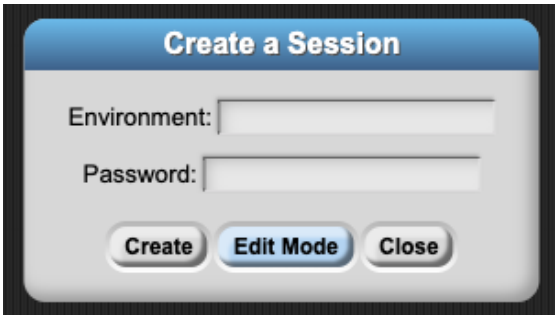
RoboScape Online

Four Color Robots

In this tutorial, we will create an environment with four robots in it, each of which have a colored platform to start on. This is a great environment for practicing robot driving with your friends!

1. First, load NetsBlox with RoboScape Online. You can go to https://extensions.netsblox.org/ and select “RoboScape Online (beta)” or go to https://editor.netsblox.org/?extensions=["https://extensions.netsblox.org/extensions/RoboScapeOnline2/index.js"] . Make sure you’re logged in.
2. From the puzzle-piece menu in the top right, select “RoboScape Online” and then “New Simulation…”

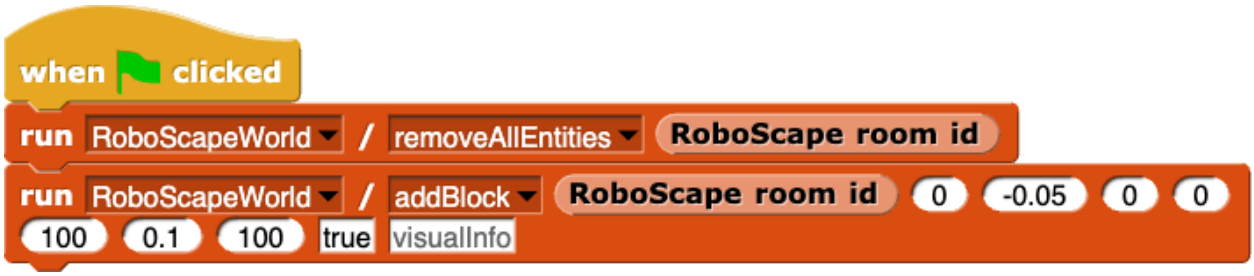
3. In the “Create a Session” dialog that opens, choose “Edit Mode”. This will open a room without a specific environment loaded, so we can create our own. Don’t worry if the room looks like there’s nothing in it, it’s just waiting for you to add things to it!



4. Let's start our code by adding a “when green flag clicked” block. When your project is loaded in the simulator at the end, the code under this block will run automatically, so we want to put the code to set everything up under this block.

5. To make it easier to develop our program in edit mode, let's start by adding an RPC run block set to RoboScapeWorld (under Community -> Device) with the removeAllEntities method. This will empty the content of our room first when we want to test our code. In the "id" field, add the "RoboScape room id" block from the Network tab.

6. Next we'll add the floor of our environment. Add another RPC run block, this time choosing the "addBlock" method from RoboScapeWorld. Use "RoboScape room id" as the id again, set the X, Y, Z to 0, -0.05, and 0 respectively, the heading to 0, the width to 100, the height to 0.1, the depth to 100, and kinematic to "true" (or a "true" block). This will make a large, flat, unmoving area with its top surface at a Y position of 0.



7. Now we'll start making a platform. Later we'll move the code for the platform into a custom block and use variables to make it easy to play more than one platform. The platform will have a flat area, with ramps to let the robots drive on and off.

   First, we'll make the main area of the platform. Make another RPC run block set to "addBlock". Set the id to "RoboScape room id" again, set the X, Y, and Z to 0, the heading to 0, the width to 2, the height to 0.25, and the depth to 2. Set kinematic to "true", and the color to "#FF0000" (this is a computer color code for red).

8. The ramps will be a little more complex. "addBlock" is simplified and only allows us to set the heading (yaw, or Y-axis rotation) of the shape. For a ramp, we need to set rotation around another axis. Instead, we'll use "addEntity".

