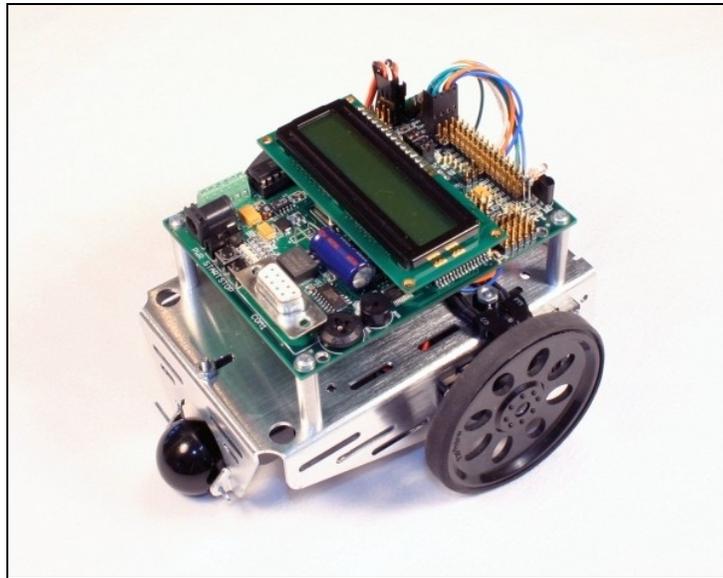




# IntelliBrain-Bot

Educational Robot

## Assembly Guide



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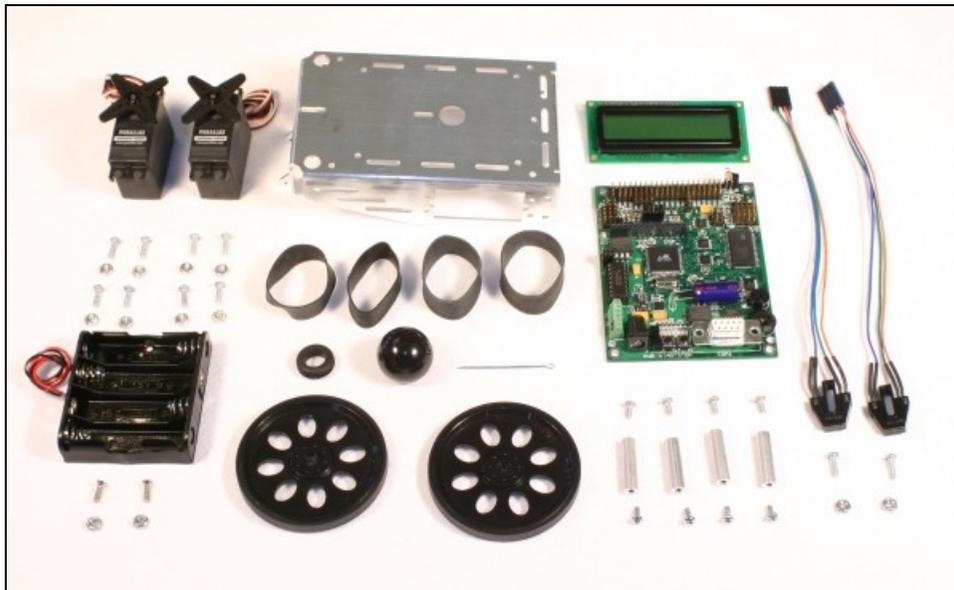
Revision 2.0

## Introduction

This document provides instructions to guide you through assembly of your IntelliBrain™-Bot. It takes approximately one to two hours to assemble the IntelliBrain-Bot.

## IntelliBrain-Bot Parts

Your IntelliBrain-Bot kit includes the parts shown and listed below.



### Parts List:

- 1 IntelliBrain™ 2 robotics controller
- 1 LCD display module
- 2 infrared photorelector sensors
- 1 battery holder
- 1 metal chassis
- 2 continuous rotation servos
- 2 large wheels
- 4 rubber band tires
- 1 ball tail wheel
- 1 grommet
- 4 standoffs
- 1 cotter pin
- 8 1/4" (short) 4-40 round head screws
- 10 3/8" (long) 4-40 round head screws
- 2 3/8" 4-40 flat head screws
- 12 4-40 nuts
- 1 6' serial extension cable (not shown)
- 1 Software and documentation CDROM (not shown)

In addition to these parts, you will need four AA alkaline, NiMH or NiCd batteries, which are not included with the IntelliBrain-Bot kit.

