Maya to Massive Tutorial (Exercise 2) V3

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ideas, code and inspiration: Gavin GuoQiang Xie

Goal

To integrate animation from Maya into Massive and utilize the action tree. This provides the framework for bringing motion capture into massive.

Step 1 Import the maya file

Start with the maya files provided in the MATERIALS folder called MassiveSpiderTutorial.

- Copy the source files to an appropriate directory
- In Massive under File – click on Import Maya ascii
  De-select cameras and select: **skeleton**
                                                        motion
  (if you fail to do this Massive will freeze on reading the file)
  Browse to the file and select   **spider_anim_clean.ma**
  Hit open and accept
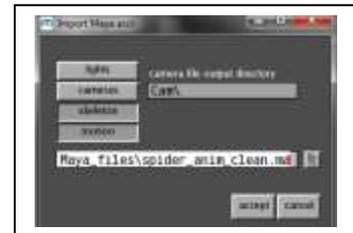
You should now see a strange looking four legged spider.
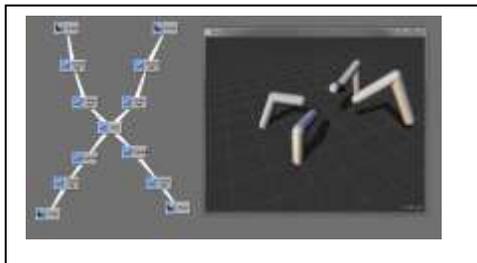
Go ahead and resize the root to make it look better. The position is correct. Select root and change the parameters:

Perhaps add another sphere for a head. Now we have our spider. Right now if we hit go the spider has no animation visible.

Step 2 Define a Loop in the Action Editor

Go to **Edit** and select Action – this brings up the Action editor panel

****IMPORTANT:** Rename it **walk** (you will want to save this file in an "**action**" folder, select save action under the File menu and make sure it has actb (or act) as the extension). As long as you reference the action you have named you are fine.

In the Action editor panel select solo
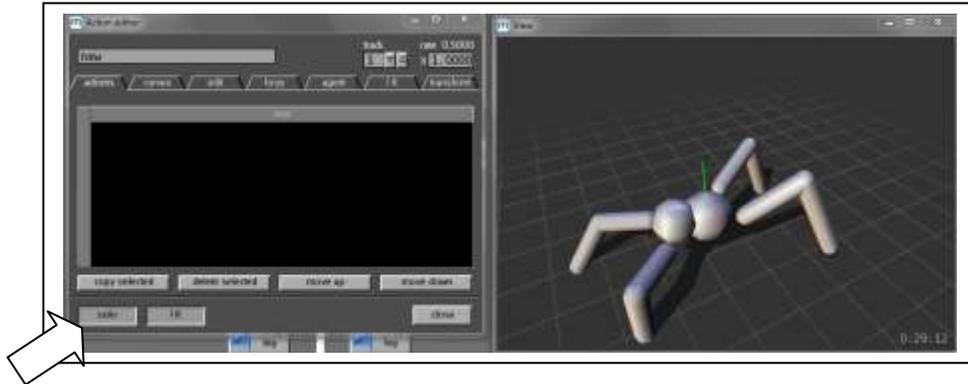
This allows you to see the animation. **Solo is to preview the action**. Now we see walking, but it goes back to the origin. We need to create a loop.

Either select the root on the body page or under the curves tab, select the root data. Now in the loop tab you will see many curves. The goal is to create a loop. Go ahead and RMB click and drag the line a little with LMB – this will give you one vertical green line (and a ghost white vertical line). RMB click again, but now to the right side, drag a little with LMB. You will have two green vertical lines which will define your loop so place each at the peak of a matching curve. Remember that you need to click once on the left side and once on the right.

If you want to preview it, alt-F will have the camera follow, but **alt-shift-F** will also follow it back to the origin so we can visualize it as a loop. **So far we have not made a loop, we have only previewed it**.
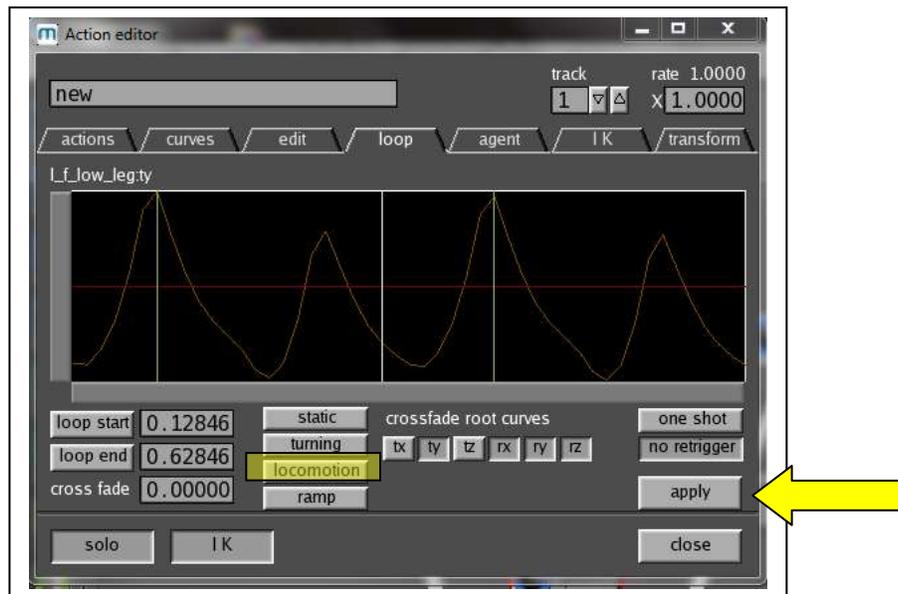

To make a loop select **locomotion** and hit **apply.** Go to the **agent** tab and make sure locomotion is selected, then hit **apply**. We have now made a loop.
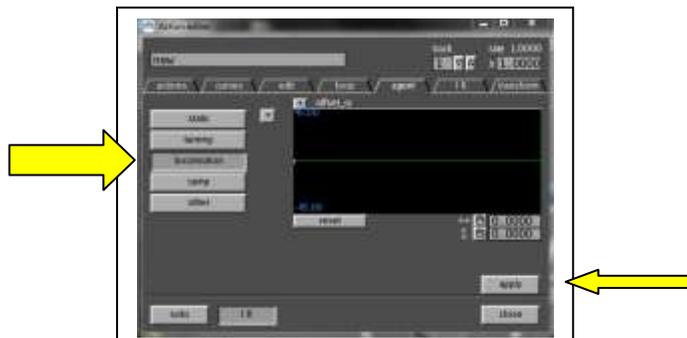
Step 3 Add IK in the body page:

A handy shortcut is alt-s to turn on wireframe. **Go to the body page**. We are going to add ik to the feet, but first we must limit the degrees of freedom on the "knee".

