

LINE FOLLOWING PROGRAM INSTALLATION

Created by Zagros Robotics on November 3, 2016
Revised March 30, 2017

Before Programming: Check your Robot

Let's look over your Robot before we start programming:

- Where is the front of your robot? Which is your Left and Right Motor?
- The most common error is incorrect or poorly seated wiring. Check to make sure your Robot is wired correctly.

✓ Ardumoto Pin 10	>	QTR Sensor Pin 8
✓ Ardumoto Pin 9	>	QTR Sensor Pin 7
✓ Ardumoto Pin 8	>	QTR Sensor Pin 6
✓ Ardumoto Pin 7	>	QTR Sensor Pin 5
✓ Ardumoto Pin 6	>	QTR Sensor Pin 4
✓ Ardumoto Pin 5	>	QTR Sensor Pin 3
✓ Ardumoto Pin 4	>	QTR Sensor Pin 2
✓ Ardumoto Pin 2	>	QTR Sensor Pin 1
✓ Ardumoto Pin 5V	>	QTR Sensor Pin VCC
✓ Ardumoto Pin GND	>	QTR Sensor Pin GND
✓ Left Motor Black Wire	>	Connected to A1
✓ Left Motor Red Wire	>	Connected to A2
✓ Right Motor Black Wire	>	Connected to B3
✓ Right Motor Red Wire	>	Connected to B4

Install Arduino, FTDI VCP drivers, and Libraries

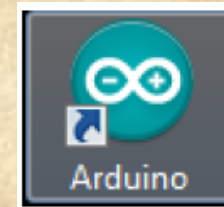
Watch the installation Video:

[Installing Arduino IDE, Redboard, and Gobbit Line Command library](#)

1. Make sure your computer is loaded with the Arduino IDE.

Download the Arduino Software from:

<https://www.arduino.cc/en/Main/Software>



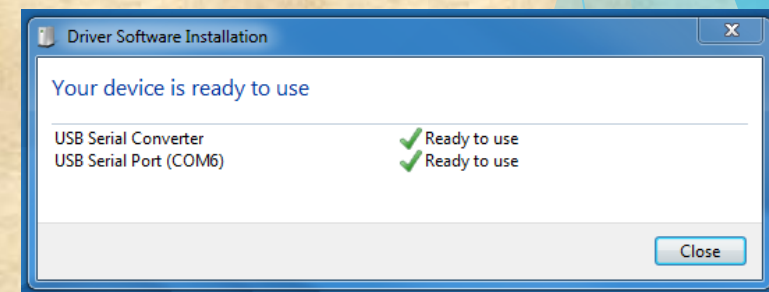
3. Connect the USB Cable between your RedBoard Arduino and the computer.

The FTDI VCP drivers (Virtual COM Port) for the RedBoard should automatically install when the Redboard is plugged into your computer.

If not, the FTDI will need to be downloaded to your PC.

<http://www.ftdichip.com/Drivers/VCP.htm>

Run the FTDI driver setup executable file.



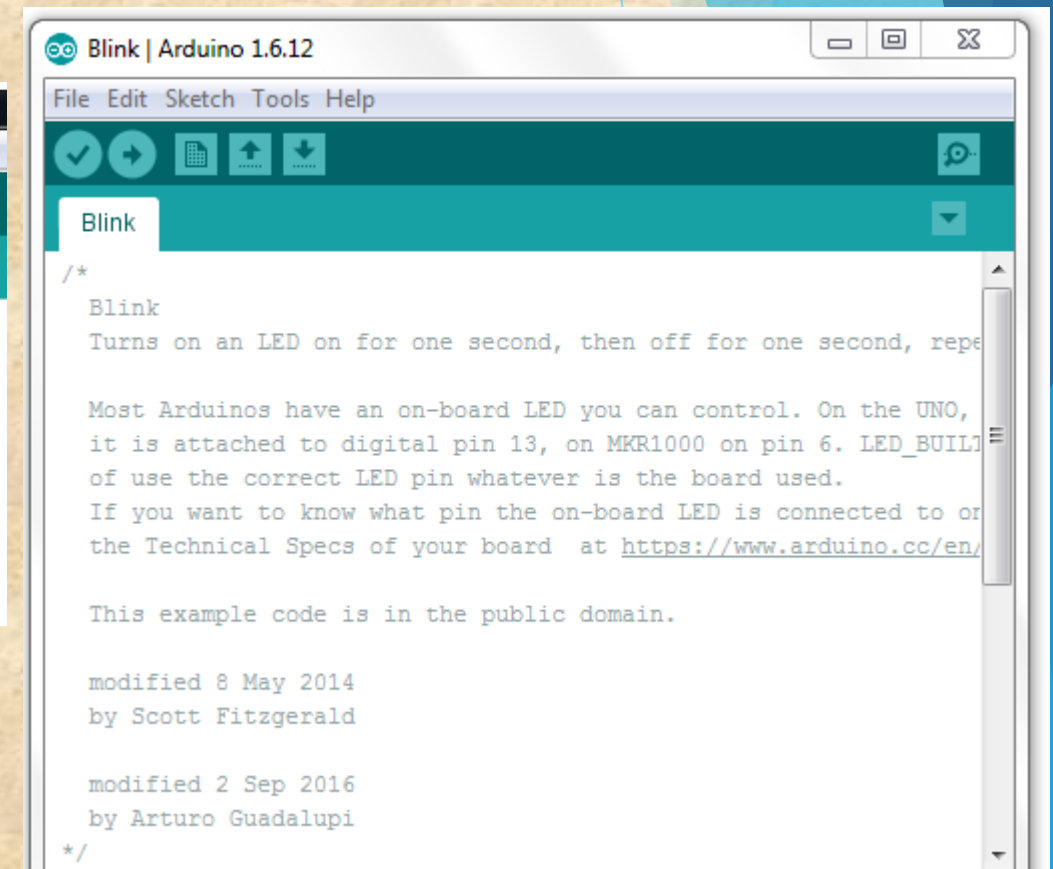
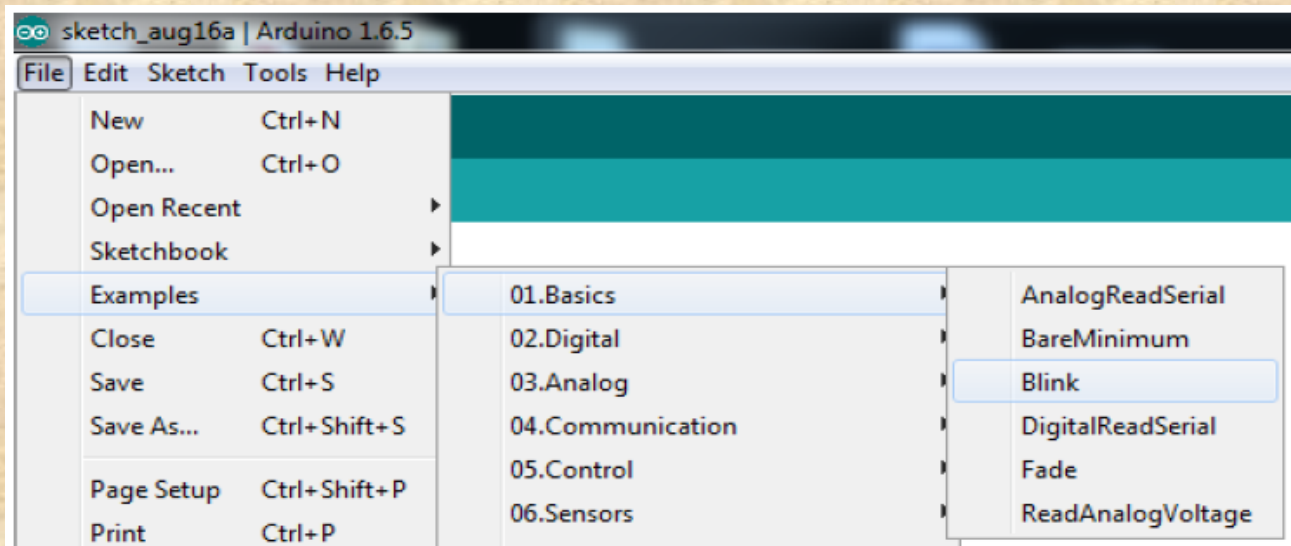
Test the Installation