## Assembly Tools

You will need the following tools to assemble your IntelliBrain-Bot:

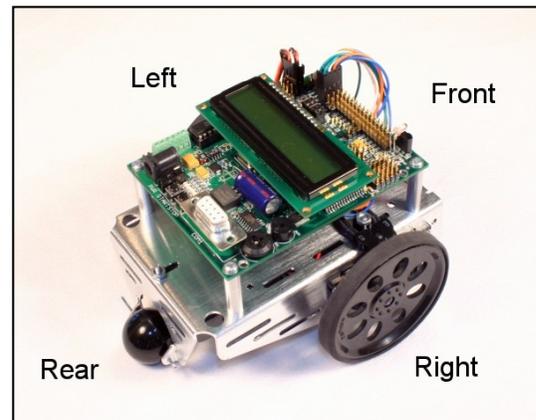
### Tools:

- #1 tip Phillips screwdriver
- 1/16" flat tip screwdriver
- needle-nose pliers (optional)



## Orientation

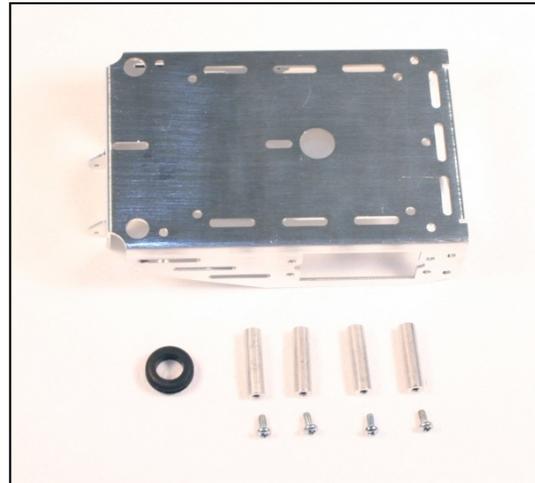
Before getting started, take a moment to review the picture of the fully assembled IntelliBrain-Bot, to the right. Familiarize yourself with the orientation of the robot, as several of the assembly steps refer to the orientation.



## Installing the Standoffs and Grommet

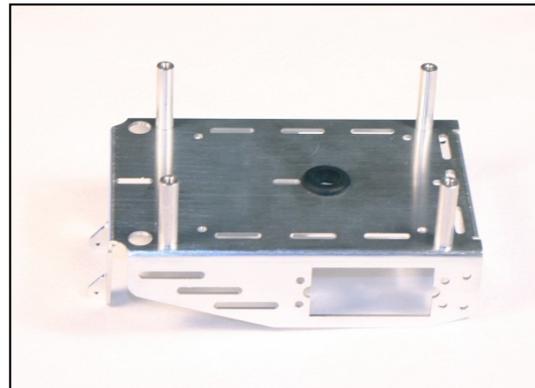
### Parts:

- 1 metal chassis
- 1 grommet
- 4 standoffs
- 4 short round head screws



### Instructions:

1. Insert the grommet in the large center hole in the chassis.
2. Use four short round head screws to attach the standoffs as shown. Leave the screws slightly loose to make it easier to align the standoffs when you attach the IntelliBrain 2 robotics controller, later.



## Attaching the Battery Holder

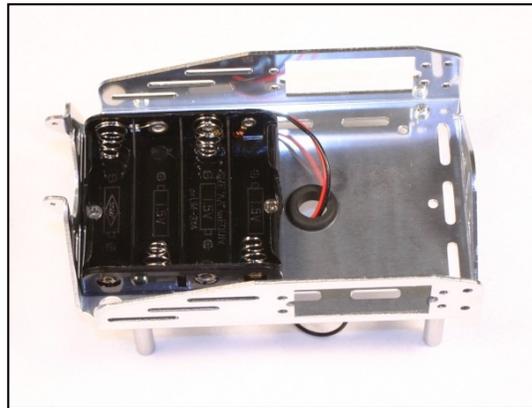
### Parts:

- 1 battery holder
- 2 long flat head screws
- 2 nuts



### Instructions:

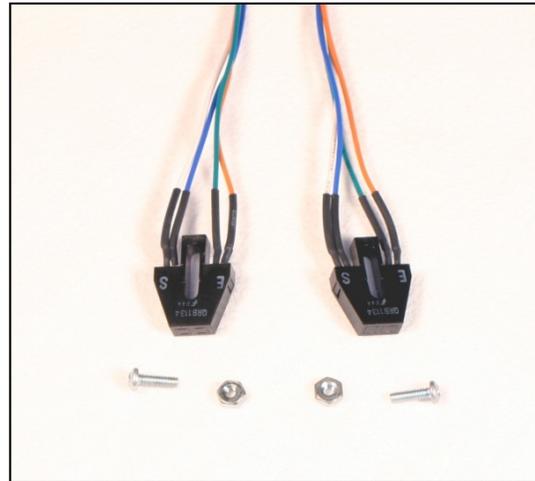
1. Insert two flat head screws through the holes in the battery holder, advancing the screws most of the way through the battery holder.
2. Orient the battery holder as shown, paying special attention to the position of the two wire leads.
3. Insert the screws protruding from the battery holder into the slots in the chassis.
4. Attach a nut on each screw on the top side of the chassis, fastening the battery holder in place. Fully tighten the screws, using pliers to hold the each nut, if necessary.
5. Slide the battery holder wire leads through the hole in the grommet in the center of the chassis, as shown.



## Attaching the Wheel Encoder Sensors

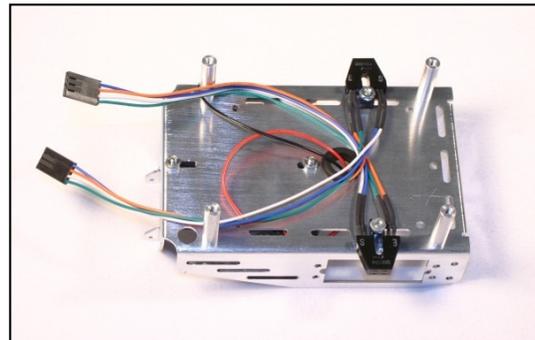
### Parts:

- 2 infrared photoreflector sensors
- 2 long round head screws
- 2 nuts



### Instructions:

1. Insert a long round head screw through from the bottom of the forward-most slot on the chassis deck.
2. Slide an infrared sensor over the screw protruding from the top of the chassis and loosely fasten it in place with a nut.
3. Slide the sensor and screw all the way to the rear end of the slot and extend the sensor as far over the side of the chassis as possible, as shown in the detailed photo.
4. Aim the sensor to point straight to the side and fully tighten the screw.
5. Repeat the previous steps for the second sensor.



## Attaching the Servos

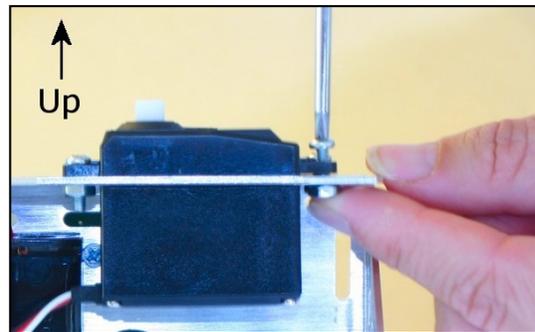
### Parts:

- 2 continuous rotations servos
- 8 long round head screws
- 8 nuts



### Instructions:

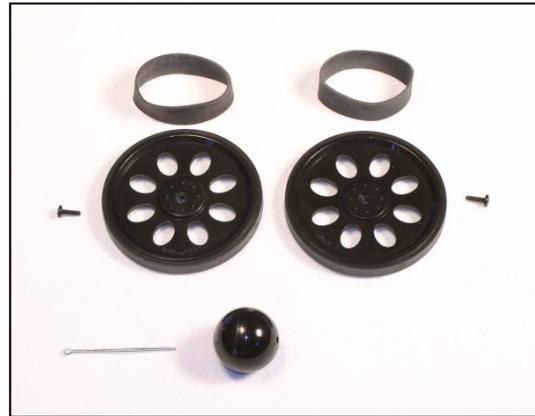
1. Remove the servo horn (four pronged plastic piece on the end of the servo shaft) from each servo by removing the screw and pulling the horn off. The servo horns are spare parts that you will not use, but you will use the screws later to attach the wheels.
2. Set the robot chassis on its edge then slide a servo into the servo mounting hole from above, positioning the servo such that the shaft is nearest to the center of the chassis and the mounting tabs on the servo are on the exterior side of the chassis, as shown to the right.
3. With the chassis on its edge, fasten the servo in place with four long round head screws and nuts, positioning each nut from below using your finger and inserting the screws from the above, as shown. This will be easiest if you keep the chassis on its edge and position the nut, using your finger, under the hole before inserting the screw, as shown.
4. Repeat the previous steps to install the other servo.