Select the lower leg. Go to the **d o f** tab. Note that all directions are enabled. Turn all of them off except for rz (Massive will do this for each side, so you only have to do it twice – front and back).
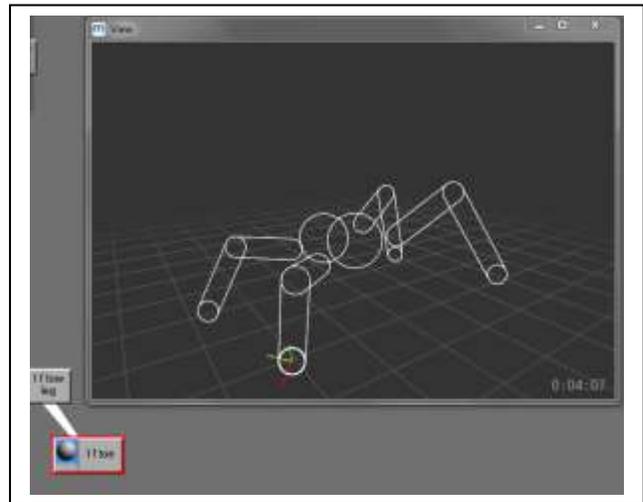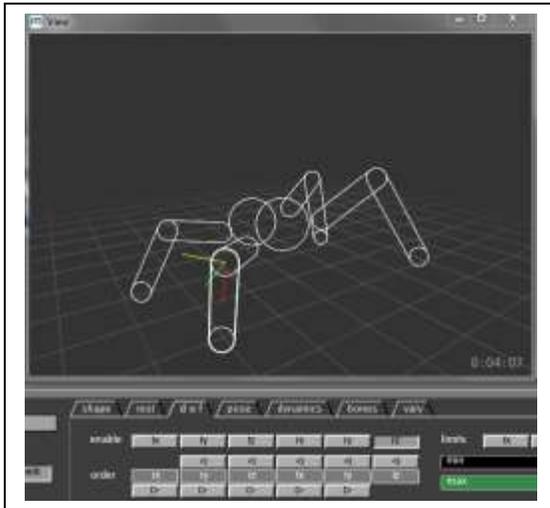
Now select the toe. We are going to add IK. Go to the action editor, make sure the curves in the curve tab for that toe (from selecting it). Now go to the IK tab, and press **IK curves**. Then press **hold curve.** Left click to select and MMB to go up. Now hit **alt-i –** you will see a blue (fk) and a red (ik) icon (these represent fk and ik being performed). These icons now appear in the foot. Adjust the green (height) and yellow (speed) lines until the red curve looks "sin" like. These are the threshold curves used in generating the hold curves. **LMB adjust yellow, MMB adjusts green.** (Hint: Keep your speed and height values relatively small).
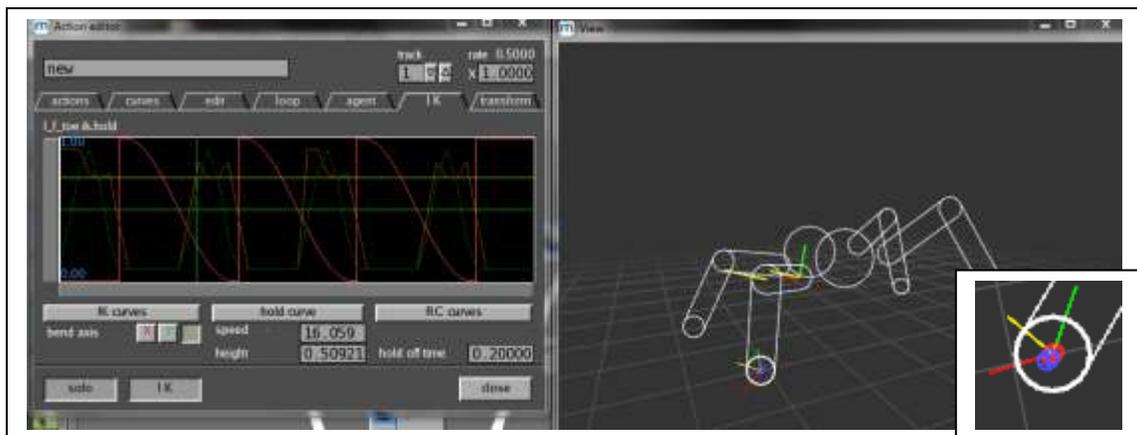
There are excellent sections in the Massive manual on loops and IK. Look under Features/Actions/loop and IK. These are well worth reading. (see Hold Curves in particular).

Quick Summary:

- Read in maya file (**File**: Import Maya ascii) – make sure you have skeleton/motion (not camera) selected
- Resize the body if desired, add a head
- Go to the **body page** and select root, now bring up the **action page** under **Edit**
- To follow the motion, turn on **solo** to preview, and **alt-shift-f** to follow
    - (Note that the root curves are selected under the curves tab)
    - In the loop tab set the loop to encompass the motion by RMB click, drag a bit with LMB to get white and green vertical lines and again, this defines the loop
    - position and hit **locomotion** and **apply**
    - go to the **agent tab**, be sure locomotion is selected and hit **apply**
    - hit space bar to preview the motion
- Now add IK to the feet
    - select l f low leg (the knee) – in the **d of f tab** set enable tz only (it will do it automatically for r f low leg). Do the same for the back.
    - Now select the toe – go to the **IK tab** and hit **IK curves** and then **hold curve**
    - MMB to move green curve, LMB to move yellow curve
    - **alt-s** shows wireframe, **alt-i** shows the icons
    - repeat for the other front toe
    - repeat for the back toes, however now turn on ik to **single rather than normal**

At this point test your spider walk! Throw down an output node and trigger the action.

Tip: If you want to slow down the rate of the spiders walk add an output node and in the channel set it to **walk:rate** then adjust the value (ie. .5 will play at half the speed).

Step 4 Adding our brain page to drive the motion:

We now have our spider with a motion loop. We need to drive that motion with a brain. This section is familiar to you from your first exercise.