4. Run the Arduino IDE from your new desktop icon.



Check your Board:

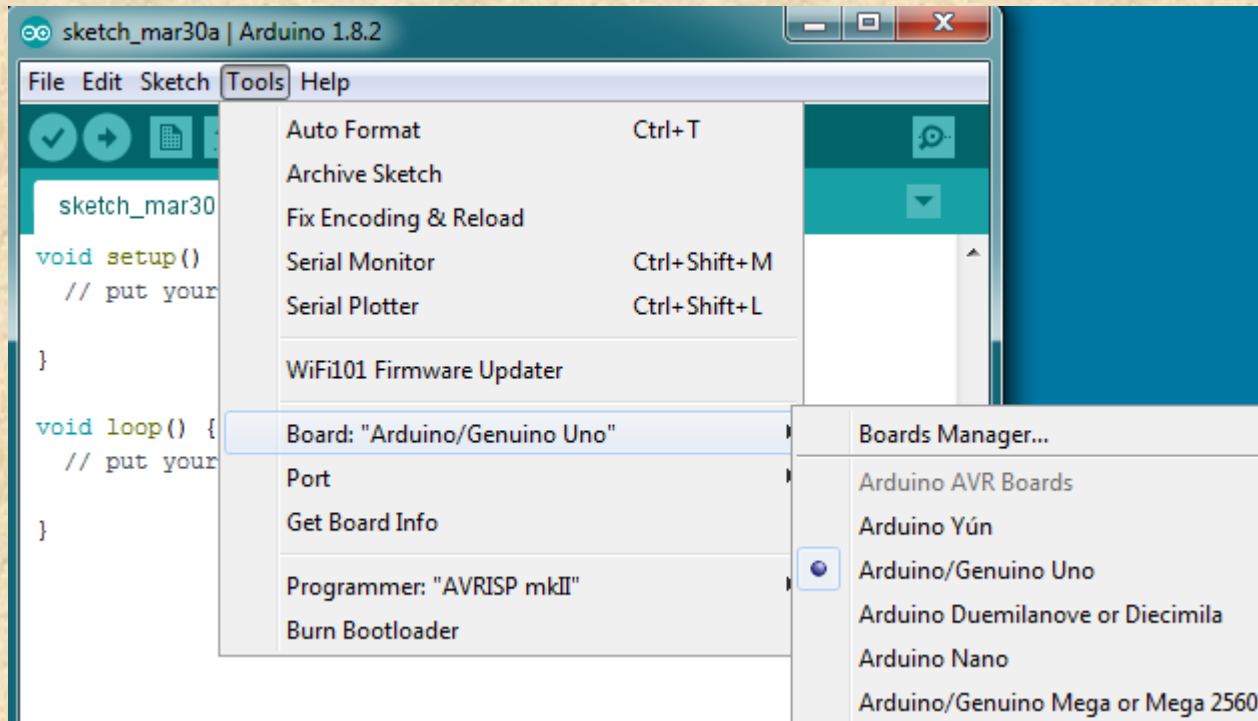
Open a basic Arduino program. From the menu bar, select File>Examples>Basics>Blink



Test the Installation cont...

