by name. :)

3. Checkoff: Discuss Rules of the Contest with your Organizer and TA.

4. Checkoff: Let us know if you intend to take this class for credit.

5. Construct the Lego Front End Loader

   - Instructions for Building the Front End Loader are in the LEGO kit.
   - Play around with the LEGO's get familiar with them and try to think why the Front End Loader is constructed in this way.
   - Checkoff: Show us the Front End Loader, and be ready to answer questions on its design and contruction.

6. Test your Handy Board.

   - Test your Handy Board. Instructions for loading the program onto the Handy Board is explained in Section A of this handout.
   - We have some sensor and motor packs you can attach to your Handy Board to ensure full functionality. If you have a faulty board, let us know.
   - After this assignment, we will assume that your Handy Board is in working order. If it malfunctions afterwards due to human error, we will not replace your Handy Board with a new one. Each Handy Board costs $200, and is obviously expensive to replace.

- Once it is done, place an address label or masking tape containing your team number onto the back of your Handy Board.
- Checkoff: none. We will simply ask you if you did it.

3   Checkoff

You can be checked off by any organizer on-duty. Please meet the deadline and finish the assignment by Tuesday. If you're behind, the work will pile up later on this week.

When you get checked off, we will immediately give you Assignment 2. The sooner you finish, the more time you will have to complete it. It will take a bit of time, so consider finishing most of the above by the end of Monday, and getting checked off Tuesday.

A   Testing the Handy Board

To test the Handy Board, we recommend you come into the lab, where you can use one of the Athena machines. These instructions assume you will be using Athena. First, start Mozilla or Netscape, and go to:

http://web.mit.edu/6.270/www/contestants/handouts/

Right-click on "Handyboard test suite," and choose "Save link as...". Save the file in your home directory.

Next, hook up your Handy Board. If a serial adapter is attached to the computer you're using, attach the phone cord to your Handy Board. If not, plug the small end of the interface cable to the back of the computer, and attach the phone cable to your Handy Board. If you have problems, ask a staff member.

Charge up your Handy Board by plugging the transformer into the serial interface or directly connecting it to the Handy Board. Wait a few minutes. Keep the Handy Board in for the rest of the Assignment.

Once it is charged, hold the STOP button on your Handy Board, and turn it on. You have just put the Handy Board in "download mode." Go to a terminal window, and type:

```
athena% cd
athena% add 6.270
athena% init_bd
```

Press Return when the program prompts you to place the board in download mode. After this step completes, turn your Handy Board off and back on. Next, type:

```
athena% ic
```

Interactive C will start up and connect to your Handy Board—if this doesn't happen, ask a staff member for help. Then, type

```
C> load hbtest.c
```

Turn your Handy Board off and back on. The first prompt displayed should read

```
6.270 HB test
press start
```

Borrow a motor and sensor pack from the lab, and plug them into your Handy Board. Press the START button on the Handy Board, and you'll see

```
motor test
press start
```

The motor lights should all flash—if they don't, talk to a staff member. If the expansion board is attached, in addition to the four motor ports on the Handy Board, the two motor ports on the expansion board should be blinking as well. Press STOP to continue.

If you are using this test suite to test the Handy Board without the alteration and without the expansion board attached, then press START then STOP to bypass the servo test and move on to the sensor test. Otherwise connect a servo to one of the servo ports. **Be sure to connect the servo the right direction!** If you are unsure about this, please talk to a staff member. Incorrectly attaching the servos can destroy the Handy Board and start fires. You should see the message:

```
servo test
press start
```

The servo should move back and forth. Test all the servo ports on the expansion board to be sure that they work. Press STOP when you're done.

Next, you should see the message:

```
sensor test
press start
```

Use the rotary knob on the Handy Board to choose a port that has a sensor attached to it. Test the sensor ports on the Handy Board and the expansion board (if attached). Be sure that they all work. If a digital sensor is connected to an analog port, the reading on the LCD panel will bounce between values of 0 and 255. Otherwise you will see a 1 when the sensor is pressed, and a 0 when it is open.

Press STOP when you're done.