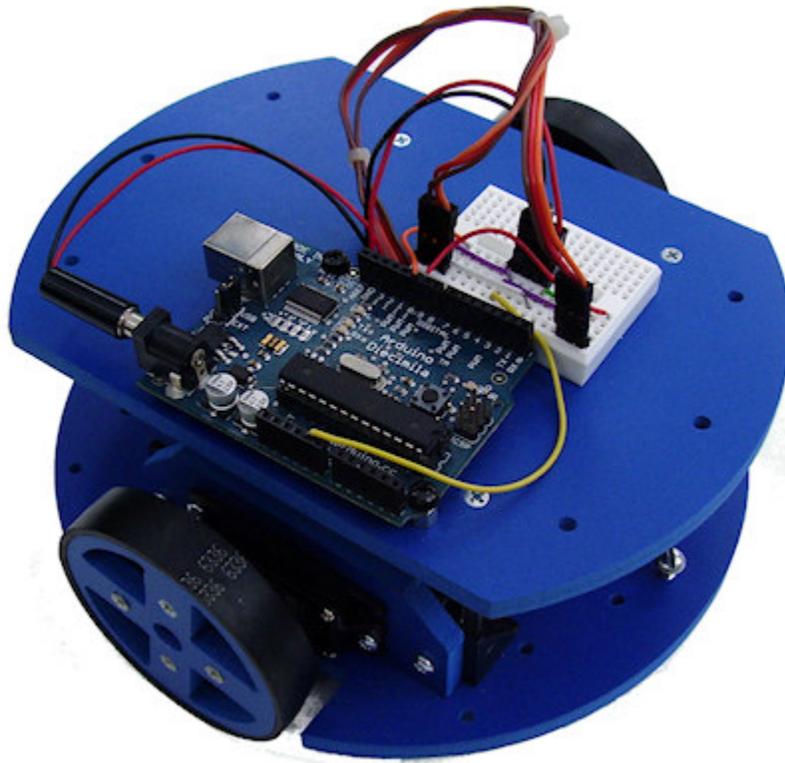


# Budget Robotics ArdBot Chassis Kit



The Budget Robotics ArdBot Chassis Kit is a low-cost, 7" diameter servo-driven robot base, ready for expansion. It's called ArdBot because it's intended for the popular and inexpensive Arduino microcontroller board. Complementing the Arduino microcontroller board is a solderless breadboard or prototyping shield.

The ArdBot uses two "decks" for mounting a pair of servo motors, batteries, microcontroller, small prototyping board, and other components you'd like to experiment with. The bottom deck is basically a 7" diameter circle, with cutouts for the wheels. The top deck is the same 7" diameter circle with the side lobes cut off. The decks are separated by a set of four standoffs.

The ArdBot uses differential steering, where the base is propelled by two motors and wheels on opposite sides. To keep down costs and minimize construction complexity, the robot uses a pair of skids, placed in the front and rear, to provide balance. With this arrangement, the ArdBot is able to move forward and back, turn left and right, and spin in place. The skids are smooth and polished metal, so they present little drag on whatever surface the robot is rolling over. Even so, the ArdBot is best suited for travel on hard surfaces, or carpet with a short nap.

**Note:** We provide only the chassis parts. You provide your own Arduino microcontroller, breadboard or other prototyping area, servos, wheels, battery holders, batteries, and other parts.

## ArdBot Chassis Kit Parts List

Quantity	Description
1	7" diameter bottom deck, with wheel well cutouts for the drive wheels.
1	7" x 5" top deck.
2	Servo mounts.
4	90° plastic L brackets, for attaching the servo mounts to the bottom deck. These brackets measure 3/4" x 3/4", with hole centers at 3/8", and are made to work with the two servo mounts.
16	4-40 x 1/2" machine screws and nuts, for attaching the servos and servo mounts to the bottom deck.
4	Deck risers consisting of: (4) standoffs with 4-40 threads, (4) 4-40 pan head machine screws, (4) 4-40 flat head machine screws.
2	Skids consisting of: (2) 6-32 x 3/4" machine screws, (4) 6-32 hex nuts, (2) 6-32 acorn (cap) nuts.
3	Sets of mounting hardware for Arduino Uno (or similar), consisting of (3 each) 4-40 machine screws, 4-40 nuts, plastic washers, and nylon spacers.