5. Set your board type.

From the menu bar, select Tools>Board>Arduino/Genuino Uno

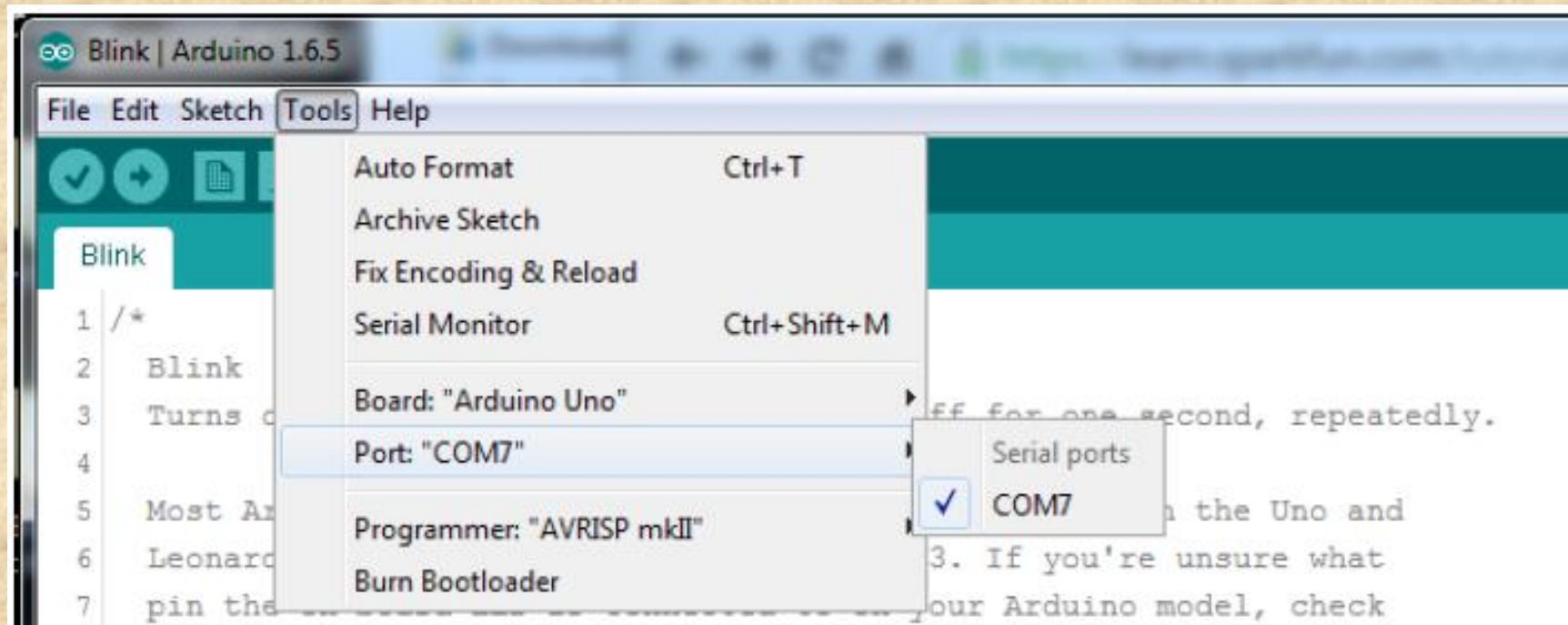


Test the Installation cont...

6. Set your Serial Port. From the Menu bar, select Tools>Serial Port>COM(some number)

Usually, if there is more than one listed, the correct COM port number will be the highest numbered port. However, a simple test is to unplug your RedBoard while watching the list of ports, and note which one disappears. Make sure to plug the board back in and select its port.

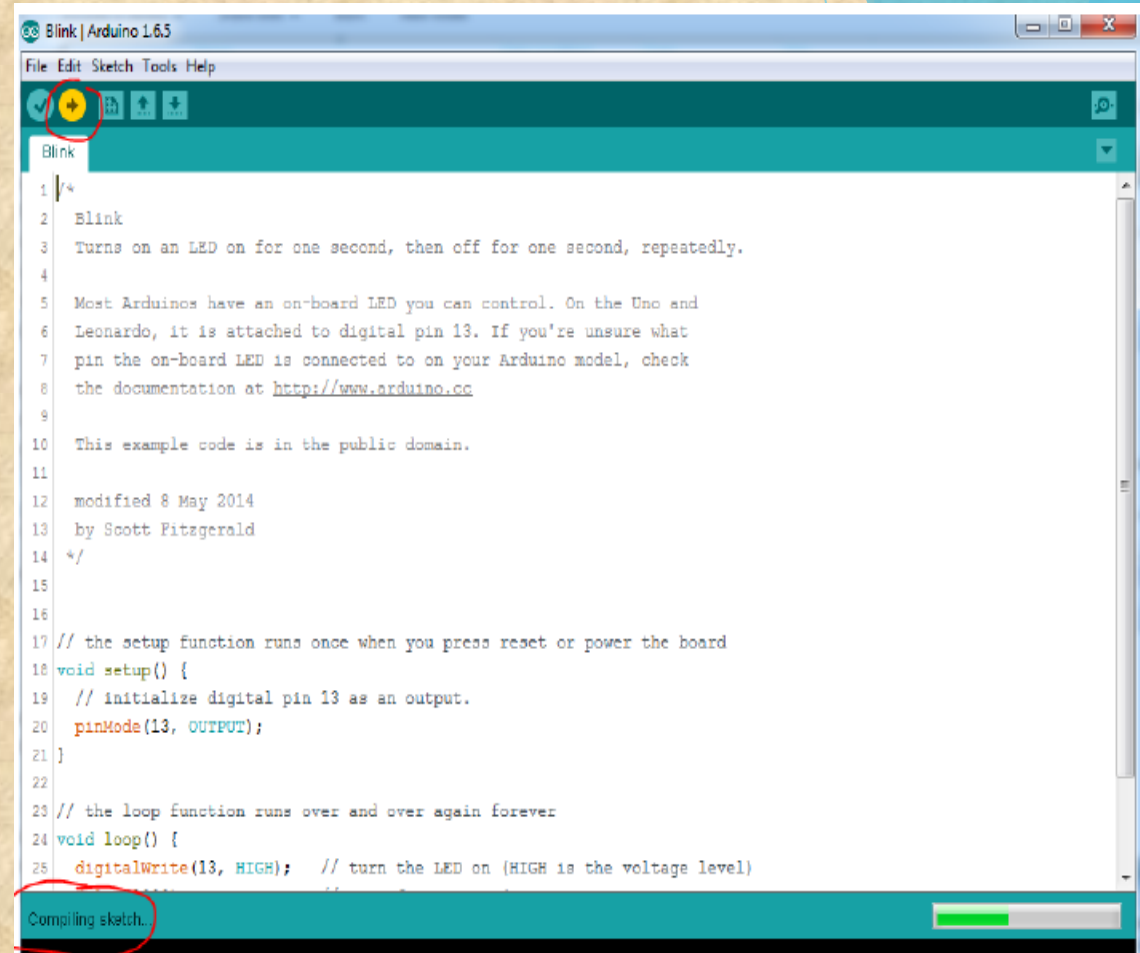
If you are unable to select a Port then the FTDI VCP drivers are not installed



Test the Installation cont...