## Attaching the Wheels

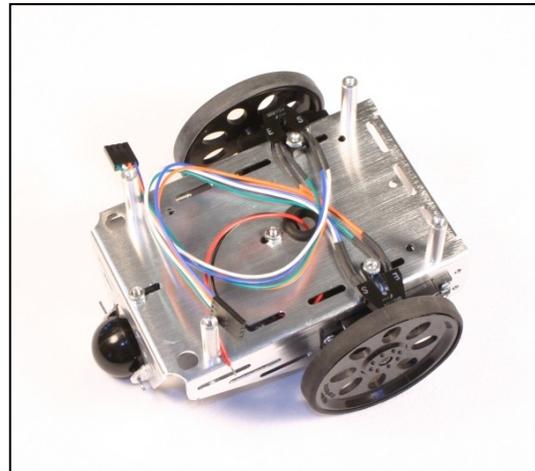
### Parts:

- 2 large wheels
- 2 rubber band tires
- 2 black screws previously removed from the servos
- 1 ball tail wheel
- 1 cotter pin



### Instructions:

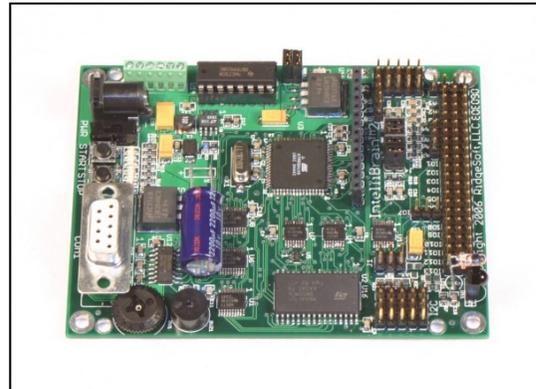
1. Press a large wheel on to a servo shaft.
2. Fasten the wheel in place with the black screw you previously removed from the servo.
3. Repeat the previous steps for the other large wheel.
4. Hold the tail wheel ball between the mounts on the chassis then slide the cotter pin through the mounting holes and the hole in the ball.
5. Bend the ends of the cotter pin apart so it will not slide out of place.
6. Stretch a rubber band tire over each large wheel. The other two rubber band tires are spares.



## Attaching the IntelliBrain 2 Robotics Controller

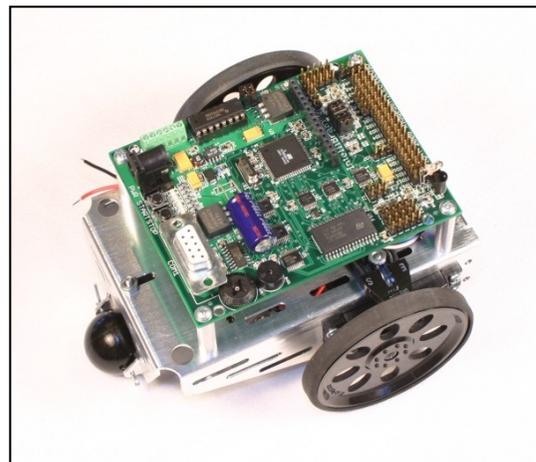
### Parts:

- 1 IntelliBrain 2 robotics controller
- 4 short round head screws



### Instructions:

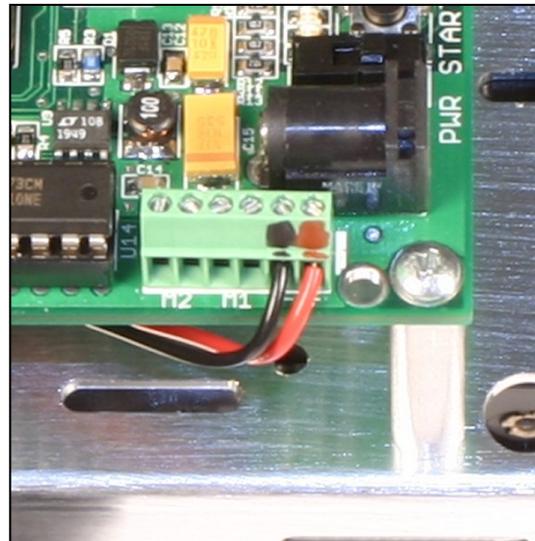
1. Attach the IntelliBrain 2 robotics controller to the four standoffs using four short round head screws, being careful to orient the controller board as shown in the figure to the right.
2. Tighten the four round head screws holding the IntelliBrain 2 robotics controller in place until they are snug, but do not over tighten them.
3. Tighten the screws that fasten the bottom ends of the standoffs to the chassis until they are snug.



## Attaching the Battery Power Leads

### Instructions:

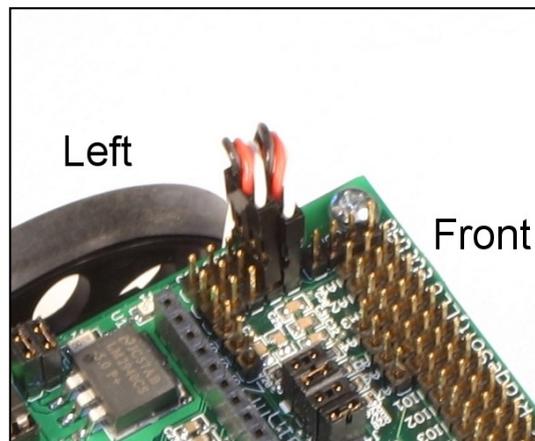
1. Insert the end of the red lead into the red terminal, marked '+', on IntelliBrain 2 robotics controller then fasten it in place by tightening the screw in the terminal block with a 1/16" flat tip screw driver until the screw is snug and the lead is held securely in place.
2. Similarly, fasten the black lead into the black terminal, marked '-'.



## Attaching the Servo Leads

### Instructions:

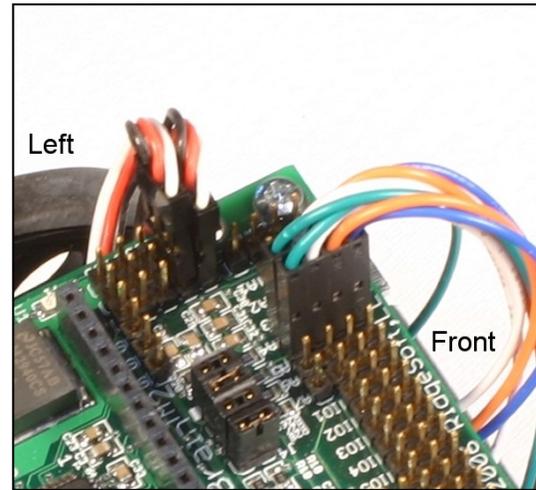
1. Slide the left servo leads through the hole in the grommet.
2. Attach the left servo lead connector to servo port 1, marked "S1", on the left edge of the IntelliBrain 2 robotics controller with the connector oriented such that the black lead attaches to the pin nearest the edge of the IntelliBrain 2 robotics controller.
3. Repeat the previous steps, for the right servo, attaching it to servo port 2, marked "S2".



## Attaching the Wheel Encoder Sensor Leads

### Instructions:

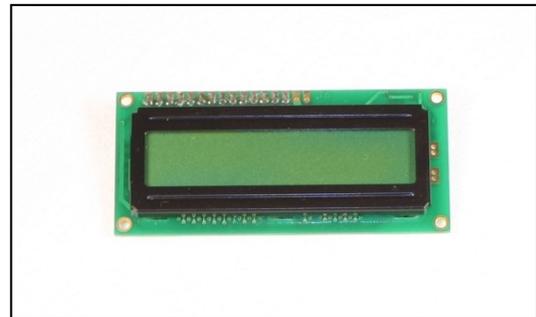
1. Attach the leads from the left wheel encoder sensor to analog port 4, marked "A4", on the IntelliBrain 2 robotics controller, aligning the blue lead with the pin nearest the front edge of the IntelliBrain 2 robotics controller.
2. Attach the leads from the right wheel encoder sensor to analog port 5, marked "A5", on the IntelliBrain 2 robotics controller, aligning the blue lead with the pin nearest the front edge of the IntelliBrain 2 robotics controller.