Described here is the navigation aspect of the brain. If you would like to add the vision section please do, it is not required for this exercise, however you could produce cooler visuals if you included that part of the brain and it is strongly advised to include it. When you add vision to your spiders remember that it is similar to the box exercise, but not exact – see tip below.
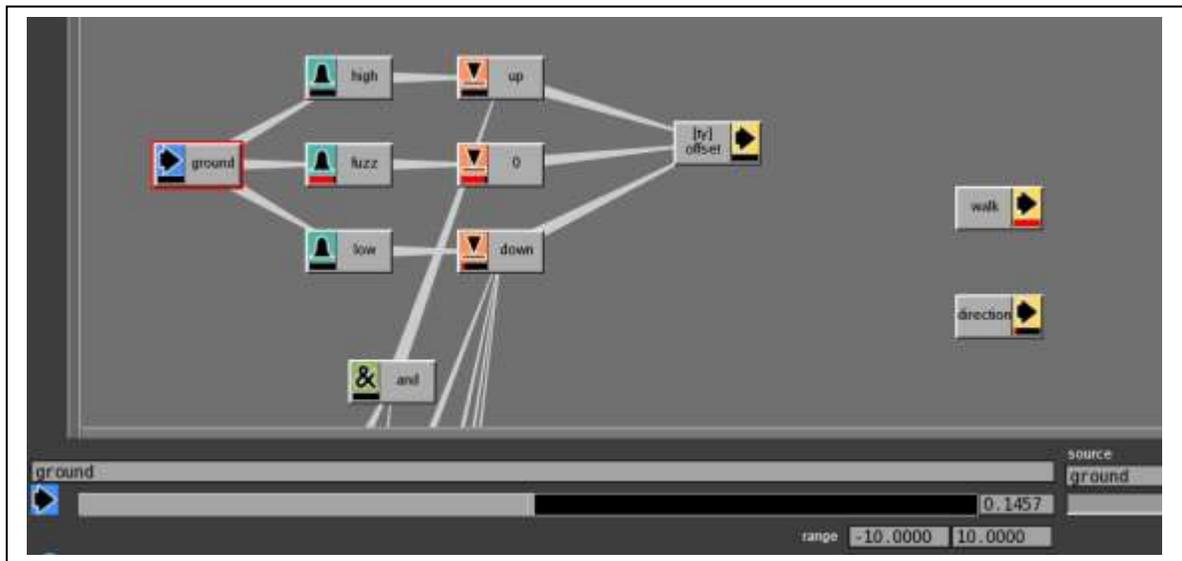**Tip:** Use [ry]:offset not ry and [tx]:offset not tz – delete the direction node – tweak your graphs.

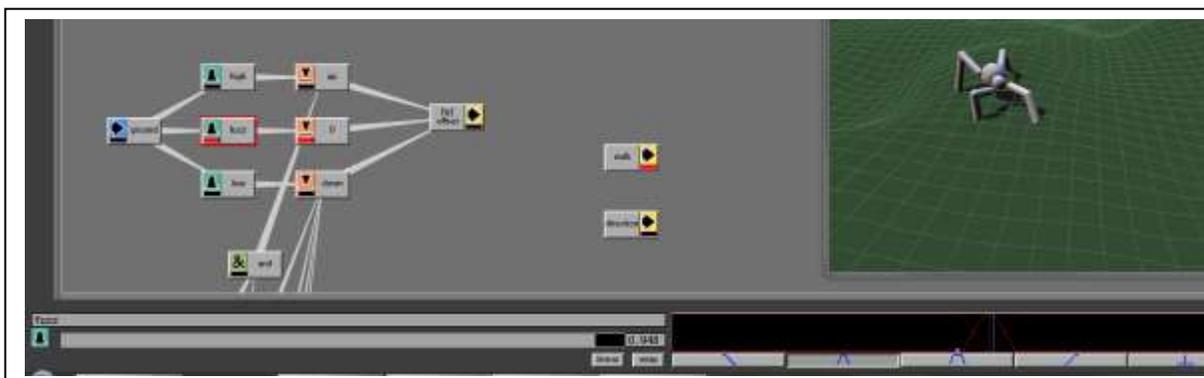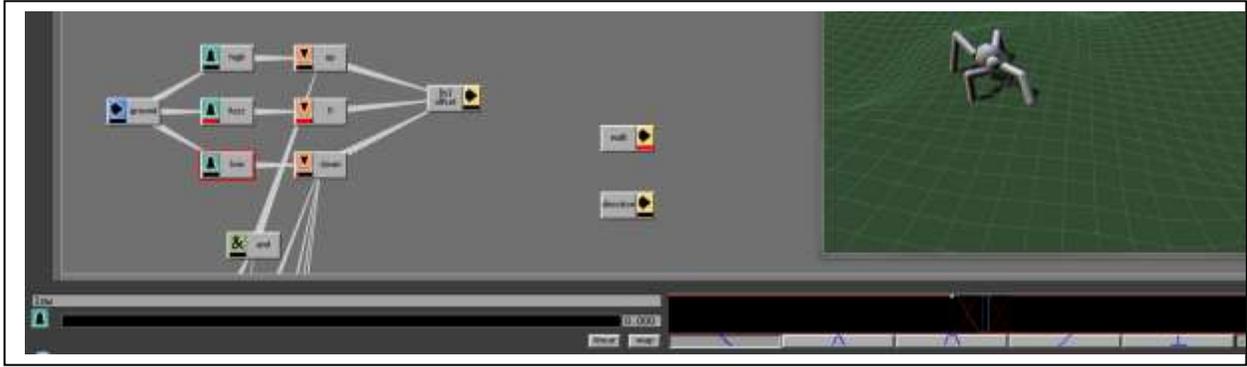To proceed, go to the brain page and create the brain shown here:
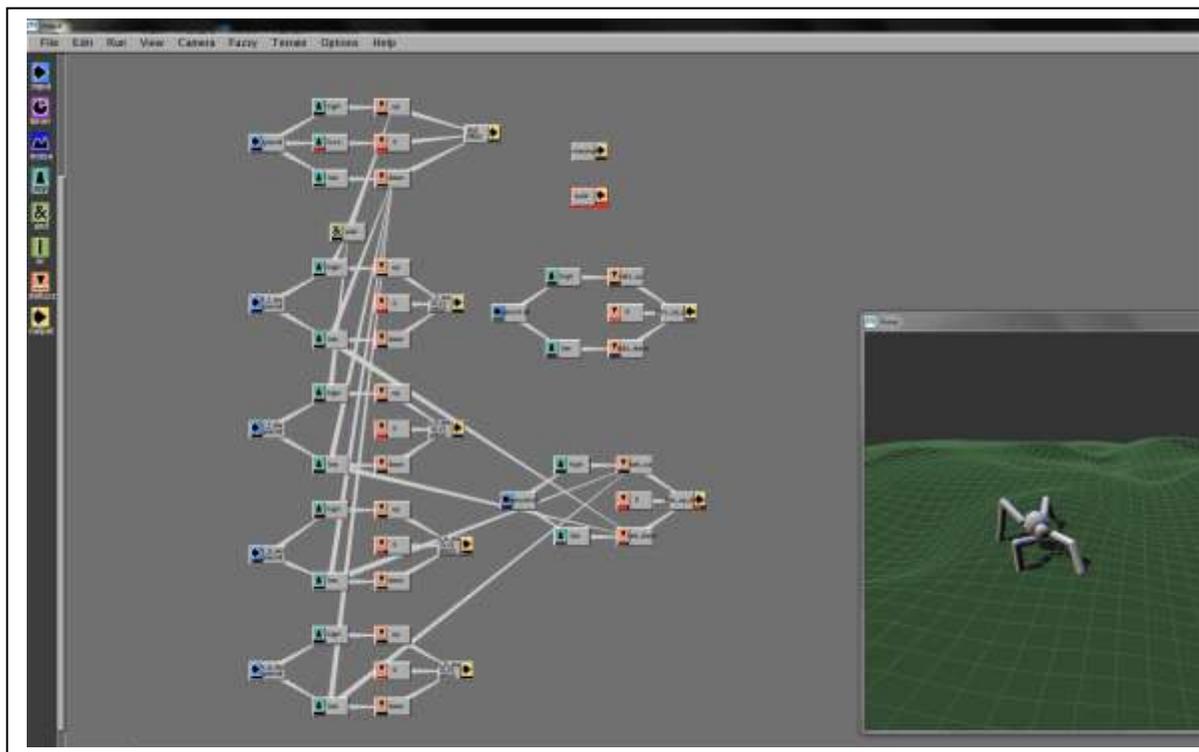
To produce this brain, let's examine each section. This is very similar to exercise 1.