7. Click on the “Upload” icon

Near the bottom of the window, the status bar will say “Compiling Sketch,” then “Uploading...,” then “Done uploading” if it was a success. While it is uploading, there should be some LED’s flickering on the RedBoard. When it is done uploading, the LED near digital pin 13 should be blinking slowly if it was successfully programmed.



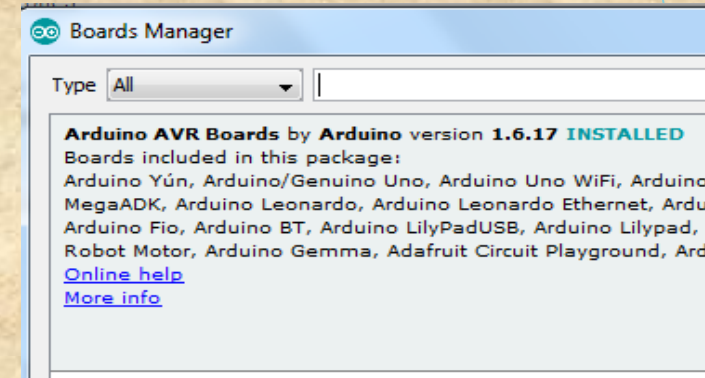
```
1 /*  
2  Blink  
3  Turns on an LED on for one second, then off for one second, repeatedly.  
4  
5  Most Arduinos have an on-board LED you can control. On the Uno and  
6  Leonardo, it is attached to digital pin 13. If you're unsure what  
7  pin the on-board LED is connected to on your Arduino model, check  
8  the documentation at http://www.arduino.cc  
9  
10 This example code is in the public domain.  
11  
12 modified 8 May 2014  
13 by Scott Fitzgerald  
14 */  
15  
16  
17 // the setup function runs once when you press reset or power the board  
18 void setup() {  
19   // initialize digital pin 13 as an output.  
20   pinMode(13, OUTPUT);  
21 }  
22  
23 // the loop function runs over and over again forever  
24 void loop() {  
25   digitalWrite(13, HIGH); // turn the LED on (HIGH is the voltage level)
```

You should now have a functioning Arduino IDE with RedBoard communication.

Troubleshooting: Redboard

Attempt these before asking for help

- Don't see the Arduino Uno Board or any Board
 - Verify that the board is installed
 - Check connection of your Mini B Cable to the RedBoard: disconnect and reconnect to make sure it cable is pushed in completely into the Board. Verify the correct Com Port is selected.
- Don't see a COM Port or Unable to select.
 - Check connection of your Mini B Cable to the RedBoard: disconnect and reconnect to make sure it cable is pushed in completely into the Board. Verify the correct Com Port is selected. You can also try switching the USB location.
 - FTDI VCP Drivers are not installed
- #13 Light does not blink
 - Check connection of your Mini B Cable to the RedBoard: disconnect and reconnect to make sure it cable is pushed in completely into the Board. Verify the correct Com Port is selected.