## Attaching the LCD Display

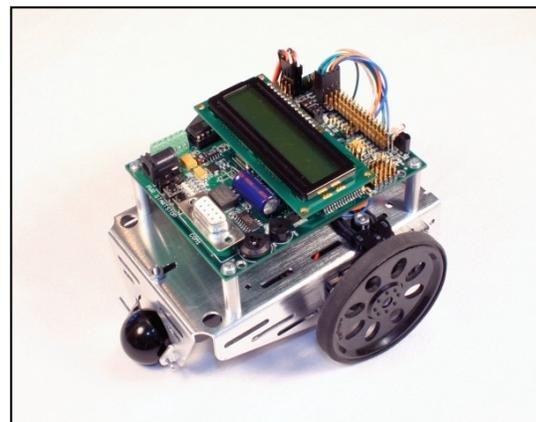
### Parts:

- 1 LCD display module



### Instructions:

1. Align the 14 pin connector on the LCD module with the 14 pin connector on the IntelliBrain 2 robotics controller.
2. Look carefully to ensure each pin is properly aligned with its hole in the connector.
3. Gently press the display module on to the IntelliBrain 2 robotics controller until the pins are completely inserted.



## Re-checking Connections

To avoid damage to the electronics, re-check each connection.

### Instructions:

1. Check that the left servo is connected to the port marked S1.
2. Check that the right servo is connected to the port marked S2.
3. Check that the black lead on each servo is connected to the pin nearest the edge of the IntelliBrain 2 robotics controller.
4. Check that the left sensor is connected to the port marked A4.
5. Check that and the right sensor is connected to the port marked A5.
6. Check that the blue lead on each wheel encoder sensor is connected to the pin nearest the edge of the IntelliBrain 2 robotics controller.
7. Check that the red battery lead is attached to the '+' terminal and the black battery lead is attached to the '-' terminal.

## Inserting Batteries and Powering Your IntelliBrain-Bot

### Parts:

- 4 AA NiMH (recommended), alkaline, NiCd or batteries

### Instructions:

1. Check that the power switch on the IntelliBrain 2 robotics controller is in the off position (switch knob pushed toward the rear of the board).
2. Insert the batteries into the battery holder in the orientation indicated on the battery holder.
3. Switch the power on and verify the RoboJDE™ version message is displayed on the LCD screen.

## Testing

1. If you have not already done so, install the RoboJDE™ Java-enable robotics software development environment on your host computer and also install the license key. See the RoboJDE User Guide for more information.
2. Attach the male end of the serial cable to the DB9 connector on your IntelliBrain 2 robotics controller.
3. Attach the female end of the cable to your host computer. If your host computer does not have a serial port, you will need to use a USB to serial adapter cable, such as the FTDI US232B USB to serial adapter cable, to add a serial port to your host computer.
4. Configure the RoboJDE development environment's settings using the Tools->Settings dialog to: 1) select the controller type, "IntelliBrain", 2) set the COM port to which you have attached your IntelliBrain 2 robotics controller, and 3) set the baud rate to 115,200. For more information see the RoboJDE User Guide.
5. Using the File->Open Project menu item in the RoboJDE development environment, open the "IntelliBrainBotDemo" example program in the folder: "\Program Files\RoboJDE\Examples\IntelliBrainBot\Demo".
6. Switch the power switch on your IntelliBrain-Bot to the ON position.
7. Use the Project->Load menu item to download the IntelliBrainBotDemo program to your robot.
8. Press the START button.
9. You should see the following displayed on your robots LCD screen: "Select Function", "Do Nothing".
10. Press the START button again.
11. Rotate the thumbwheel slowly until the LCD screen displays the readings of the left and right wheel sensors as follows: "L Wheel: <value>", "R Wheel: <value>".
12. Gently turn each wheel, to verify that the corresponding sensor reading is less than 200 when a spoke is in front of the sensor and greater than 800 when a hole in the wheel is in front of the sensor.
13. Press the STOP button.
14. Without switching your robot's power off, gently disconnect the serial cable from the IntelliBrain 2 robotics controller.
15. Press the START button.
16. Press the STOP button repeatedly until "Navigate Square" is displayed.
17. Set your robot on the floor in an open space.
18. Press the START button.
19. Verify your robot drives in a square pattern, stopping after one time around the square.