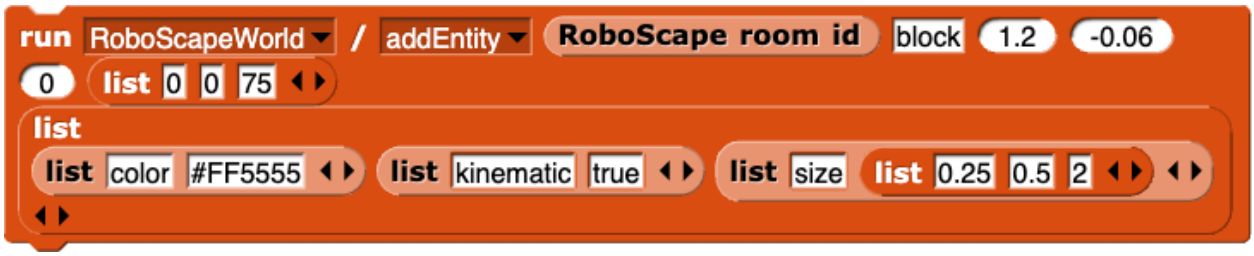
   Add a new RPC run block and set it to RoboScapeWorld's addEntity method. Set the id to "RoboScape room id" again, the type to "block", the X, Y, and Z to 1.2, -0.06, and 0. Put a list block into the rotation slot, and give it three values: 0, 0, and 75.

   For the options slot, we'll need to make a list of lists. First, let's make the lists we'll put into it. We'll need one list with two slots, in the first, put "color", in the second put "#FF5555" (this will be a lighter red). In another list with two slots, put "kinematic" in the

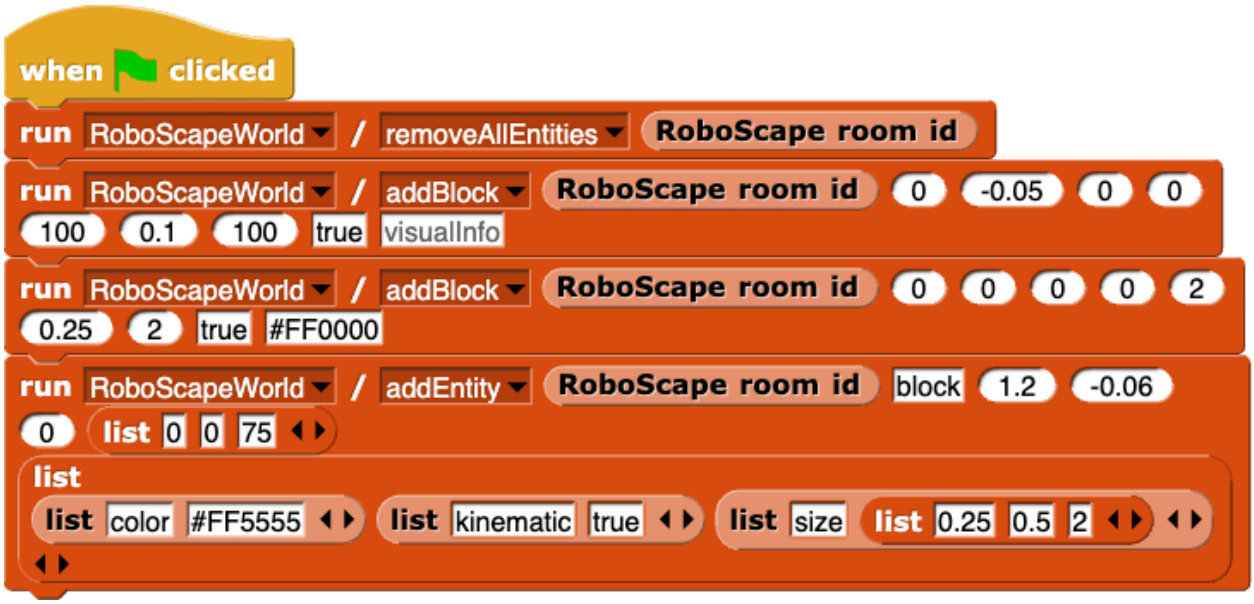
first and “true” in the second. In the third list, put “size” in the first slot and in the second, add a second list, with three slots set to 0.25, 0.5, and 2.

It’s a bit more work adding things with addEntity, but we can do more complex things with it.