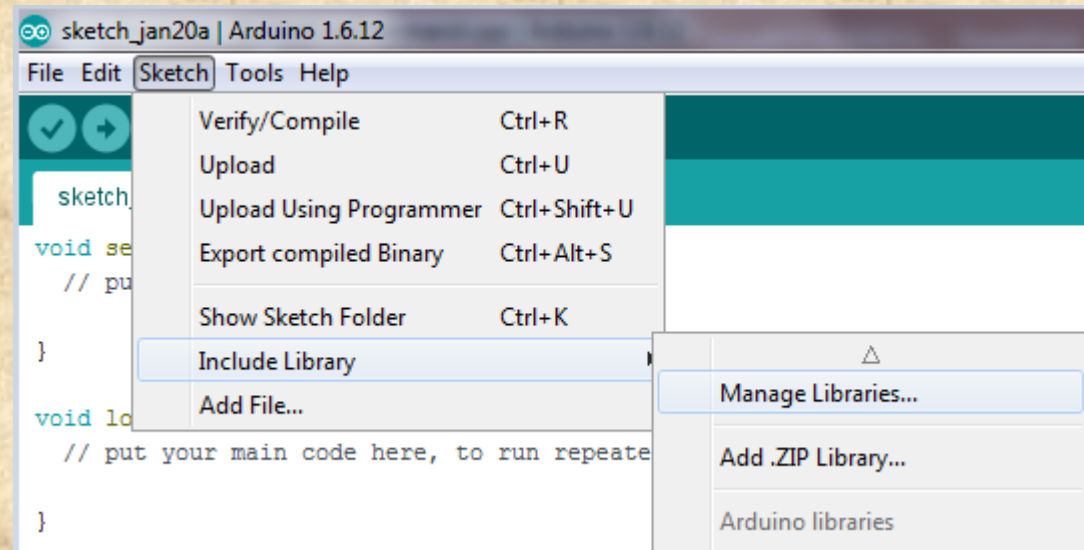


Installing the Libraries

8. Check to make sure the following Libraries are installed:

- GobbitLineCommand
- QTR Sensors
- Adafruit Motor Shield V2 Library

9. Go To Sketch > Included Library > Manage Libraries

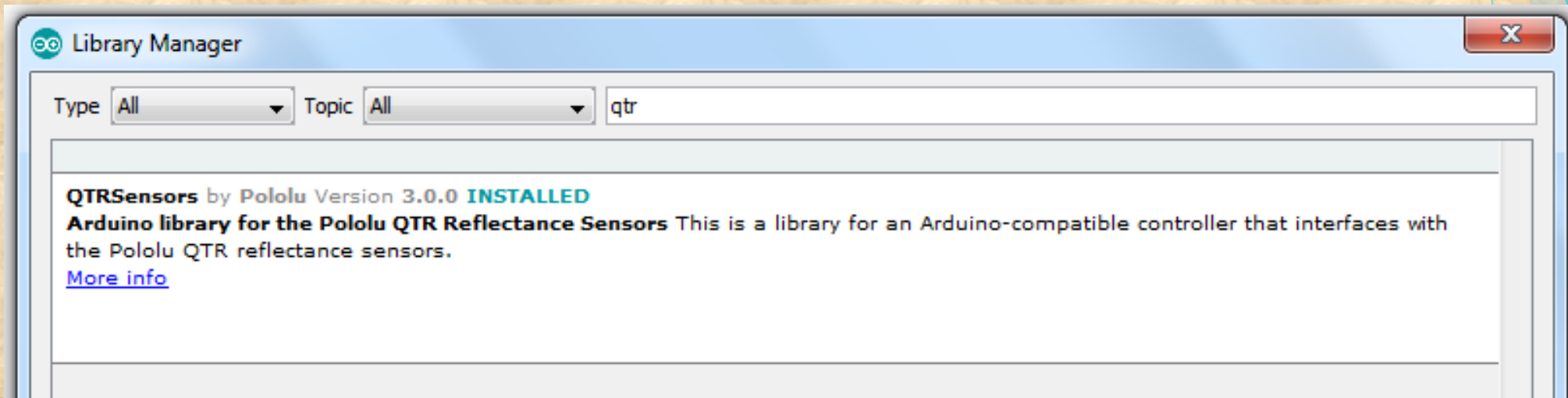


Installing Libraries Cont.

10. Under Library Manager search for the libraries. The library should display and say INSTALLED
If it is not installed, click on the box and then click Install

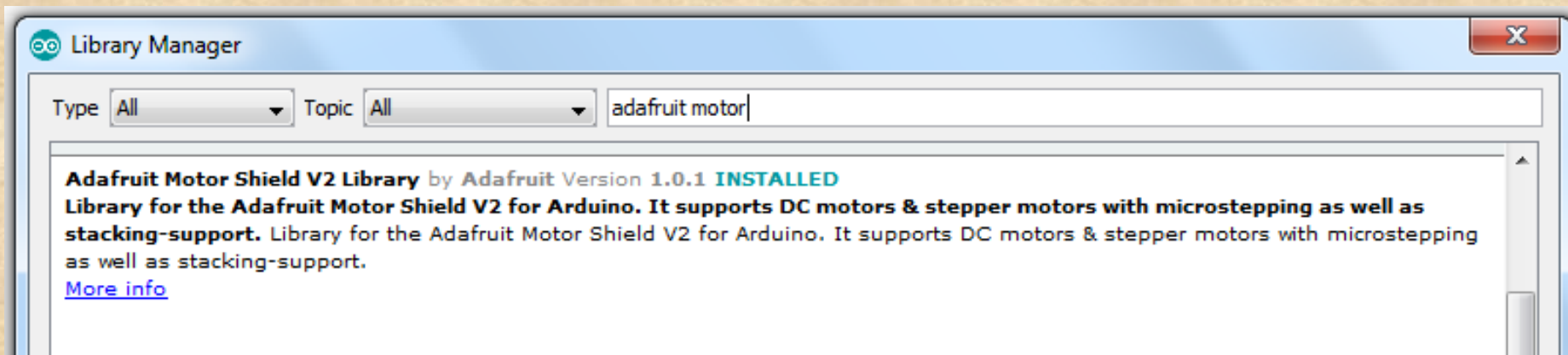
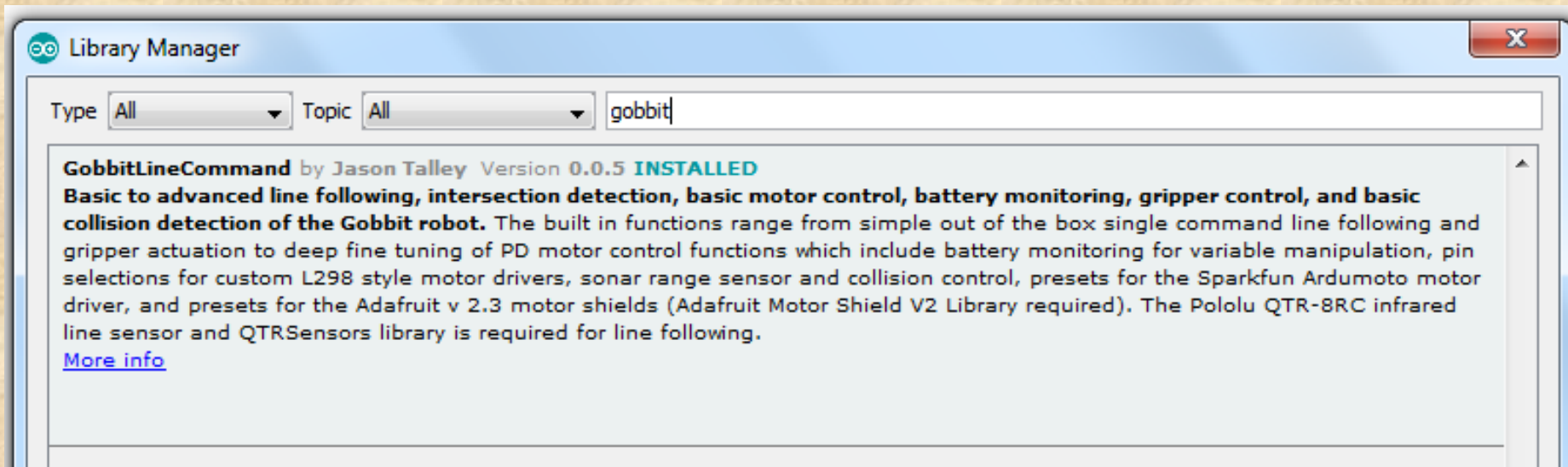
A rectangular button with a light gray background and a thin border, containing the word "Install" in a dark gray font.

