USER DOCUMENTATION

Introduction

Puppet2D is a tool for Unity3D that allows you to quickly set-up your 2D character for animating. With this tool you can create 2D skeletons, skin your characters to the bones, and create really easy to use controls that make animating the characters a breeze.
To bring up the Puppet2D window, select the Puppet2D menu and go to Window>Puppet2DWindow. All the creation tools are contained in this window.
To begin creating your puppet you'll want to get your character ready to be "rigged". In Unity go into the scene view and click the 2D button at the top of the view. Drag in your 2D character sprites and put them into a locked layer. This is useful so you don't end up accidentally clicking on it when your trying to draw bones or controls. Now your ready to start creating the bones.

Bone & Control Layers and scale
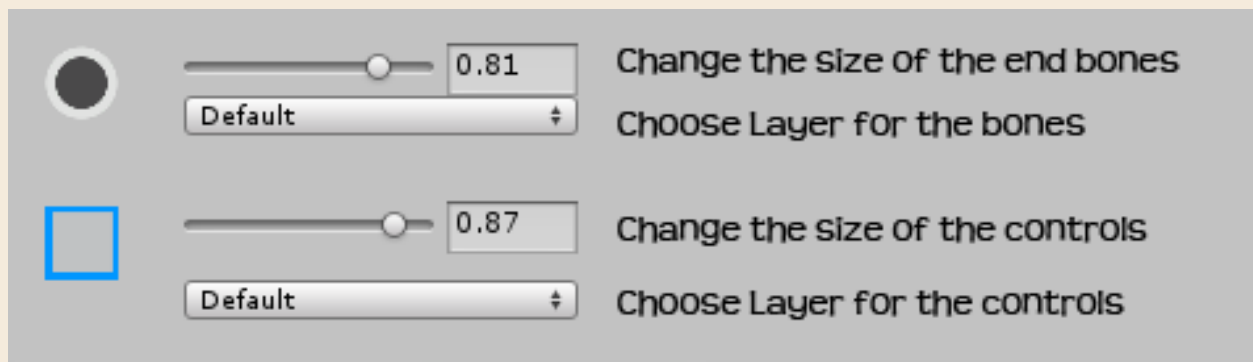
You are able to change the size of the controls and end bones at the top of the Puppet2D window. You can also specify which sorting layer the bones will be created under. This doesn't change their layer once they have been created so make sure you set this at the beginning before creating your bones and controls.

AUTORIG NEW

With AUTORIG you can rig your biped character in less than a minute. Heres a step by step how to do it:

1. Draw your character in the t-pose facing right (see bellow). If you are using a single image - make sure the arms, legs and head are not overlapping. Otherwise you can build it in separate sprites and assemble it in the scene.
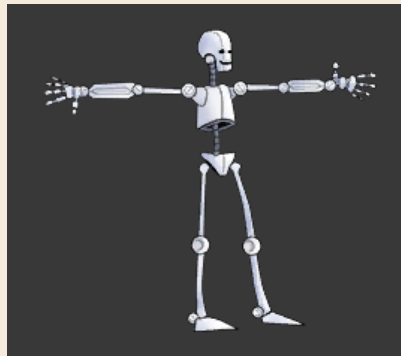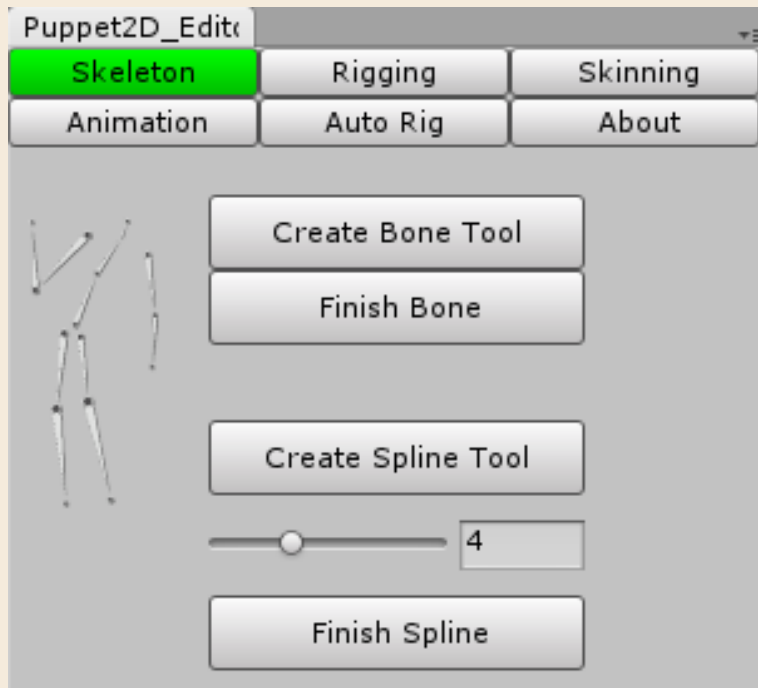

