

# Adventures in Robot Body Design:

## By, Justin R. Ratliff

Square or round; wires hanging out or not; one caster wheel or two; one level or two levels? Is your robot looking like the regular homebrew project? Why not make your robot look like a million dollars with an aesthetically pleasing body design? This little article will give you some ideas on how you can spruce up your current robot or your next project for not a lot of money.

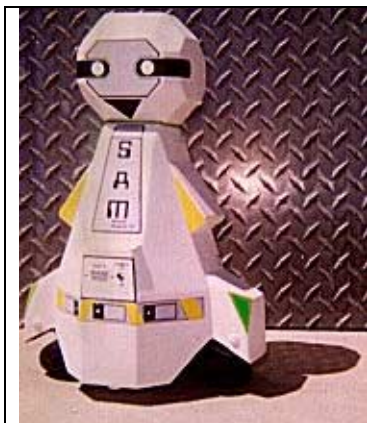
### **Small** (1.5 feet or shorter)

We'll start with the small robots. For the first time robot builder a good first body is a project box or two from Radio Shack. They come in several different sizes and for \$5 or less you can have a nice looking robot.



These pictures show my fighting robot body design with the project box mounted away from the drive servos. You can of course simple mount servos right onto the project box. To mount servos or other drive motors inside a project box you'll need to drill a starter hole in the box. You'll then need a good strong utility knife to cut away the rest of the plastic to make the correct cut out size for your servo or other drive motor device.

A somewhat different take on the project box is to use a bowl. Round or square there are many different cheap plastic bowls out there which can make a good robot body. In the US there are several new disposable microwave safe bowls on the market from makers like Glad Ware and Zip Lock. These new bowls comes in packs of 4 or so and cost under \$5 a pack. You can find them at most any grocery store. Most of the bowls are clear and the plastic is not very hard, but they would make a nice cheap cover for a small robot.



For a larger sized small robot the coolest body with out a doubt would have to be the S.A.M. plastic body from <http://www.smallrobot.com/> S.A.M. is about 14" inches tall and looks like the old Topo or B.O.B. robots which were made in the early 1980's.

This body only kit sells for \$29.99, you add your own servos and electronics. Not a bad price when you consider how nice it makes your robot look.

**Medium** (1.5 to 3 feet tall)

For small to medium sized robots a trashcan can make a fantastic looking robot body. You'll find all sorts of trashcans at your local department store such as Wal-Mart or Target. The plastic in trashcans are thicker and can support a fair amount of weight. You can even find metal trashcans, for that all metal robot look. Cost is around \$10 or less for most trashcans. I would suggest you turn your trashcan upside down and mount it to your robot's base. I would make shelving levels, which mount onto your robot's base. The trashcan would then simply cover up your electronics.



This picture shows my robot, which is now named Itty Bitty. It did go by the name of, "The Ladies Man."

With the new name came some upgrades as well. The arms are made from aluminum sheet metal, which were rolled into a tube shape. Little fake hands were cut from the aluminum sheet metal as well. Two standard, unmodified servomotors control the arms. The arms are really just for looks and swing back and forth.

This robot was made for show use; it has a \$200 animatronic head kit, which was purchased, from the Robot Store. The head included servos, a custom Basic Stamp II controller board and the wood and all other hard ware needed to make the head.

The robot's main body is a simple round trashcan that has flat sides. The flat sides are where the arms are mounted. The robot also wares a children's sized jacket.

Have an old coffee maker that's not making coffee? Why not make it into a robot? This robot is my own creation which I just started and is named West Bend, this also happened to be the name of the coffee maker. It was originally a programmable coffee maker that went on the blink after an electrical outage. (I guess it really does pay to have surge protectors!)

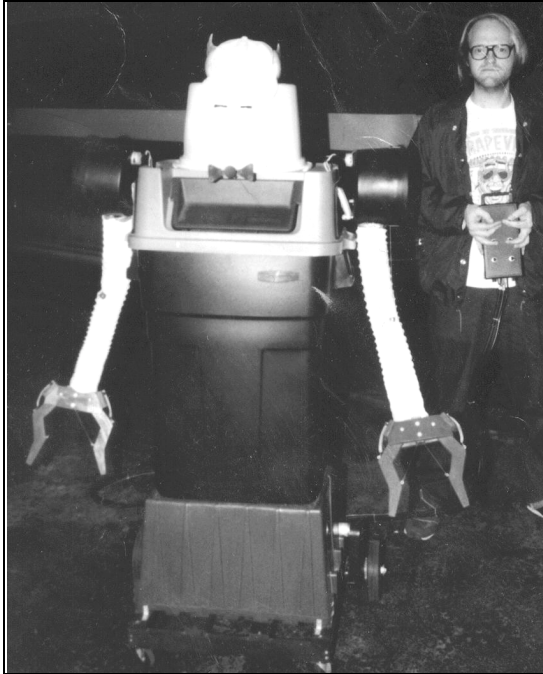


After removing all of the electronics and heating elements. What I was left with was a great looking robotics shell. Where the electronic controls where is now perfect for mounting an LCD or different sensor arrays. The flitter area provides a great little electronics bay, which is hinged and can swing out. Where water used to go in could now hold batteries or motor controls, just about anything.