Search for the QTR Sensors. The QTRSensor Library should display and show **INSTALLED**

The word "INSTALLED" in a bold, teal-colored font, enclosed in a white rectangular box with a thin gray border.

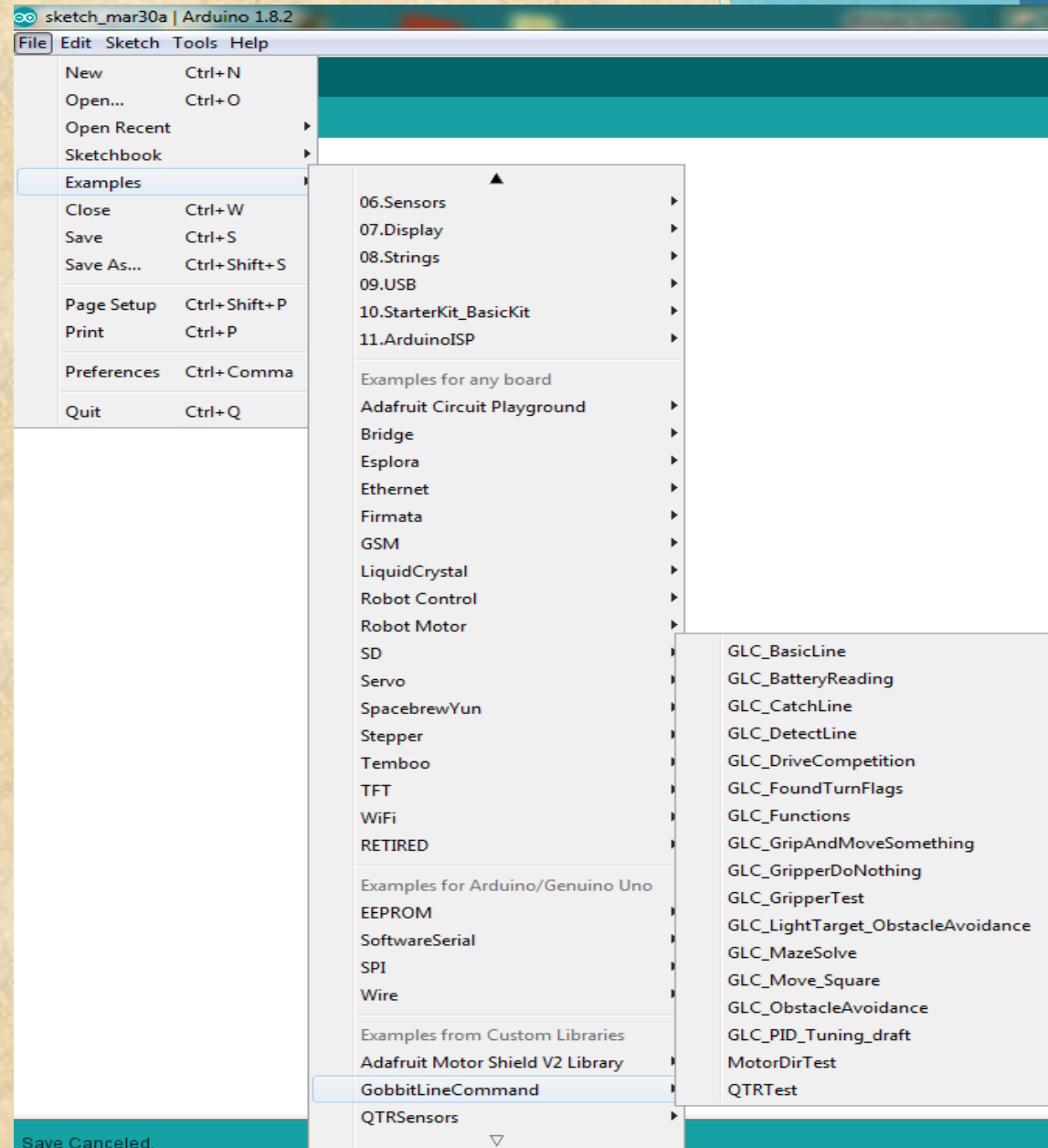
Installing Libraries Cont.

11. Repeat for GobbitLineCommand, and Adafruit Motor Shield V2 Library.



Open the Libraries

12. Once all the Libraries are installed. Open the library. Go to the File Menu > Examples > GobbitLineCommand. Here you will find all of the basic files you will need to test your Gobbit Motors, QTR Sensor, install the Basic Line Command program, and additional function commands used to program your robot.