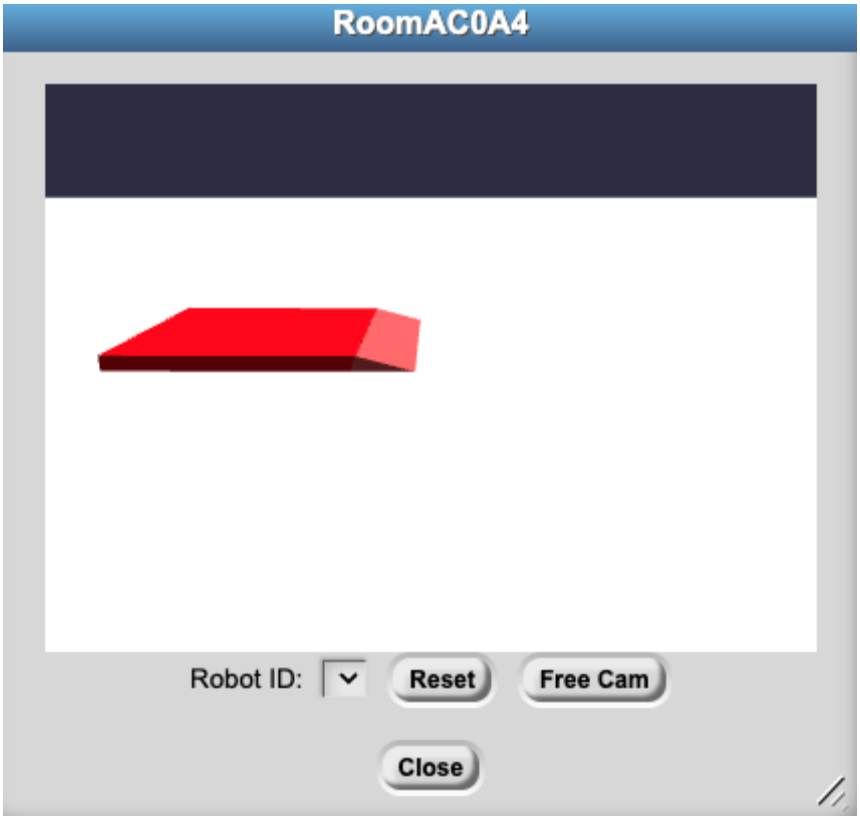
Now we can assemble the full addEntity block by putting these three lists into one larger list, which goes in the “options” slot:



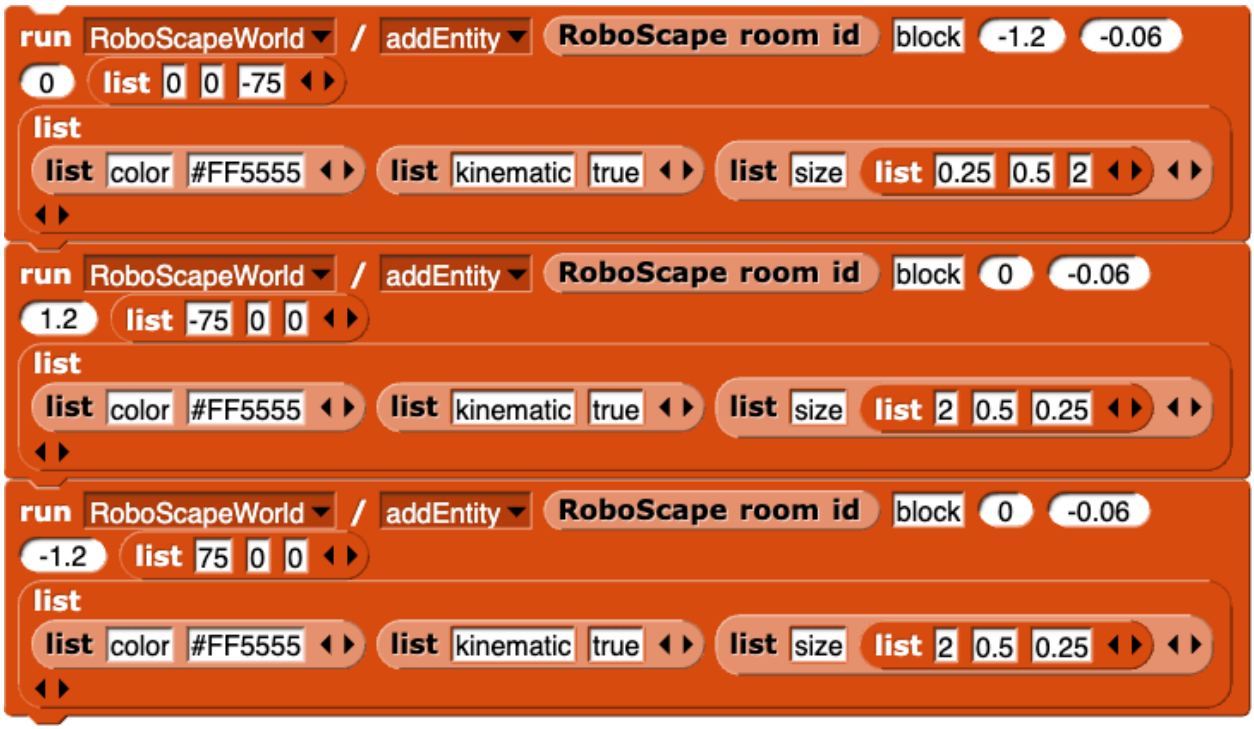
9. Your code should now look like this assembled:



If you run it, your room should have a red box with a light red ramp:

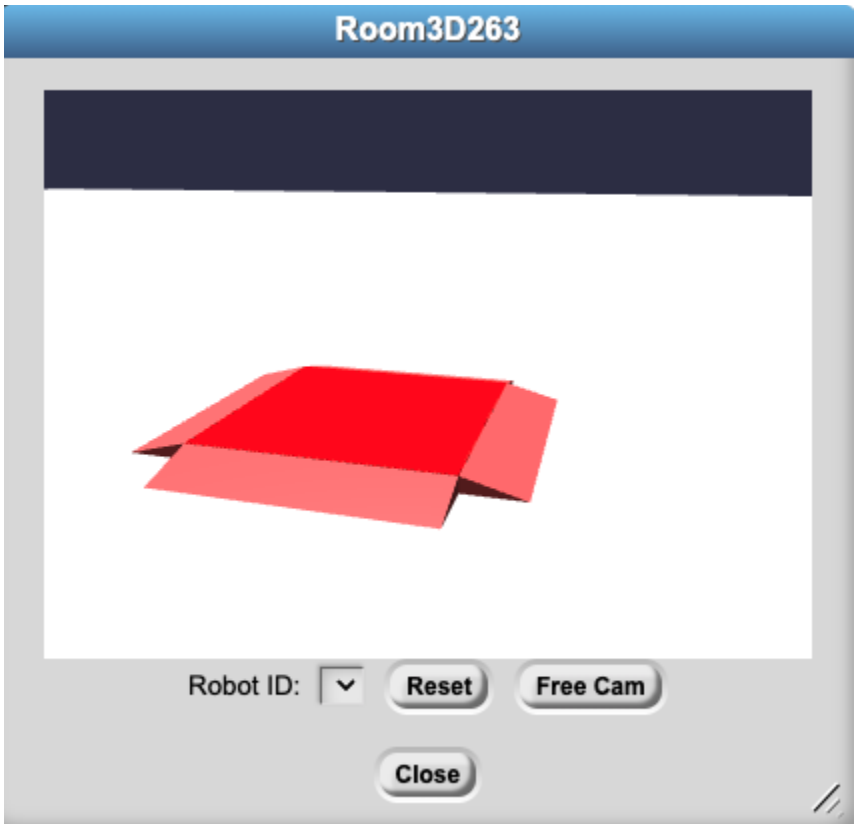


10. Now we can add the other three ramps to this platform. Add three more addEntity RPC run blocks (TIP: right click on the one you've already made and duplicate it to make this easier). Change the settings to match the following:



For each side, we've changed some of the coordinates or sizes to match the new orientation. The block on the opposite side of our first block will have its X coordinate flipped and the other two ramps will differ on the Z axis instead of the X axis.

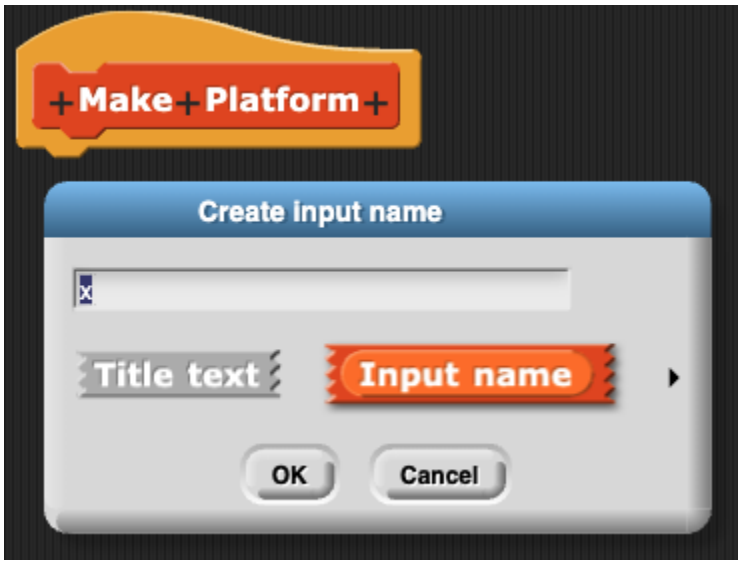
If you run the complete code, you should now see the other three ramps appear:



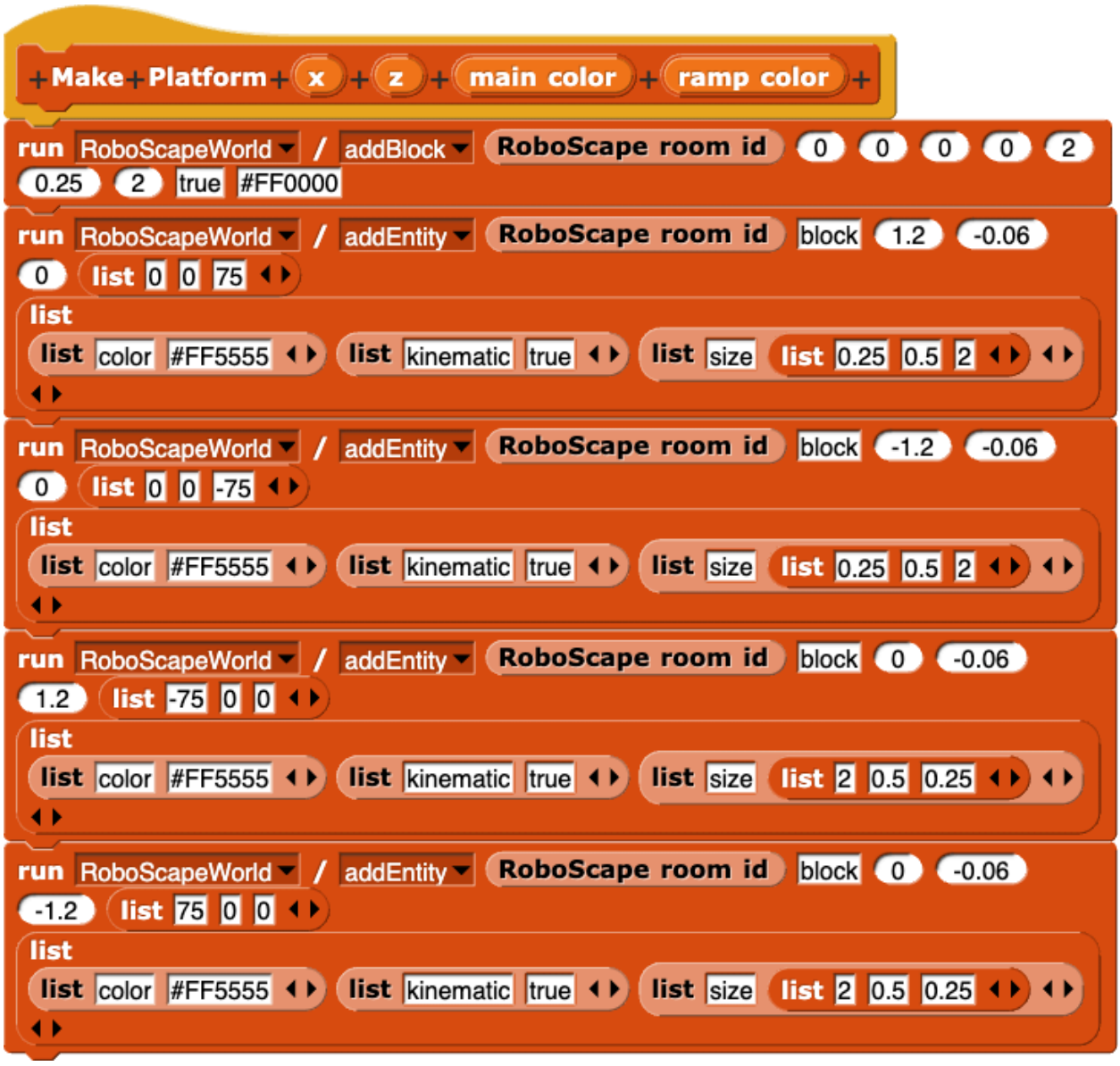
11. Now that we have one platform created, we should move this code to a custom block to make it easier to build the other platforms. Click the "Make a block" button.

    Name the new block something like "Make Platform" and click "OK".

