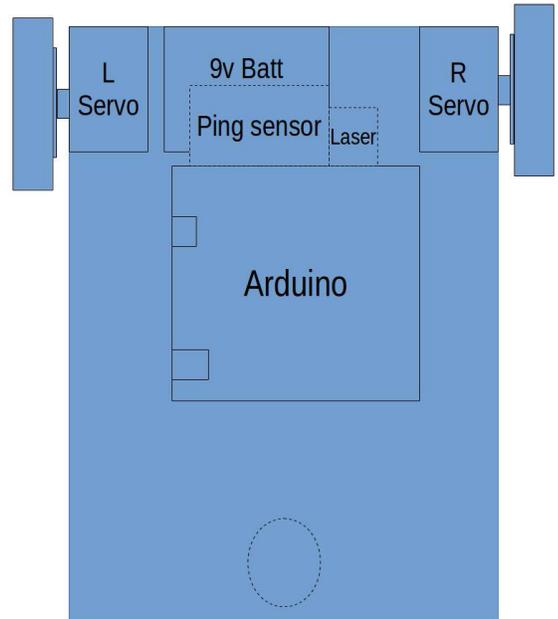
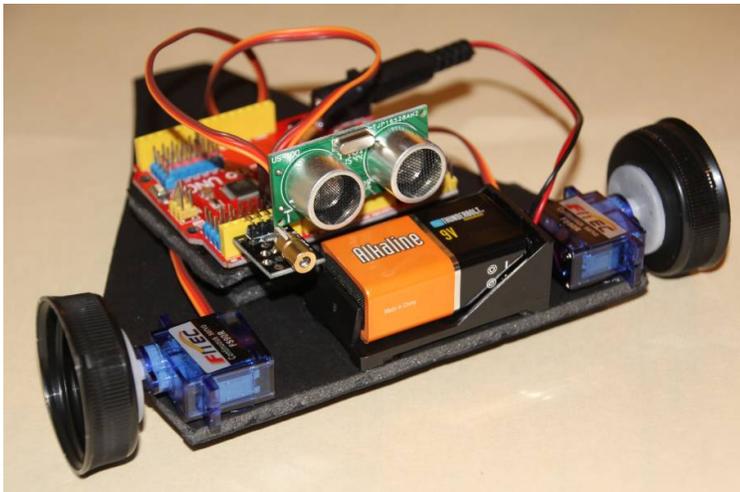


# Let's Code Blacksburg! Arduino Sensors and Robotics Workshop

v2016-06-22a\_tweaks

Code: [https://github.com/LetsCodeBlacksburg/LCBB\\_arduino-collision-bot](https://github.com/LetsCodeBlacksburg/LCBB_arduino-collision-bot)



## 1. Physically build your collision avoidance bot:

- one 6x4 piece of cardboard or foam board
- one “Funduino” arduino  $\mu$ controller, mounted as shown
- one ping sensor (“eyes”), DO NOT PLUG IN until step #3b
- two continuous rotating servos, mounted as shown
- one battery holder
- two milk jug caps (for wheels) hot glued to servos
- one soda bottle cap (as “rear dragger” )

### TA SIGN-OFF:

*WARNING: DO NOT POWER UP or plug in USB until TA has inspected, and sensor configuration code in step#3b has been uploaded to the arduino.*

## 2. Test Arduino board & arduino software install

- Start your arduino software
- Load “blink” program from File / Examples / Basic / Blink
- Test by clicking the compile  button and verify LED 13 is blinking
- Verify by changing the blink speed (with the delay() function ) **TA SIGN-OFF:**

## 3. Upload ping sensor & laser code to Arduino, then test

### 3a) Upload ping-and-laser code

- Copy ping\_US-100\_and\_laser.ino code from github repository:  
[https://github.com/LetsCodeBlacksburg/LCBB\\_arduino-collision-bot](https://github.com/LetsCodeBlacksburg/LCBB_arduino-collision-bot)
- Paste code into arduino (but DO NOT CONNECT ping sensor or laser yet!)
- Compile  and verify code has uploaded.
- Disconnect USB power before 3b)