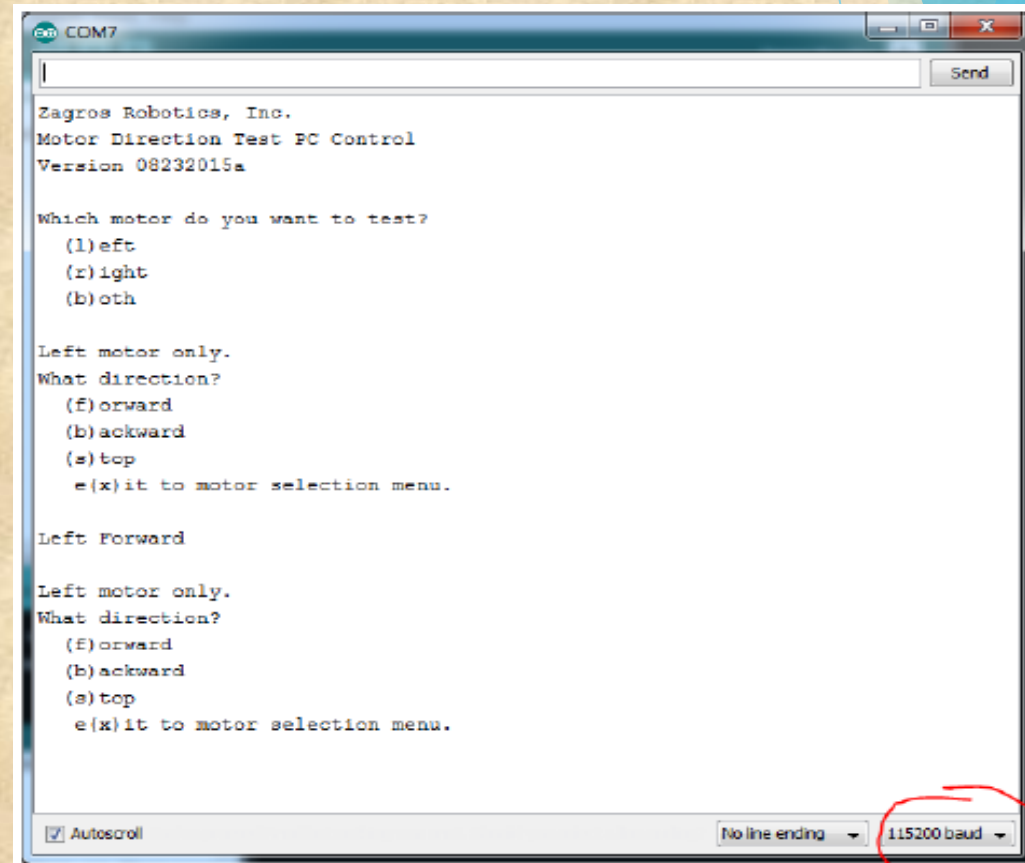


Test Motors and Wiring with Serial Monitor

When testing your motors it is recommended you set your robot on end or prop it with the wheels just off the ground

Note: The ball caster is in the back.

13. From within the Arduino IDE examples, use the File menu>Example>GobbitLineCommand>MotorDirTest
14. Make sure your robot and computer are plugged into the USB cable, your COM port is correct, then Upload the sketch.
15. Open the Serial Monitor from the menu Tools>Serial Monitor, or use Control+Shift+M to open. The baud rate should still be at 115200.



The screenshot shows a Serial Monitor window titled 'COM7'. The text displayed is as follows:

```
Zagros Robotics, Inc.  
Motor Direction Test PC Control  
Version 08232015a  
  
Which motor do you want to test?  
(l)eft  
(r)ight  
(b)oth  
  
Left motor only.  
What direction?  
(f)orward  
(b)ackward  
(s)top  
e(x)it to motor selection menu.  
  
Left Forward  
  
Left motor only.  
What direction?  
(F)orward  
(b)ackward  
(s)top  
e(x)it to motor selection menu.
```

At the bottom of the window, the 'Autoscroll' checkbox is checked, and the baud rate is set to '115200 baud', which is circled in red.

Test Motors and Wiring with Serial Monitor cont...

16. Set your robot on end or prop it with the wheels just off the ground. You will need the USB cable to stay connected for this step, so you don't want your robot to roll away or fall off the table.

Within the serial monitor, follow the menus to test the motors individually first (l or r). Enter the command letter in the prompt at the top of the monitor window and hit either enter or the send button on the right.

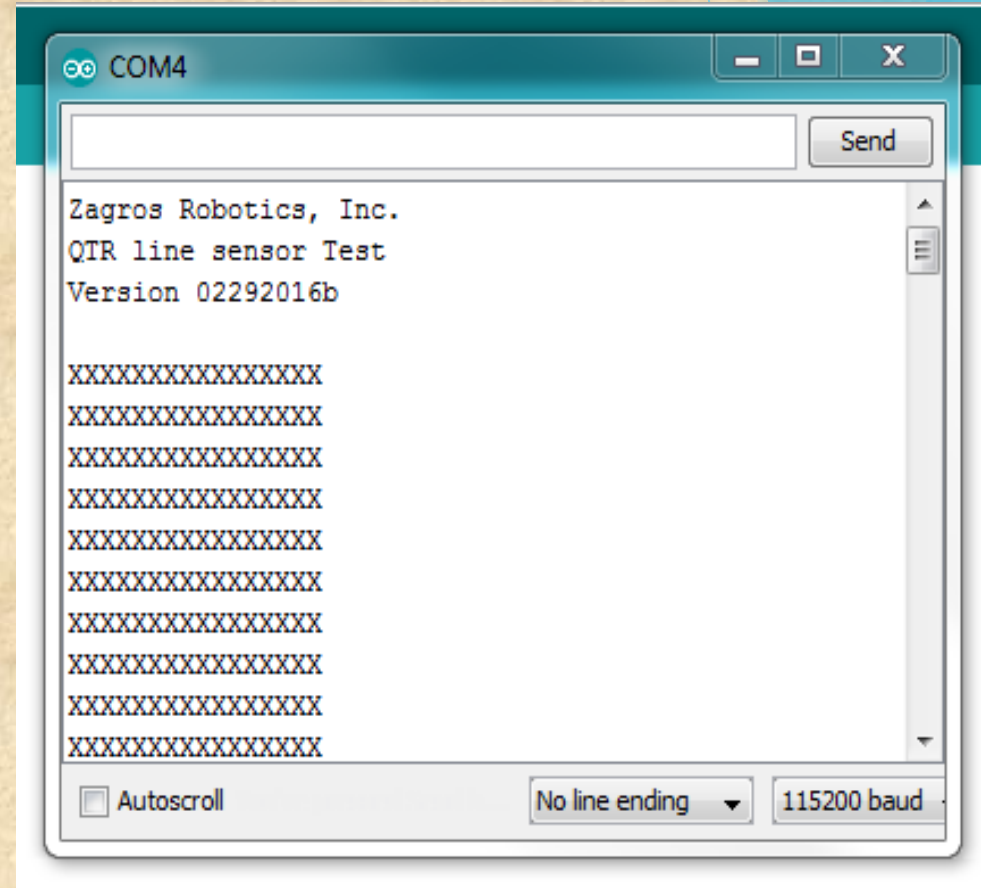
- a. If the wrong motor moves, swap the Ardumoto A1-A2 terminal wires with the B3-B4.
- b. If the correct motor moves, but the wrong direction, swap the black and red motor wires at the Ardumoto A or B terminals for just that motor.
- c. Re-test individual motors after any wiring changes and make any additional needed wiring changes.
- d. After the individual motors appear to run correctly, run the test for both motors to confirm individual setup is correct.