Starting with ground, range is -10 to 10 (This again, depends on the size of your terrain model if customizing later).
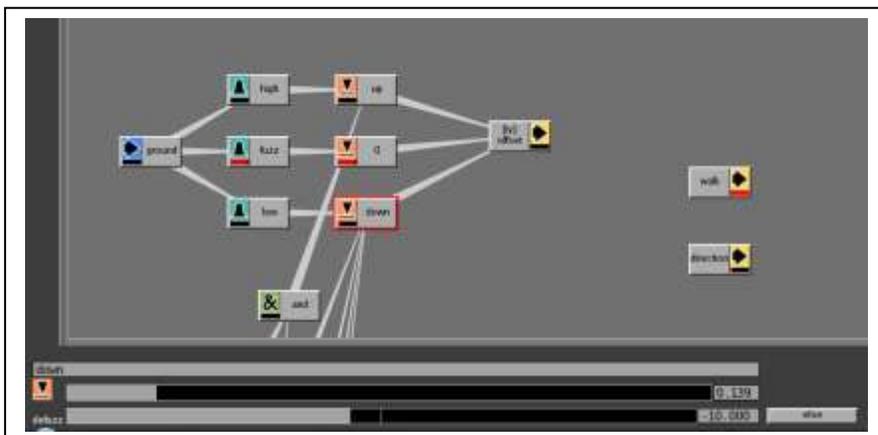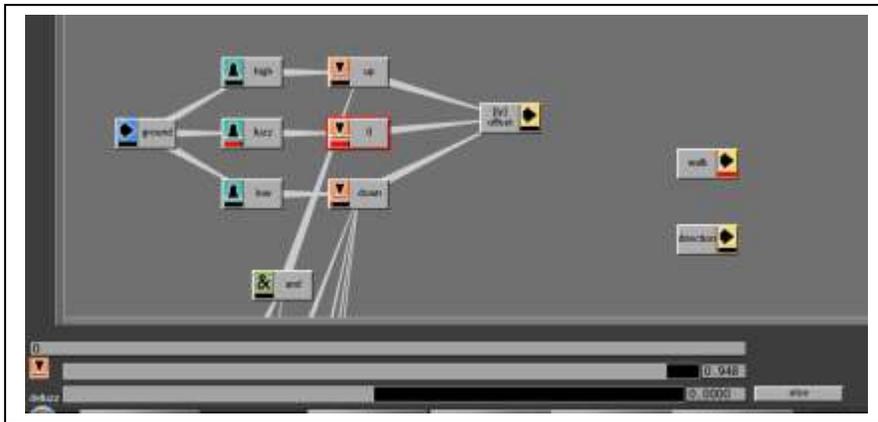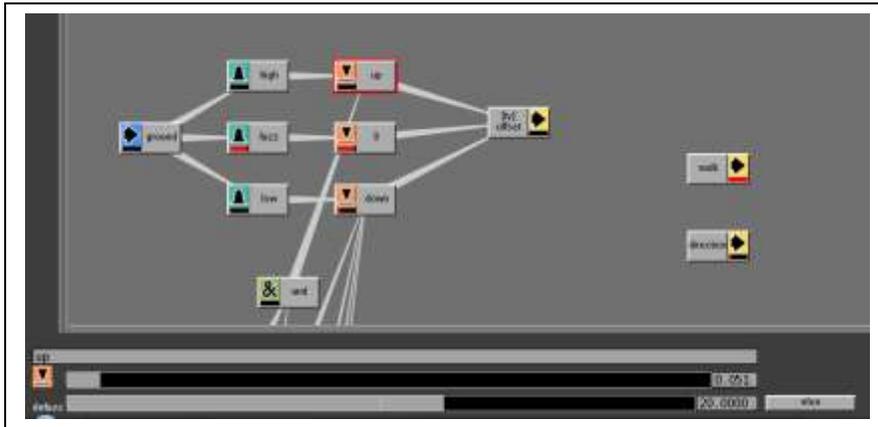