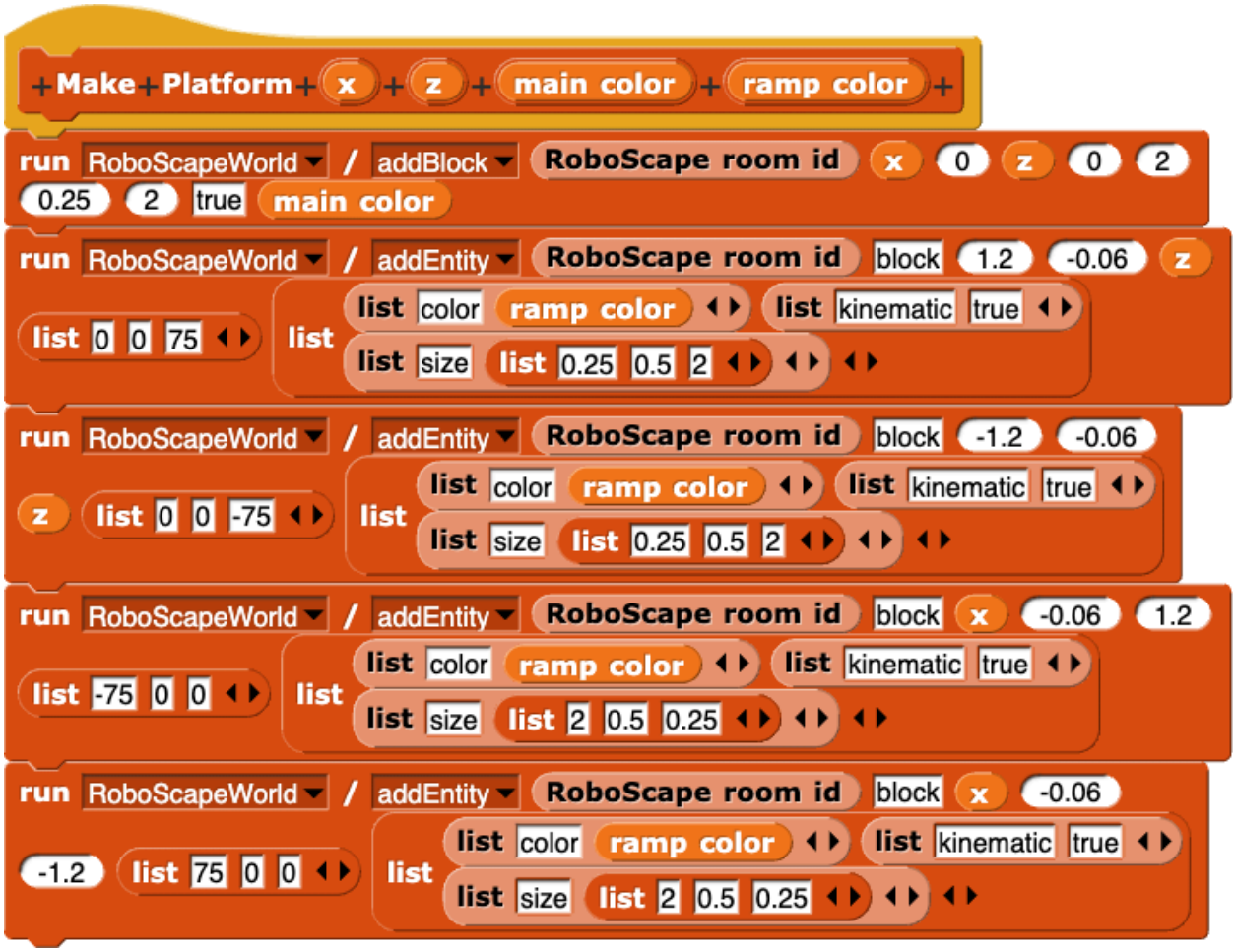
12. Click the + at the end of the block's name and add inputs for x, z, "main color", and "ramp color".



13. Drag your existing code to make the platform (not the code to make the ground or run removeAllEntities) into the custom block.



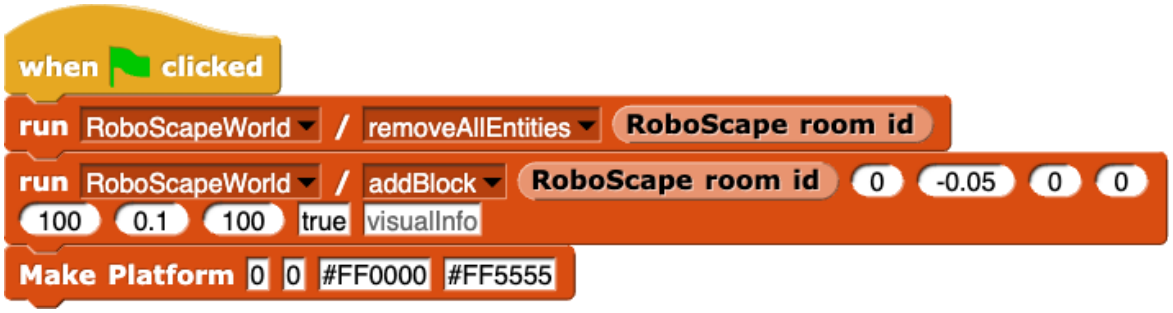
14. Now we can start using the inputs in this code. Where before we had “#FF0000”, we can put “main color”. Where before we had “#FF5555”, we can put “ramp color”. For the main block, we can set its X and Z coordinates to our x and z inputs. For the first two ramps, we can set their Z coordinate to the z input, and for the second two ramps, we can set their X coordinate to the x input:



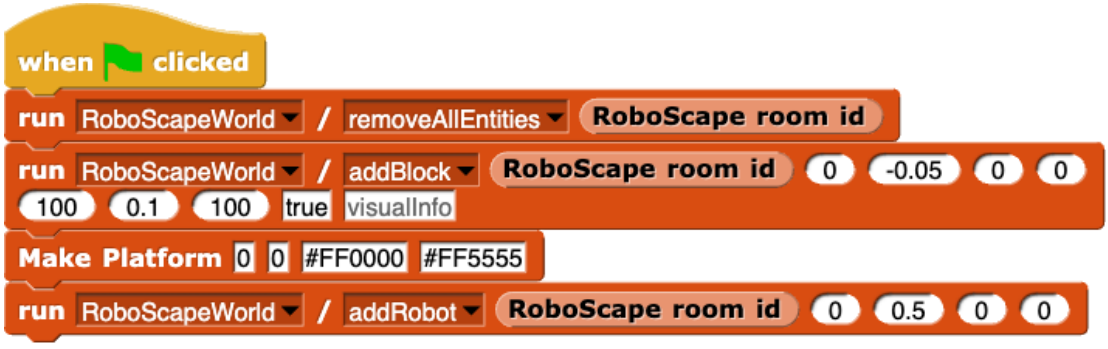
15. The other X and Z coordinates will need to be changed, instead of 1.2 or -1.2, they need to be offset from the inputs by that amount. We can do this with math blocks from the Operators tab:

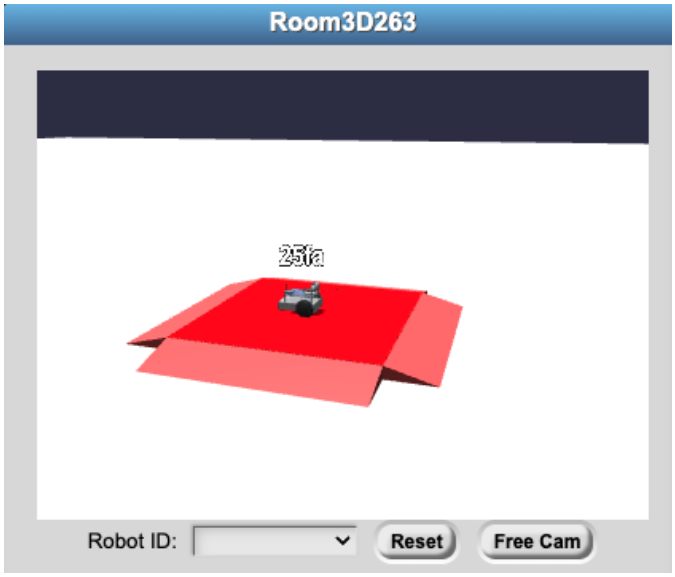
Now the code for our platform block is complete.

16. To use our custom block, add it into our “on green flag clicked” code. Drag one in and set the x and z inputs (the first two) to 0, the main color to “#FF0000” and the ramp color to “#FF5555”. If you run this code, you should see what we had before we moved the code to the custom block. Test your code by changing the values and making sure the output makes sense. Changing the x and z inputs should move the platform and ramps to a new location when the code is run again. Changing the colors (examples: use “#00FF00” for green, or “#0000FF” for blue) should change how the platform looks.