2. Select your sprite/s in the scene and click "Make Guides"
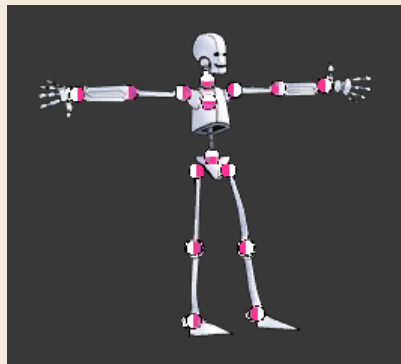
3. Move the guides into the correct joint positions. (See below)
4. Now click "Auto Rig" and your character should be rigged!

You'll be able to use ready-made animations. A walk and an idle have already been made. You can also purchase more (just click Get More Animations)

Skeleton

Bone Creation

Bones are the pivots that will control how your puppet moves.
To start creating a bone click the "Create Bone Tool" button. This sets you in *bone creation mode*. You will remain in this mode until you press enter or click the "Finish Bone" Button.
In the 2D View start left clicking and you will start drawing bones. Each bone will be parented to whatever you have selected.
Create Bone Tool Button – start creating bones
Left Click – draw bones
Backspace – delete selected bone
Hold Shift – move selected bone only
Hold Ctrl – move selected bone and its children
Alt Left Click – Insert Bone between selected bone and its children
Right Click – Deselect bones
Press Enter/Click "Finish Bone" - Finishes creating bones.

Spline Creation

This is a special kind of bone chain that behaves as a bezier curve. It is created differently than normal bones as you draw the controls instead of the bones.
To start creating a bone click the "Create Spline Tool" button. This sets you in spline *creation mode*. You will remain in this mode until you press enter or click the "Finish Spline" Button. At this point the bones will be made.
In the 2D View start left clicking and you will start drawing Spline Controls.
Using the slider you can specify how many bones will be made between each control. Set this before starting this tool.
Left Click – draw controls
Hold Shift or Ctrl – move control
Press Enter/Click "Finish Spline" - Finishes creating Splines Controls.

Rigging Setup
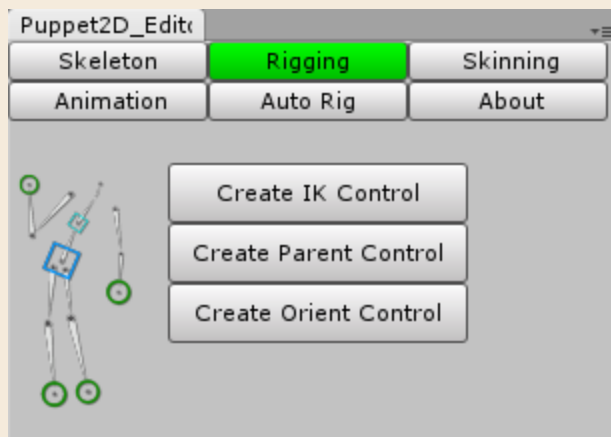
Although its possible to animate your characters just by rotating the joints directly, this can be a tricky way to animated, particularly when it comes to keeping the feet on the ground. Creating some custom controls for your character with Puppet2D is a very quick process, and really makes the job of animating more intuitive and easy.

Global Control

When you first create a control you will see a gloabl_ctrl also get created in the hierachy. This is the base from which all the control scripts get executed. Turning the script on this off will disable all the controls. You will want to add all your animations on this gameObject and move it to move your character around.

Start Rotation Y – allows you to change the y axis plane of your character

IK handles – all the Ik handles for this character (in execution order)

Parent Controls – all the Parent & Orient for this character (in execution order)

Control Visibility – Turns controls visibility on and off

Bones Visibility - This will toggle visibility of all bones parented to this global_Ctrl (make sure u press the refresh button the first time you parent the bone)

Combine Meshes – This Combines all the meshes that share a texture into one mesh (so 1 draw call)

Flip – use this to flip the character in the x-axis

Auto Refresh – auto orders the execution order of the controls

Refresh Global Control – click this when you change something in the rig – such as delete a control or change the hierarchy in some way.

You can flip the character in the x axis by using the flip checkbox.