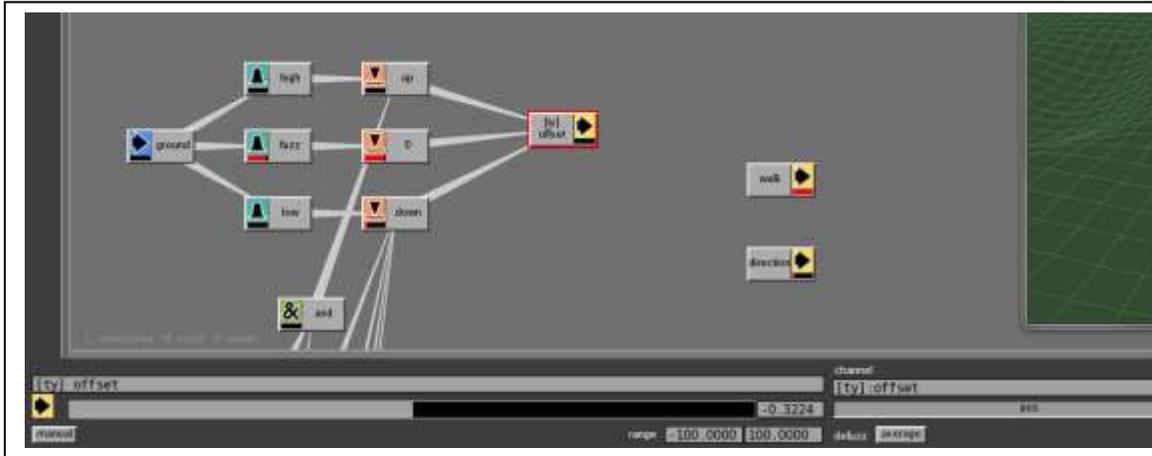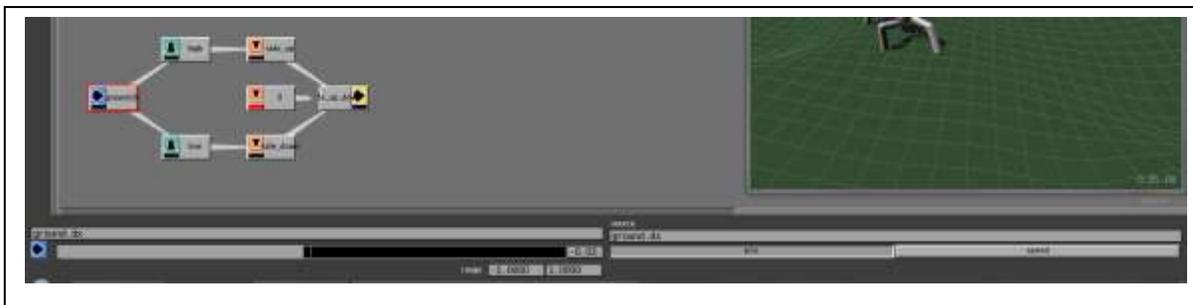high is a smooth fuzz node ranging from 0 to 1 on the graph

And the defuzz nodes, up, straight (0) and down: Where up is 20 and down is -10, note 0 is NOT an else, as it has input.

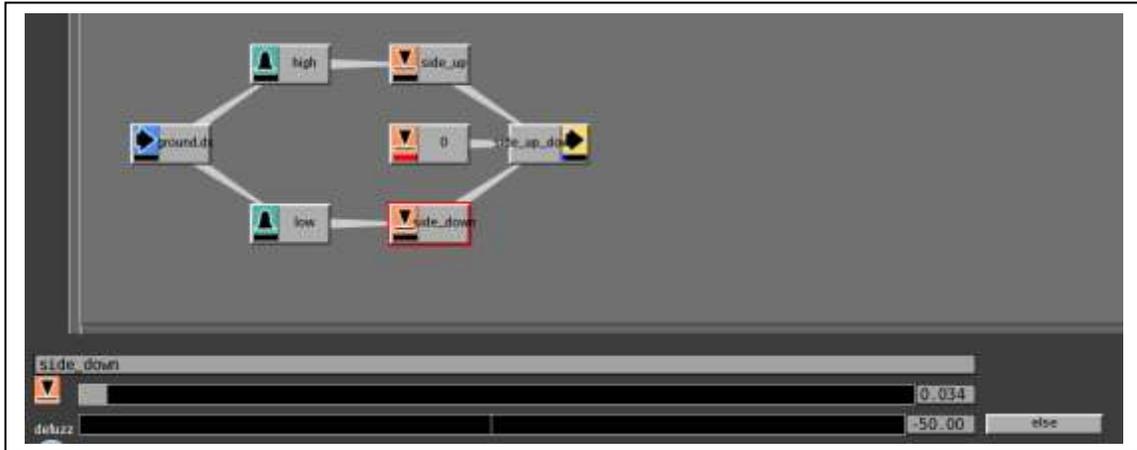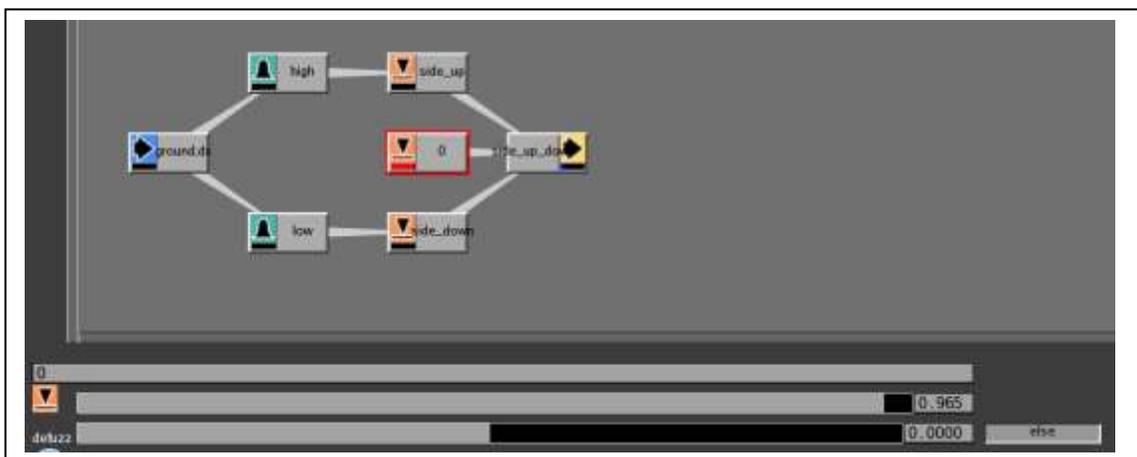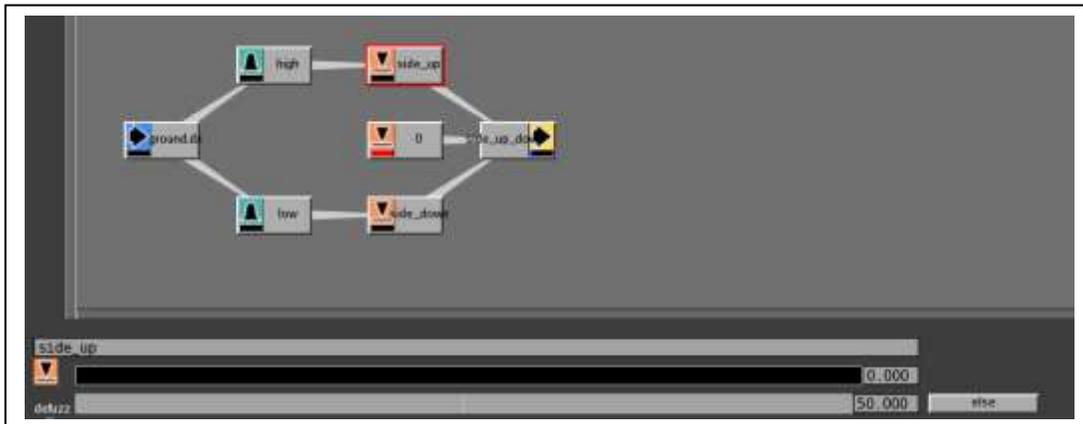Output node is [ty] offset (note the channel here is [ty]:offset)

Next working with ground.dx – range is -1 to 1 (see manual)

Fuzz nodes, high and low, have linear graphs from 0 to 1.