You also get a neat lid on the top to access anything you want to put in there. You also will have a great open area where the coffee pot used to sit. All in all I think this makes for a great looking robot body.

West Bend here is shown all taped up in a rough testing state. The arm on top is the OWI Robotics Arm Trainer kit. The kit cost about \$60 and makes for a great robot arm. The arm will not list much, but it can pick up a screwdriver off the ground. The drive motors are surplus 12-volt gear head car window motors. You can order them from many places for \$19 for a matched pair (left and right). The motor housings have holes to mount the motors so I simple screwed them onto to the West Bend shell. This coffee maker was square on the sides, which made it very easy to mount motors on. The wheels are cheap lawn mower or cart replacement wheels that I picked up at a farm supply store. The wheels were hammed onto the gear heads for a tight fit.

A new idea presented in a resent issue of Nuts and Volt magazine showed how even a medium sized plastic tool box costing about \$10 could be used as a robot body. The robot was to be a tethered bot for experimenting and was presented by author and famous robot builder, Karl Lunt. A toolbox looks like it would make for a great body for a robot you plan to experiment on. You could put your electronics and batteries in the bottom and leave the top insertable tray open for tools. Your robot would also provide you with an easy to carry handle. How cool is that??



Another idea is to use a plastic storage bin as a robot body/base. You can find these located in most any department store next to the trashcans. If you do use a trashcan or storage bin for your robots main body (i.e. the bin or trashcan is not just a cover) then I suggest that if you mount motor or heavy object to the outside that you also mount wooden support beams on the inside so the trashcan or storage bin does not cave in and collapse or become warped over time.

The robot shown here is named FORD and is a remote controlled robot for show at Halloween. It uses a storage bin for its bottom base and a trashcan for the upper body.

### **Large** (anything over 3 foot tall)

Building a monster robot, huh? If your robot is going to support large batteries, heavy drive motors and a fully sized PC then you are probably better off to build your robot body from scratch. And then try to find a trashcan that can fit over your robot's internal framing structure.

Another idea is to cover your large robot with aluminum sheet metal. You can find aluminum sheet metal at most hardware stores such as Lowes and Home Depot. Aluminum sheet metal comes in different sized rolls. Some rolls can cost over \$100, the sort you are looking for runs under \$5 and will provide several feet. The aluminum is light in weight and very bendable. You'll want to be careful when working with it however. Make sure to wear protective gloves so you don't cut your hands. You'll also need a pair of metal shears. The shears look like really big scissors, basically that is all they are. Aluminum sheet metal is also easy to drill through, so you could attach it to your robot's frame with screws or bolts.



Here is a new idea for a robot body, use a draw cart. The robot pictured to the left is named Borg 1-of-1. It's going to be my computer controlled robotics platform for testing. The main goal of this robot is to play around with some security robot ideas that I have. The robot has a servo-controlled arm, which can raise and lower a hacked "laser tag" toy. This will allow me to play laser tag with my robot.

As you can see the robot is build around a plastic cart, which has several different sized draws. Such carts come with wheels on the bottom so you can roll them around and store things in them. You can find them at most any department store. Cost can range from \$8 to \$30 depending on where you buy them. Most are made from sturdy plastic which can carry a fair amount of weight.

The reason I wanted to use such a draw cart is because this robot will be a test bed for some computer control ideas that I have. So it was important for me to be able to change out circuit boards and have easy access to all components. With this robot I simple throw circuits in the draws, run wires down the side of the robot and forget about!

My drive motors are cheap \$6 surplus power wheels motors with attached lawnmower wheels. Not pictured is a large castor wheel, which extends from the base in the back.

The head is a cheap \$3 Styrofoam head, which has a b/w camera eye, implanted in it. The head was also painted with latex paint to make it look like a cyborg head.

Just an added note: if you use such a Styrofoam head and which to paint it, only use latex paint, or you may damage the head!

That is it for now. Would you like to add a robot body idea to this article? Do you see errors in this article? Then send me e-mail at [Weyoun7@aol.com](mailto:Weyoun7@aol.com)