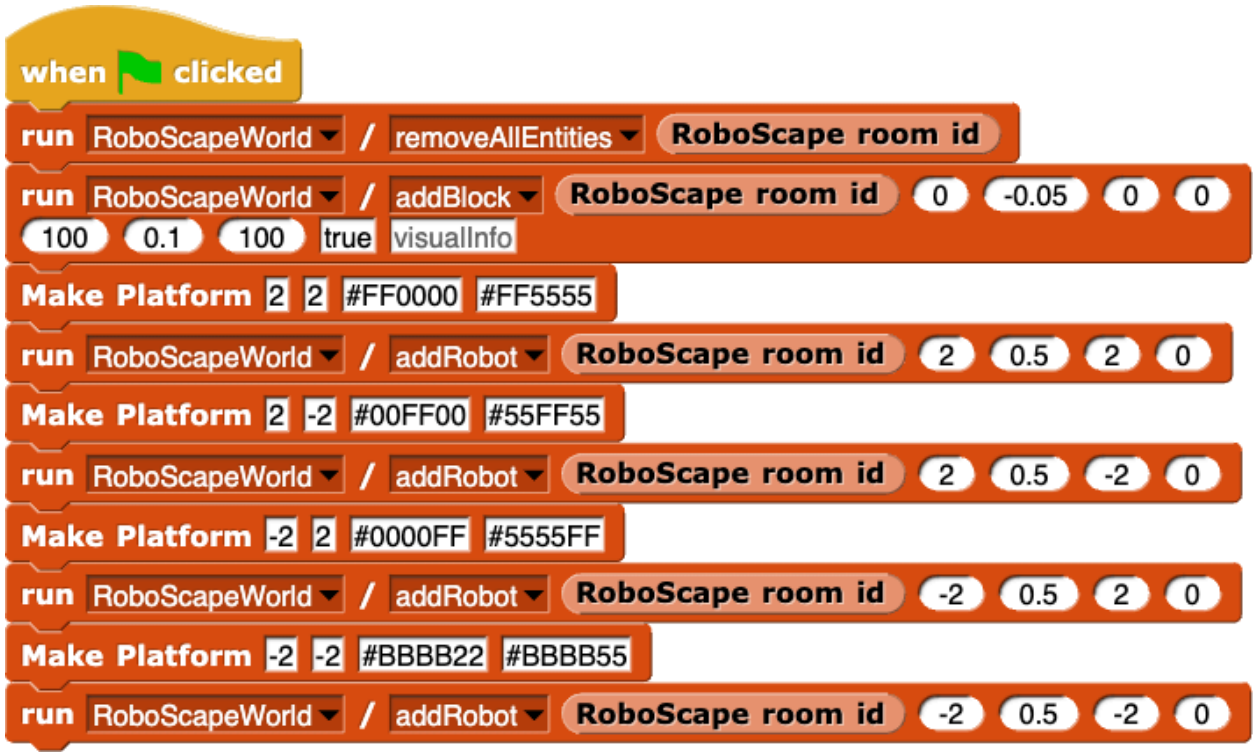


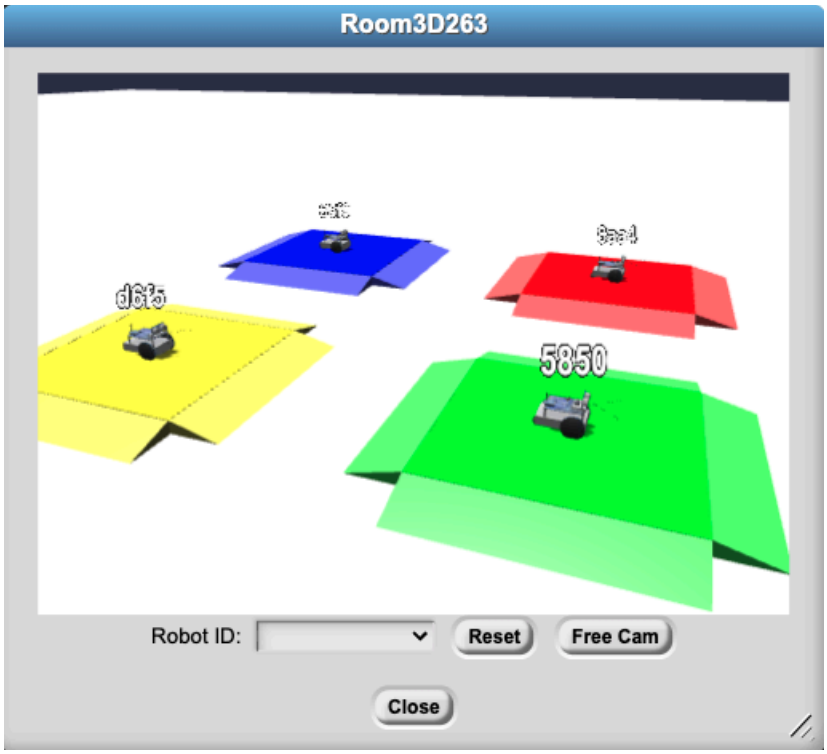
17. Let's add a robot on top of our new platform. Add another run RPC block and this time set the service to RoboScapeWorld and the method to addRobot. Set the id to “RoboScape room id”, the X, Y, and Z coordinates to 0, 0.5, and 0, and the heading to 0.





18. The only thing left is to set up four platforms with four robots!





Finished project available at:
https://editor.netsblox.org/?extensions=%5B%22https%3A%2F%2Fextensions.netsblox.org%2Fextensions%2FRoboScapeOnline2%2Findex.js%22%5D&action=present&Username=gstein&ProjectName=Four%20Color%20Robots%20Tutorial&editMode&noRun

Going Further

Finished this activity and want to make your environment more interesting? Here are some ideas to help make your scenario more interesting:

- Add some walls around the environment to keep robots from falling off the edge, or as obstacles for the robots to navigate around
- Change the custom block to allow you to change the size of the platforms
- Add four more blocks placed to make ramps at the corners of the platforms too
- Add another, larger, platform with ramps for the robots to drive onto
- Add blocks or balls for the robots to push around
- Give the platforms and ground textures instead of colors
- Make each robot's starting area into a little "house" or "garage"
- Try different angles for the ramps, can you make it so the robots easily drive off the platforms but not back on?