The defuzz nodes are as follows: side_up, straight(0) and side_down with values 50, else and -50:

The output node: side_up_down is for rz

Similarly, we can define the ground.dz, the only difference from the above is that look_up is -100 and look_down is 100 (versus 50 and -50) and the output node, look_up_down is rx. So copy (ctrl-c), paste (ctrl-v) and make those changes.
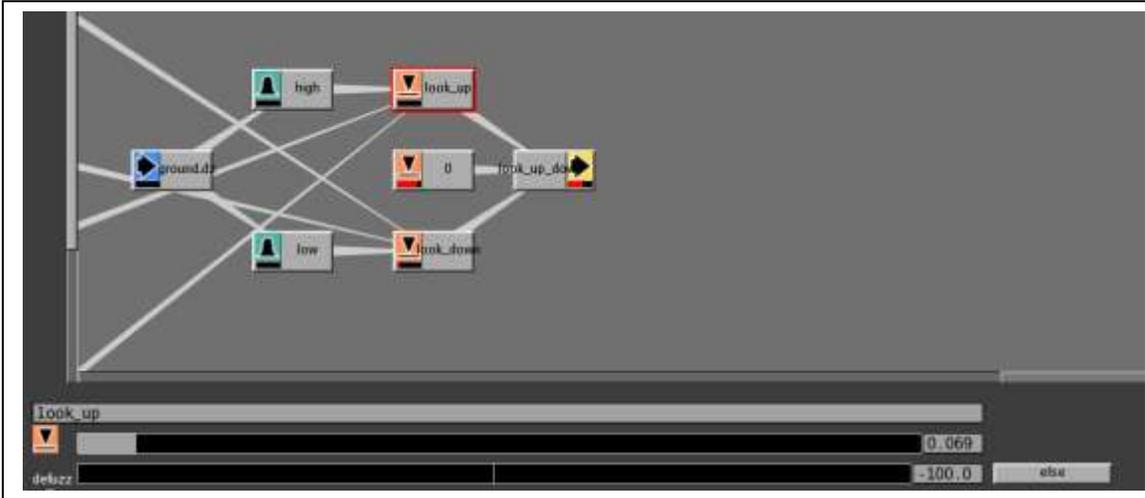
Now we can describe one of the sections for each toe and we will have all the groups of nodes.
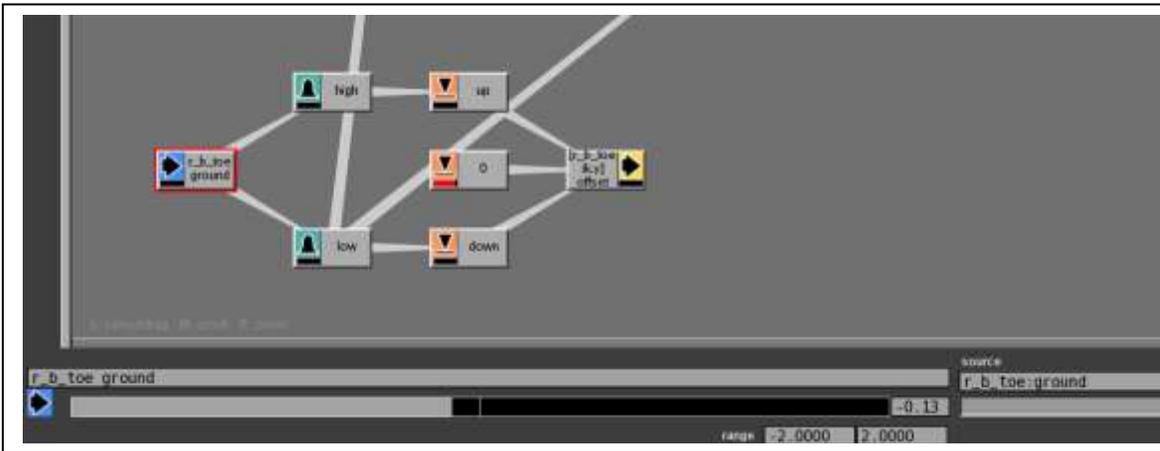
A linear graph ranging from 0 to 2 for high and -2 to 0 for low

Finally to the output node: r_b_toe has channel [r_b_toe:ik.y]:offset
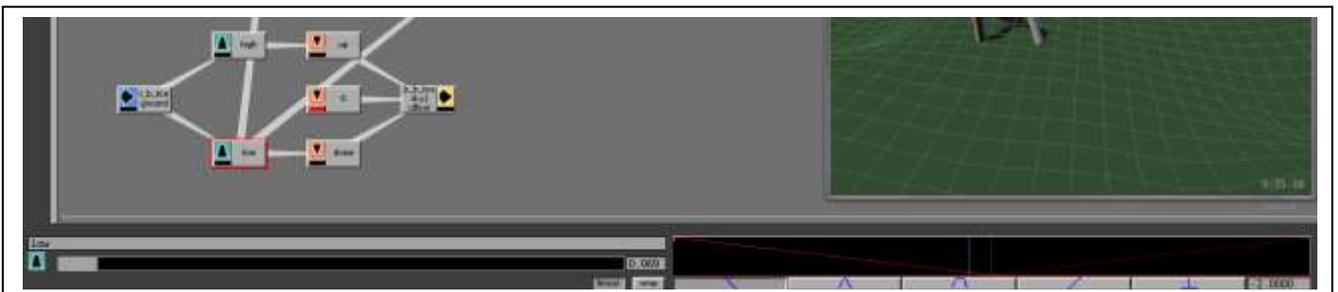
Copy and paste this network r_b_toe, changing it to l_b_toe, and r_f_toe, l_f_toe. (So from right back you will copy to left back, right front, left front toes and change appropriately).