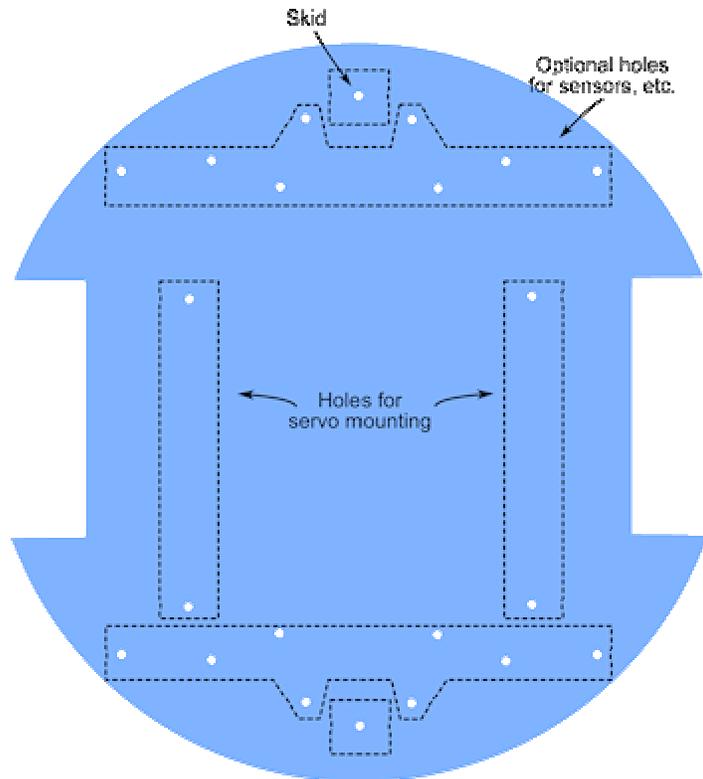
## Assembling the ArdBot

### Step 0

Before assembly you may wish to use 150 grit sandpaper to smooth the edges of the base parts.

Orient the bottom deck so that the holes are aligned as shown. Note that the holes for each servo are not symmetrically placed on the deck. This is to accommodate the offset of the servo drive shaft.

While there is technically no "front" or "rear" of the ArdBot, for the purposes of assembly, the top of the illustration is the front, and the bottom is the rear.

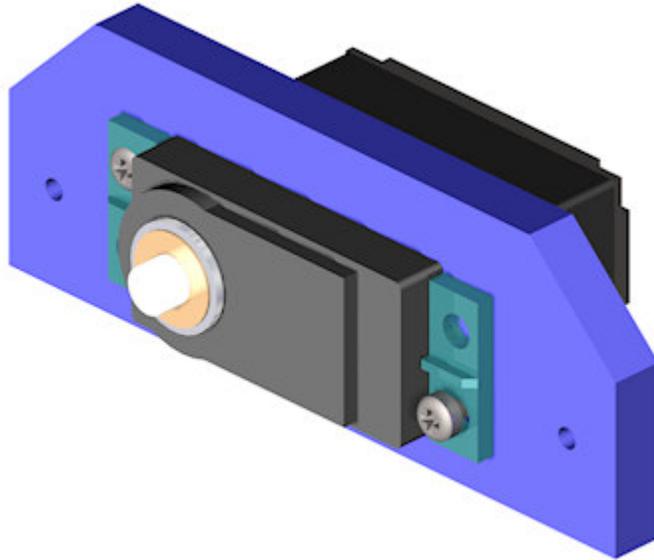


## Step 1

Insert a servo (you supply) into a servo mount by sliding it back-end first through the mount. The fit may be tight, depending on the make and model of the servo. Do not force the servo into the mount, or the mount may be damaged.

Secure the servo to the mount with 4-40  $\times$  1/2" screws and hex nuts. You can use four screws for each servo, or only two. When using two screws position them on opposite corners of the servo mounting flange, as shown.

Repeat for the opposite servo and mount. *Be sure to construct the second servo and mount in mirror-image to the first!* Refer to Step 3 to see how the motors should be inserted into the mounts. For reference, see also Step 5 for an aerial view of the Ardbot and its completed bottom deck.