IK Controls

Are controls you need for any of your characters limbs (IE arms or legs). This gives you a single end control which you can use to animated their limb. It will mean your feet will stay on the ground when you move its body.

To create an IK control, select the end of a three bone chain and click the "Create IK Control" Button. For example if you have leg which has bones such as thighBone>kneeBone>footBone. Select the footBone and click the button.

You can flip which way the knee (or elbow) faces by clicking the "flip" check box in the inspector. This can also be animated.

If you want you can have "stretchy limbs" by clicking the "Squash and Stretch" check box.

Parent & Orient Controls

A problem with animating bones directly is that they start from awkward rotations and positions. This means you cant quickly reset them by zeroing them. Puppet2D allows you to create controls that are easier to select and start out at zero position and rotation, so can be easily reset. Parent controls affect the position and rotation, orient controls affect only the rotation.

To create a parent control select a bone to control and click "Create Parent Control"

To create a orient control select a bone to control and click "Create Orient Control"

You can resize the controls in your scene by moving the slider to the desired scale.

In the drop down menu at the bottom of rigging setup you can choose which sorting layer to put the controls on. It is a good idea to have a "Control" Sorting Layer so you can keep it visually in front of the character and the Bones.

Skinning
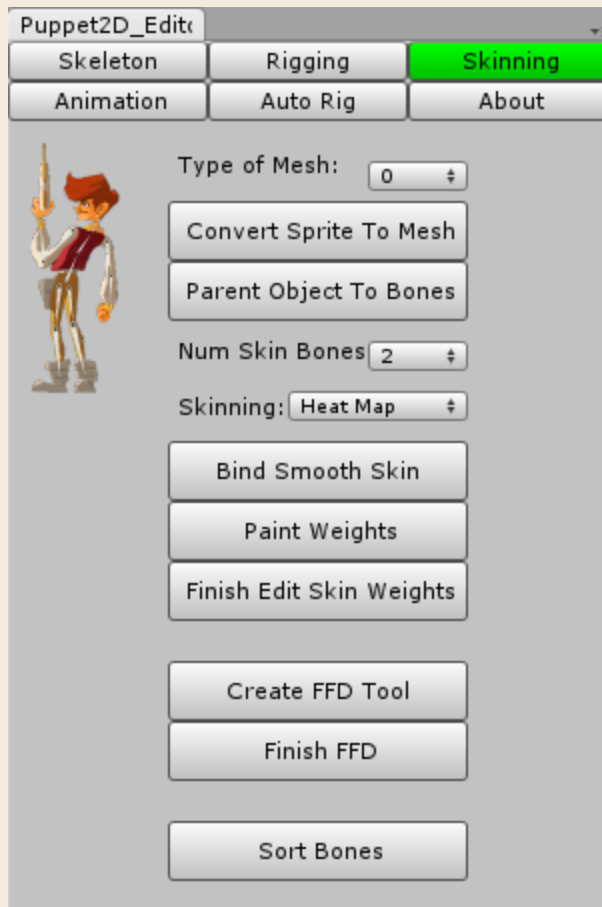
There are three ways to get the bones to influence your sprites; by **parenting** them**, skinning** them, or **FFD**.

Parenting

You could manually parent your sprites to the bones, but to speed this job up Puppet2D has a button that does all of your object in one go. Select all the bones and all the sprites/objects and click "Parent Object to bones". This will parent all your objects to the nearest bones.

Skinning

Skinning allows single objects to be influenced by more than one bone. In order to do this the sprites need to be converted to a mesh.

To do this select your sprite (make sure its not parented) and click "Convert Sprite To Mesh". You can choose how subdivided you want the mesh to be from the "Type of Mesh" dropdown menu.

You can change the number of vertices in the mesh by first adding a polygon2Dcollider component to the sprite. You can use this to remove and add vertices before converting it to a mesh.

To bind the mesh to the bones, select all the bones and the skin, and click "Bind Smooth Skin"..You can choose the number of bones you want the default skin to bind to using the "num Skin Bones" dropdown menu. Your mesh should now have a Skinned Mesh Renderer component on it. ~If you move the bones the mesh should move with it.

You can pick between two types of skinning - Heat Map and Closest Point. Heat map should give better results but is slower. You can speed it up by lowering the resolution of your sprite texture (you can always change it back after).

To paint the skin weights select your mesh and click "Paint Skin Weights". You can now paint the strength of each bone onto the meshes vertices by selecting the desired bone and left click to paint the weights of that bone.

Change the brush size and strength by using the sliders or hold B for brush size and N for strength.