Troubleshooting the Motors

- Wrong Motor moves or moves in opposite direction:
 - Check motor connections to the Ardumoto
 - ✓ Left Motor Black Wire > Connected to A1
 - ✓ Left Motor Red Wire > Connected to A2
 - ✓ Right Motor Black Wire > Connected to B3
 - ✓ Right Motor Red Wire > Connected to B4
- Motors do not move:
 - Open robot and check wiring: verify wires are not loose or pinched during assembly

Test the QTR line sensor and Wiring with Serial Monitor

17. From within the Arduino IDE examples, use the File menu>Example>GobbitLineCommand>QTRTest
18. Make sure your robot and computer are plugged into the USB cable, your COM port is correct, then Upload the sketch.
19. Open the Serial Monitor from the menu Tools > Serial Monitor or Control+Shift+M. The baud rate should still be at 115200.



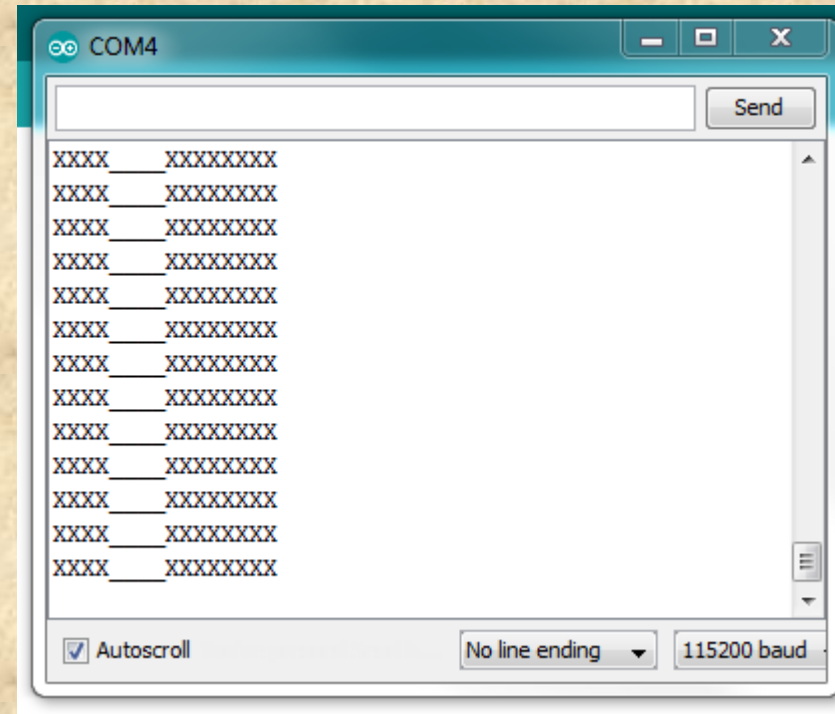
Test the QTR line sensor and Wiring with Serial Monitor cont...

20. Stand the robot up on end and pass your finger or a large pencil/pen/marker near the sensors. If it is wired correctly, the readout should show “XX” at a sensor that is seeing little reflection, such as a dark line or open space, and “___” where it sees a bright reflection, such as your finger or white paper. It will also display “—” where it is seeing somewhere between no reflection and a lot of reflection.

a. The display should match left/right with the left/right of the sensors you are covering. If they are opposite, you will need to change your wiring.

In this example, my finger was covering the 3rd and 4th sensor from the left.

b. If some of the sensors do not change, and only show “XX” they may be either unplugged or non functional. Check your wiring for loose connections and your solder joints on the sensor.



Troubleshooting the Sensor

- Nothing happens when performing the Sensor Test or the reading wrong pin
 - Check sensor connections: make sure all jumper wires are pushed in completely and no wires were pinched during assembly
 - Is your sensor correctly wired?

✓ Ardumoto Pin 10	>	QTR Sensor Pin 8
✓ Ardumoto Pin 9	>	QTR Sensor Pin 7
✓ Ardumoto Pin 8	>	QTR Sensor Pin 6
✓ Ardumoto Pin 7	>	QTR Sensor Pin 5
✓ Ardumoto Pin 6	>	QTR Sensor Pin 4
✓ Ardumoto Pin 5	>	QTR Sensor Pin 3
✓ Ardumoto Pin 4	>	QTR Sensor Pin 2
✓ Ardumoto Pin 2	>	QTR Sensor Pin 1
✓ Ardumoto Pin 5V	>	QTR Sensor Pin VCC
✓ Ardumoto Pin GND	>	QTR Sensor Pin GND

Upload and Run the Line Follower Sketch

21. From within the Arduino IDE examples, use the File menu> Example> GobbitLineCommand> GLC_BasicLine
22. Make sure your robot and computer are plugged in to the USB cable, your COM port is correct, then Upload the sketch.
23. Set your robot on your lined course and turn it on. You should see the robot turn back and forth over the line and begin following.

Troubleshooting the Line Follower

- Error Uploading the Line Follower sketch
 - Make sure you have the correct COM Port Selected
 - Check connection of your Mini B Cable to the RedBoard: disconnect and reconnect. Make sure it cable is pushed in completely into the Board. Verify the correct Com Port is selected
 - Verify that all the example files are installed.
- Robot Does nothing when turned on:
 - Check connection from our battery to switch to board.
 - Red to positive, and Black to Negative.
 - Check your batteries – are they new? Are they installed correctly into the battery box?
- Robot just spins in a circles or does not find the line:
 - Check over your robot.
 - Are the pins from the Ardumoto and Redboard seated correctly? Is your robot wired correctly – QTRsensor to Ardumoto, motors to Ardumoto, Battery to Switch to Arudumoto?
 - Verify no wires are pinched or became loose during assembly.