URDF: Adding simple geometry, part 2

Last time we started adding the pedestal for the second robot to the factory by adding a simple box geometry to the xacro.

We saw that the defaults for properties like color, location and the dimensions were not ok for our purposes, so in this video we'll be making changes to those properties and we'll turn the box into a proper pedestal.

We'll first adjust the size and shape, then raise the pedestal so it rests on the floor, change the color and finally update its location.

Let's get back to our editor and open the xacro file.

So first lets open the file.

Now scroll down to where we last edited the pedestal link and joint for ‘robot_2’.

First we'll make the box a bit taller by updating the 'size' property.

As always, ROS follows the X, Y and Z convention here, so the first entry is for the size of the box in the X dimension.

The second is for the Y dimension and finally the last is for Z, or the height of the box.

We'll make the box twice as tall as it is wide.

Now we'll need to raise it slightly to get it out of the floor.

The reason it is in the floor right now is that primitive shapes have their origin at the center of the shape in URDF.

The origin of a box is halfway between its top and bottom faces and in the default case this origin is located at the origin of the link that is the parent, which in this case the 'world' link.

As the 'world' link is at floor-level in the middle of the factory, so is our pedestal box, which is why it is stuck in the floor.

To fix this, we'll need to provide a new origin like this and then shift the visual geometry up by half its own height by putting a zero-point-three in the last position, or the element for the Z-coordinate.

With that fixed we still have to give the pedestal the correct color and place it in the right location.

Colors are added to geometry primitives by adding a 'material' element, so let’s add one now.

The name attribute allows us to reuse this for other objects in the urdf, but for now this material is only applied to the pedestal.

Finally, as we'll be using a solid color for the pedestal we need to add a 'color' element.

These colors are defined as a mixture of red, green and blue. The last number defines how saturated the color or transparent the object is.

For this pedestal we'll re-use the blue color of the shelve stands.

Let's set the values of the rgb entries.

Our pedestal is completely opaque, so that's why I specify a value of 1 here.

Let's see what our pedestal looks like now.

I'll first save the xacro file, and then switch to the terminal.

Now we have to relaunch the visualization launch file to start RViz.

That looks much better!

But it's still in the wrong location so we cannot put the robot on it.

Let's move it to the correct place in the factory first.

Just as a reminder, this is where we are expected to place the pedestal.

The coordinates for this location are similar to those of the bin, so we can use those as a starting point.

We're going to do this in exactly the same way as when we moved the bin in the previous unit, by adding an 'origin' element and setting the 'xyz' coordinates to the correct values.

We'll start by adding a basic 'origin' element.

As we are not going to rotate the pedestal, we'll only specify a value for the 'xyz' coordinates.

The location we've chosen is at 7.8 meters in the negative-X direction and 1.5 meters in the negative-Y direction, relative to the center of the factory where the 'world' frame is located.

This places the pedestal right behind the pallet with the boxes on it and right next to the bin.

Of course the pedestal should still be on the floor, so I've kept the Z coordinate zero.

Let's do a final check and inspect our result.

Don't forget to save the file again.

Switch to the terminal.

And then relaunch the visualization launch file.

Now we have a pedestal!

It's still a box, but it's in the right location, has a proper color and it's no longer halfway stuck in the floor.

We now have just about everything in the factory that we need.

The turtlebot can drive right next up to the pedestal coming from 'robot_1' and deliver the part it's carrying to 'robot_2' to be placed in the bin.

So wrapping up, we can mark the 'adding the pedestal' task on our list as completed, and start working on the next one, which will consist of adding a second robot to the factory.

For that we'll be able to re-use an existing model, and we'll mount that on the pedestal in the next video.