Left Click – Add Weights

Hold ALT – Subtract weights

Hold SHIFT – Smooth Weights

Hold B – change brush size

Hold N – Change brush strength

Finish painting weights by clicking "Finish Edit Skin Weights"

You can also manually edit the skin weights by clicking the "Edit Skin Weights" button. You will see a bunch of vertex objects parented to the mesh. If you select the vertex you will see a list of the bones that influence the vertex followed by their weights. To edit the weight values or influence, just change the values in the inspector. If you want to change multiple vertices at once, change the value and click the "Update Skin Weights" button in the inspector.

To finish Editing weights click the Finish Edit Skin Weights" button, and the vertices will be removed.

You can resize the vertexHandles in your scene by moving the slider to the desired scale.

FFD

This is the most flexible method as it allows you to deform the character. As well as move it with the bones.
To create an FFD, select your sprite and click "Create FFD Tool" . You can now start drawing the FFD around your character. You should first start drawing the frame around the character. After that you can add any interior parts if you need it. Click "Finish FFD" to finish creating it and make the new FFD Mesh.

Create FFD Tool – start creating FFD Controls
Left Click – draw FFD Controls
Hold Shift or Ctrl – move selected FFD Control
Right Click – Close Current FFD loop and start creating a new loop
Press Enter/Click "Finish FFD" - Finishes creating FFD
.
To get the FFD controls to move with the bones you can either parent them or skin them. (Essentially you can treat them as if they are a mesh.)

FFD Parenting

To parent them select the FFD controls and the bones and click "Parent Object to bones" - the FFD parents will be parented to the bones.

FFD Skinning

To skin them, select the FFD controls and the bones and click "Bind Smooth Skin". You can also choose the skinning value to be 1 or 2 (Don't use 4(FFD) as this is needed for another feature).

## Using the FFD on another Mesh

You can also embed other meshes into the same FFD. To do this you need to set Num Skinned Bones to 4(FFD). Make sure the new mesh falls inside the FFD. Select the FFD controls and the mesh and click "Bind Smooth Skin".
Its important to be aware that in order for this to work you will need to have the original mesh created with the FFD visible. You should keep this around for future skinning.

Sort Bones

This will sort the order of your skinned meshes vertices based on the sorting order the bones.
To use, first set the bones sorting orders, then select the mesh and click "Sort Bones".

Animation
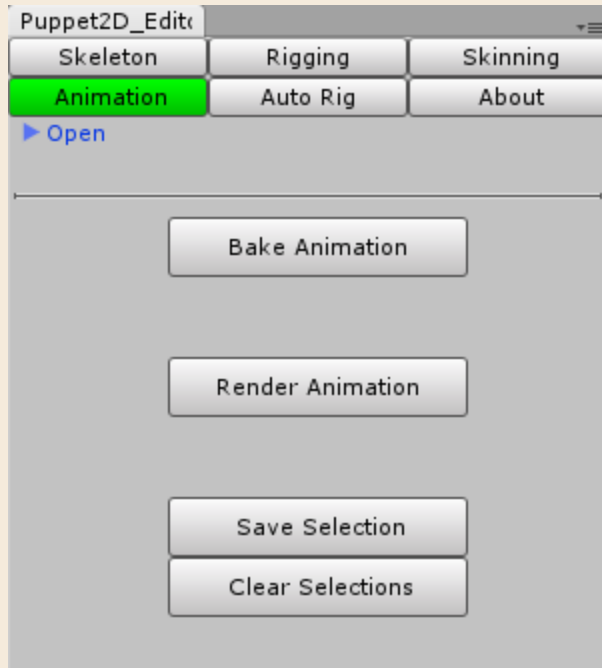
To start animating simply create an animation clip on the global_Ctrl and you can move/scale rotate the controls and set keyframes in the animation window.
If you would like to optimize the animations by removing all the control scripts -you can bake the animation onto the bones.

To bake animations open a scene with the global_ctrls that have the animations you want to bake. Click bake animation – this will make duplicates of all your animations with baked inside the Puppet2d>Animation>Baked folder. These will be the animations as keyframes on the bones instead of the controls. You will also notice after you do this Puppet2d will disable the globalCtrl script. You can now add theses animations to your animation Controller and they can replace all your control animations.

You can use Render Animation to make a png sequence of your animation.

To help with animating you can save poses and load them.
To save a selection, select things in your scene and click "Save Selection".
To load a selection right click on one of the Load squares and hover over "Select Objects".
To Delete Load slot right click and select "Remove Selection"
To Add to the Load square, select what you want to add and select "Append Selection"
To Load a pose click "Load Pose"
To Save a pose click "Save Pose"