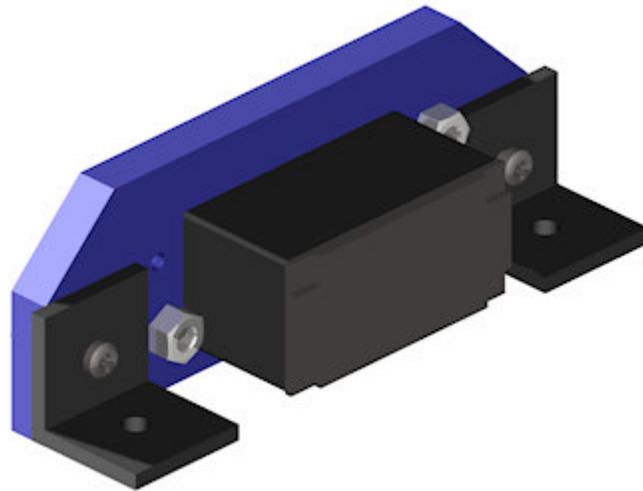


## Step 2

Using 4-40  $\times$  1/2" machine screws and nuts, attach two plastic L brackets to each of the servo mounts. You'll be making a "left" and a "right" mount assembly.

- For the left mount assembly, the motor shaft should face to the left, and toward the "top" of the deck. Attach the L brackets to the right side of the mount.
- For the right mount assembly, the motor shaft should face to the right, also toward the top of the deck. Attach the L brackets to the left side of the mount.

Insert the machine screws through the L bracket, then through the servo mount. Secure on the other end with a nut. Before tightening be



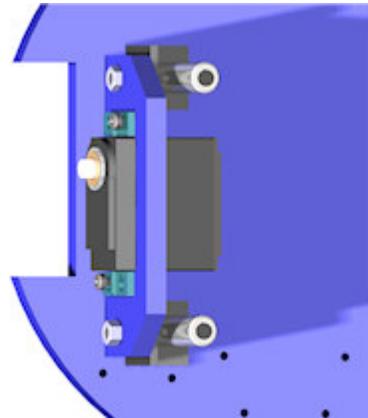
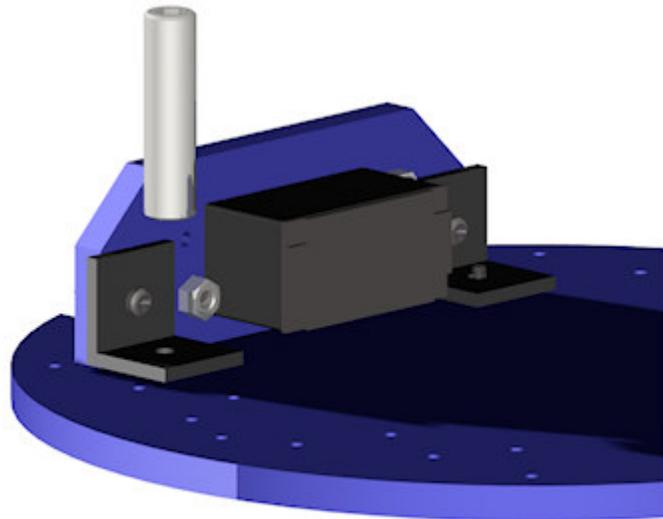
sure the bottom of the L bracket is flush with the bottom edge of the servo mount.

### Step 3

Attach the left mount assembly to the bottom deck using two 4-40  $\times$ 1/2" screws and standoffs. The screws should come up from the underside of the deck, through the L bracket, and then into the standoff.

When orienting the mount assembly, be sure that the servo shaft is centered in the wheel well cutout. Align the assembly so it is parallel with the wheel well cutout, and tighten all screws.

Repeat the same procedure for the right mount assembly.



*How the completed servo, mount, and standoffs should look.*

## Step 4

Attach the front and rear skids as shown. Each skid uses a 6-32" machine screw, one or two hex nuts, and one acorn (cap) nut.