This completes the group nodes, now there are two other nodes and some interconnections to achieve.
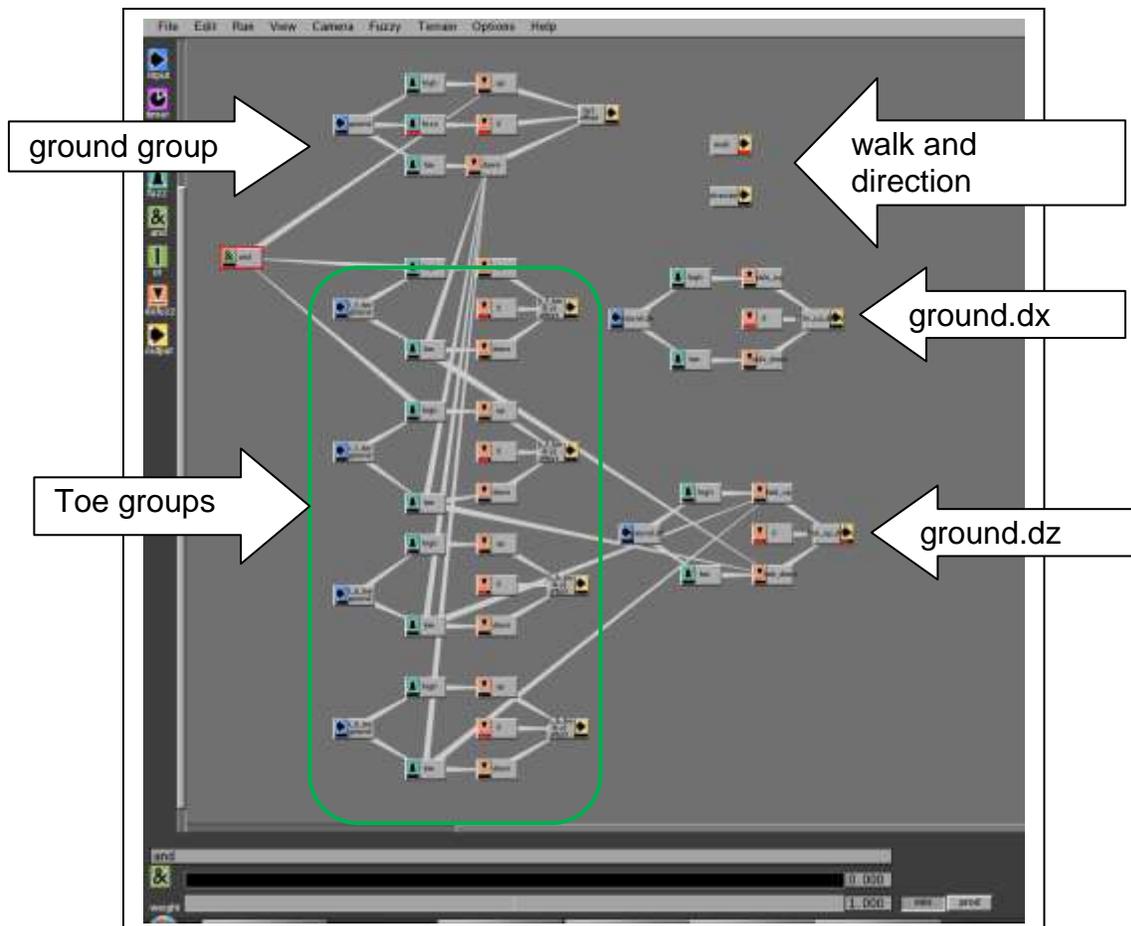
Direction
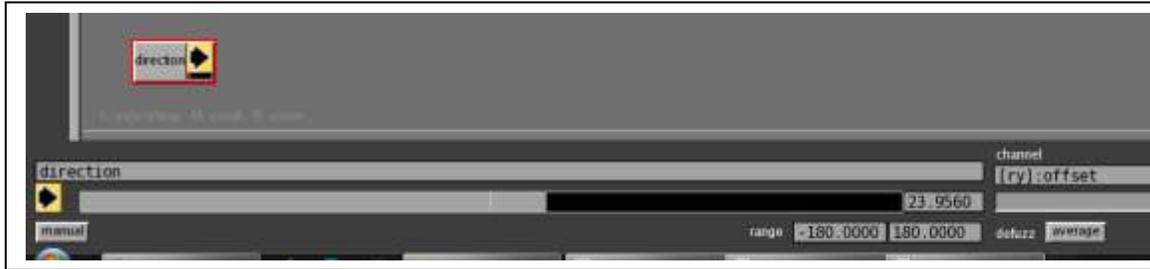
Walk (you should have named your action loop **walk** and saved as specified on page 1)
Note, you must give walk some value (here 1) or it won't trigger the walk action.

And finally the AND node: two highs as input, connects to up (**note directions of connections**)

Finally, the four **low** nodes are connected to the **down** node of the "ground group" as seen in the preceding diagram.

The **low** from the **back** toes groups are connected to "ground.dz" **look up** defuzz node.
The **low** from the **front** toes groups are connected to "ground.dz" **look down** defuzz node

As noted above, the **AND** node has two **high** nodes from the **front toes as input**, connects to **up** in the "ground group" (Make sure you use the front not the back toes or your spider will rear up like a horse).

This completes your brain. Now it is time to start building the body.

## Step 5 Adding geometry to the body:

In the materials folder you will find the .obj files corresponding to the parts of the skeleton.
ie. body_poly.obj, head_poly.obj, l_b_low_leg_poly.obj … and so on.

To assemble the body geometry in Massive:

- first under **Options** checkmark beside **Bones window.**
 This will bring up the Bones window display
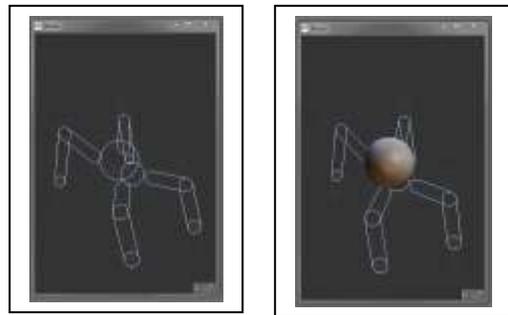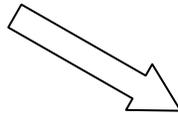
- add a **geo** node and **material** node forthat particular body part –
  do not attach the geo node to anything
  (material node is attached to the geo node)
- when you select the geo node the geometry appears in the bones window. In the **View** menu remember to select geometry or skeleton (or both) if you want to see them in the view window. Note if you have the skeleton on, you won't be able to see the skinnier legs.
- **select** the geo node and **shift-select** the corresponding skeleton node. The geometry in the bone window will appear colored
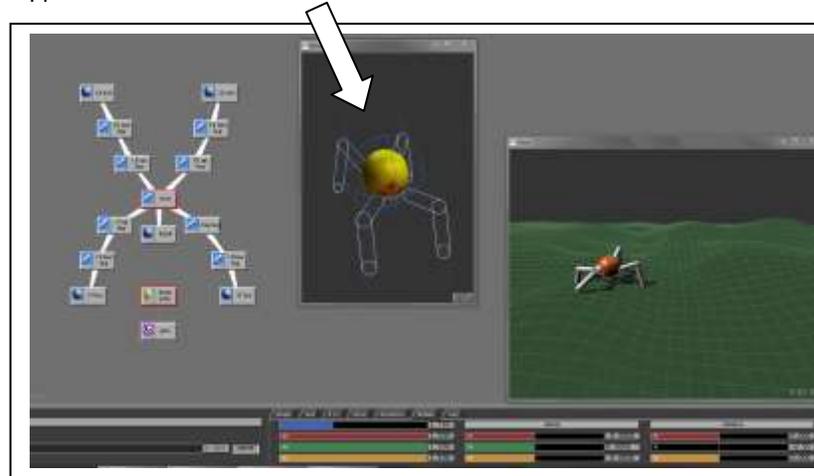
- **in the bones tab** select initialize only if there are no parameters, then size up the bones until the blue icon envelops the geometry (adjusting scale, translate)
- **repeat** this procedure for each body part (ctrl-c, ctrl-v is your friend with the legs)