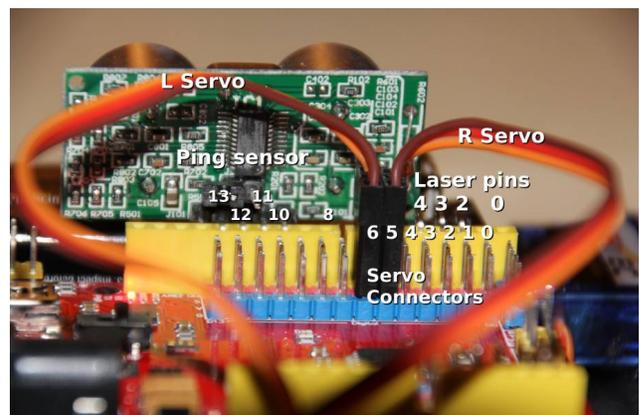
### TA SIGN-OFF:

### 3b) Connect the ping sensor, laser and test

- Connect the ping sensor to pins 10, 11, 12, 13 and laser to pins 2,3, 4 (as shown)
- Connect USB power and test sensor, using the serial monitor  to see the sensor readings and watch for laser blasts.

### TA SIGN-OFF:

- After TA sign-off, save your ping/laser code



#### 4. Connect the two servos to the servo-headers 5&6 (with USB disconnected)

-Start a new code window

-Connect the servos (while arduino is unplugged/powerd off) as shown in pin-out diagram (above).

-Copy the “two-servos-test.ino” servo test code from github URL (above)

-Calibrate your stopL, stopR, forwardL, forwardR, etc values until they all perform as expected for your servos and robot configuration so that you can demonstrate working forward(), stopall(), turnL() and turnR() functions, and get TA sign-off:

**TA SIGN-OFF:**

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*NOTE: You may need electrical tape around your wheels if you're running your bot on a shiny or smooth/slippy surface (as shown above).*

**BOT CHALLENGE: Using the two-servo-test code, try to program your bot to move around to form a 2 foot x 2 foot square**

**TA SIGN-OFF:**

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#### 5. Make Your Bot Smart - Combine Servo Code & Ping Sensor Code

##### 5a) Hard Way – Combine your code

Combine the ping sensor and servo code you previously saved to make your bot stop, scan for obstacles, and navigate the room without hitting anything.

If you're less experienced, you can experiment with the existing LCBB\_collision-bot\_complete.ino code, or use what you have in previous steps to design your own!

##### 5b) Easy Way – Download working code

Download the ready to use “LCBB\_collision-bot\_complete.ino” code from

[https://github.com/LetsCodeBlacksburg/LCBB\\_arduino-collision-bot](https://github.com/LetsCodeBlacksburg/LCBB_arduino-collision-bot), re-calibrate your servos and make your bot roam around the room and avoid obstacles.

*NOTE: The older LCBB\_collision-bot\_complete.ino code does not have the laser code built in. Can you add a laserFire() function? (hint, look back at your saved ping/laser code)*

##### 5c) Cool & Easy Way – Download Laser-Bot Code

Download the ready to use “LCBB\_Laser\_Bot\_Mission\_to\_Mars.ino” code to get code that will give you a ready to program bot with laserFire() function already set up. But there's a problem with the laser configuration. Can you find out and fix what's wrong?



**“SAVE THE EARTH” MARS LASER-BOT BOT CHALLENGE:**  
**Your Mars rover Laser-Bot has been sent to Mars to stop an alien invasion force attacking Earth!**



**TA SIGN-OFF:**

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**Download, compile and then upload the**

**“LCBB\_Laser\_Bot\_Mission\_to\_Mars.ino” code to the arduino.**

**Quickly figure out why your Mars Laser-Bot's laser is malfunctioning, fix the laser (in code), program your bot to navigate the mountainous mars obstacle course and take out the alien attack ship with your 5000μWatt laser before they launch their attack on Earth!**