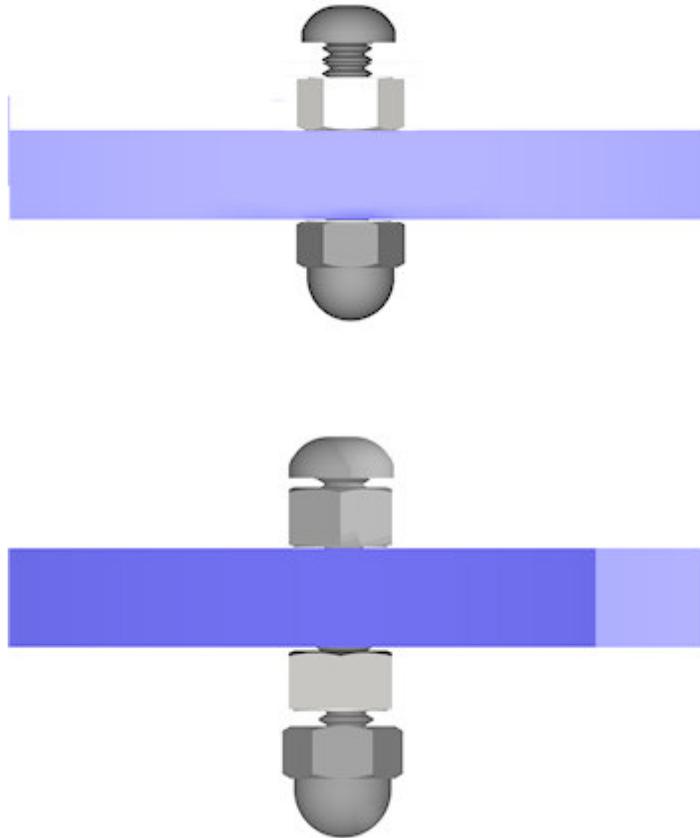
1. Insert a machine screw into the hole at the front and back of the deck (refer to Step 0 for the location of these holes). The screw is inserted from the top of the deck (the side with the servos).

2. Put a hex nut on the screw, followed by the acorn nut.

Repeat these steps for the other skid.

You may adjust the height of the skid by loosening or tightening the machine screw in the hole.

As needed, you can adjust the leveling of the base by using a second nut, as shown. The two skids can be of unequal height.

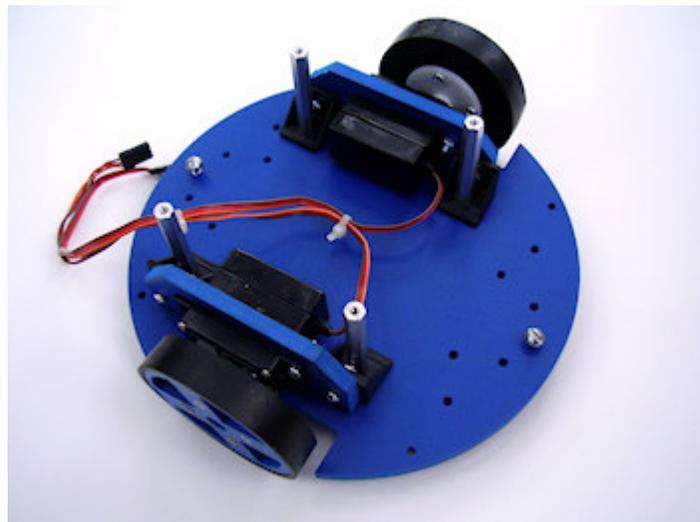


## Step 5

Attach the wheels (you supply) to the servos. Each wheel is secured with a small self-tapping screw that is supplied with the servo.

Note that the servo shaft is splined, and this spline matches the wheel hub. Be sure to press the wheel onto the shaft firmly while tightening the screw.

Do not over-tighten the wheel mounting screw, but be sure the wheel is on snugly.