In the diagram below we now have the head and body
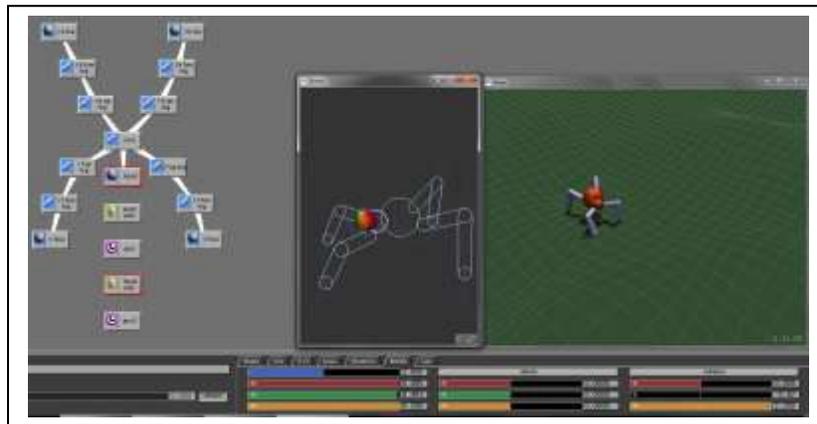
- attach these parts to a material node (you may use one node if it is going to be all one color - see diagram) Assembled body:
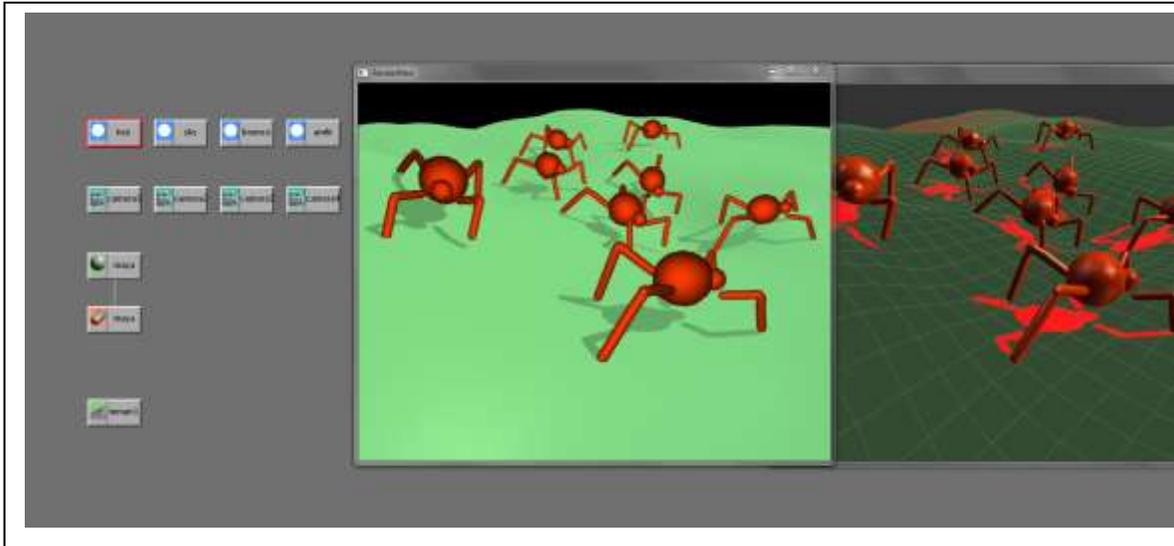
Step 6 Refer to the rendering document:

Note that you need only render one spider animated to meet the minimum requirements. However, you should use this as a jumping off point to have many spiders running around, possibly interacting. The following diagram shows the spiders assembled and rendered using prman.

Additional notes:

- you can delete an ik if it isn't working by selecting in the action editor and hitting delete
- you can complete this tutorial with only front leg ik as the back legs will follow if the bumpiness of your terrain is greater than the spider size
- ****TIP: you may use card **stand-ins** if your spider uses vision to increase the speed of the computations (the tab for standin is next to the tab for vision – click on it and then click add - it will create a standin for your agent (like a "sprite") – size up appropriately if need be - default work well for this project).

- even when you are doing a rigid association for your geometry, renderman renders estimate a bounding box for the agent based on the skeleton (for the bones method we will see in exercise 2 this is more obviously true as you will see when we size things up in the bones window). This simply means that your geometry should be about the size of your skeleton (normally you would want this so that the behavior also matched – for example it uses the skeleton to figure out not to bump into each other).

As always, the manual is also a resource – don't forget about it – especially when exploring more features.

Troubleshooting tips:

When creating your ik/fk make sure when you select the node that the curves are actually correctly highlighted in the action editor. This is a common error.

When testing your action walk, if the spider is rearing up or sliding sideways, check to see you have the correct toes connected to the ground. (Front toes differ from back tops in your brain).
Check your render paths. If you are missing one of the ribs, you may have forgotten to "select" the render in the sim window. Toggle it on and off to ensure it is selected.

After you have built the loop, if the action test shows your spider popping back to the start make sure you have set locomotion and apply on both the loop and agent tab.

If you spider is not moving – make sure you have a value in your output walk node triggering it.

Integrating your own Geometry:

You may also want to create your own creature in maya and bring it into massive. This is quite do-able. Create an animation and rig file as provided. If you use a pose you can set bind pose, however check to see that it retains this pose when hitting reset. You can save the bind pose you intend to use in a bones.act file for your agent. To do this, read in the spider_anim_clean.ma file and click on save – you must specify the extension to be act (not actb). You then refer to this file in the bind tab just above where you saved.