*The completed bottom deck of the ArdBot, with motors, mounts, and wheels attached.*

## Step 6

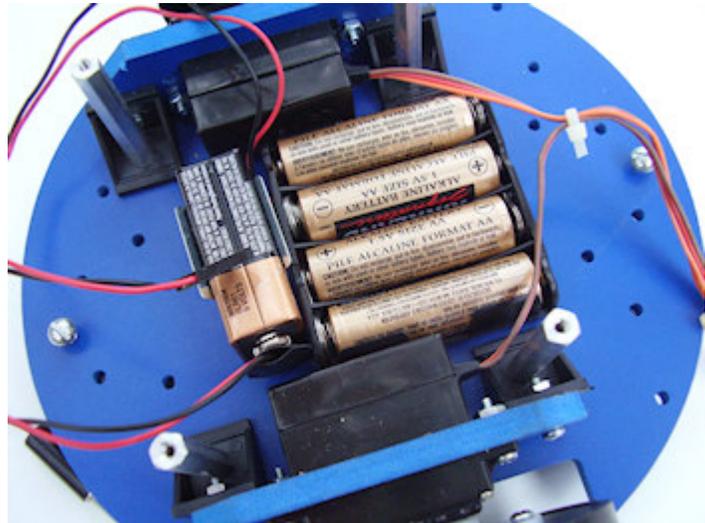
(Note: You supply the battery holders, batteries, and Velcro.)

Secure the side of a 9 volt battery holder against the side of a AA battery holder, using a small piece of double-sided foam tape or hook-and-loop (Velcro). Then secure the AA battery holder to the approximate center of the bottom deck, using a square or two of hook-and-loop to keep it in place.

Note the electrical connections for both the 9 volt battery and the AA battery holder:

- The 9 volt battery uses the traditional two-prong battery clip, terminated on the other end with a 2.1mm barrel plug. This plug inserts into the power jack of the Arduino. You can make this power lead yourself by soldering a barrel plug onto a standard two-prong battery clip, or purchase one ready-made. When constructing your own, be absolutely sure the + (positive) connection is the center of the plug; the – (negative) connection is the outside of the barrel.
- If your AA battery holder uses a female 0.100" pin header connector, you can use a connector with 2 or more pins; the additional pins can be used to help assure proper polarity.

Insert fresh batteries into the holders, and attach the clip to the 9 volt battery.



## Step 7

Find a favored spot on the top deck for your Arduino, and mark three holes for mounting

the board. Be sure not to cover up any of the four holes used for securing the top deck in place. Otherwise, you'll have to remove the Arduino in order to take off the top deck

Drill the three holes using a 9/64" bit. Secure the Arduino board to the top deck using 4-40 machine screws, nuts, and plastic washers. The washers go between the heads of the screws and the board, and minimize the possibility of a short circuit.

Mount the mini solderless breadboard so that it's close to the Arduino, but doesn't block the 1/2" wiring access hole in the top deck. Though most mini breadboards come with double-sided self-adhesive tape, we recommend that you don't use the tape. Instead, mount the board using a square or two of hook-and-loop. This allows you to easily remove the board when you need to.

## **Step 8**

To complete the ArdBot, secure the top deck to the standoffs using 4-40 × 1/2" flat head screws. The heads of the screws should countersink by themselves as you tighten them, and lay flush against the deck.

Thread the battery and servo leads through the center hole of the top deck. To keep down cost and complexity, there are no power switches for the batteries, so leave the battery leads unattached until you're ready to program and use the ArdBot. (And, when you're done playing, be sure to unplug the batteries to keep them from draining.)



```

/*
  ArdBot ServoTest
  Tests servos of robot by moving them in different directions
  Requires Arduino IDE version 0017 or later
  (0019 or later preferred)
*/

#include <Servo.h>

Servo servoLeft;          // Define left servo
Servo servoRight;        // Define right servo

void setup()
{
  servoLeft.attach(10);  // Set left servo to digital pin 10
  servoRight.attach(9);  // Set right servo to digital pin 9
}

void loop()              // Loop through motion tests
{
  forward();             // Example: move forward
  delay(2000);           // Wait 2000 milliseconds (2 seconds)
  reverse();
  delay(2000);
  turnRight();
  delay(2000);
  turnLeft();
  delay(2000);
  stopRobot();
  delay(2000);
}

// Motion routines for forward, reverse, turns, and stop
void forward()
{
  servoLeft.write(0);
  servoRight.write(180);
}

void reverse()
{
  servoLeft.write(180);
  servoRight.write(0);
}

void turnRight()
{
  servoLeft.write(180);
  servoRight.write(180);
}

void turnLeft()
{
  servoLeft.write(0);
  servoRight.write(0);
}

void stopRobot()
{
  servoLeft.write(90);
  servoRight.write(90);
}

```