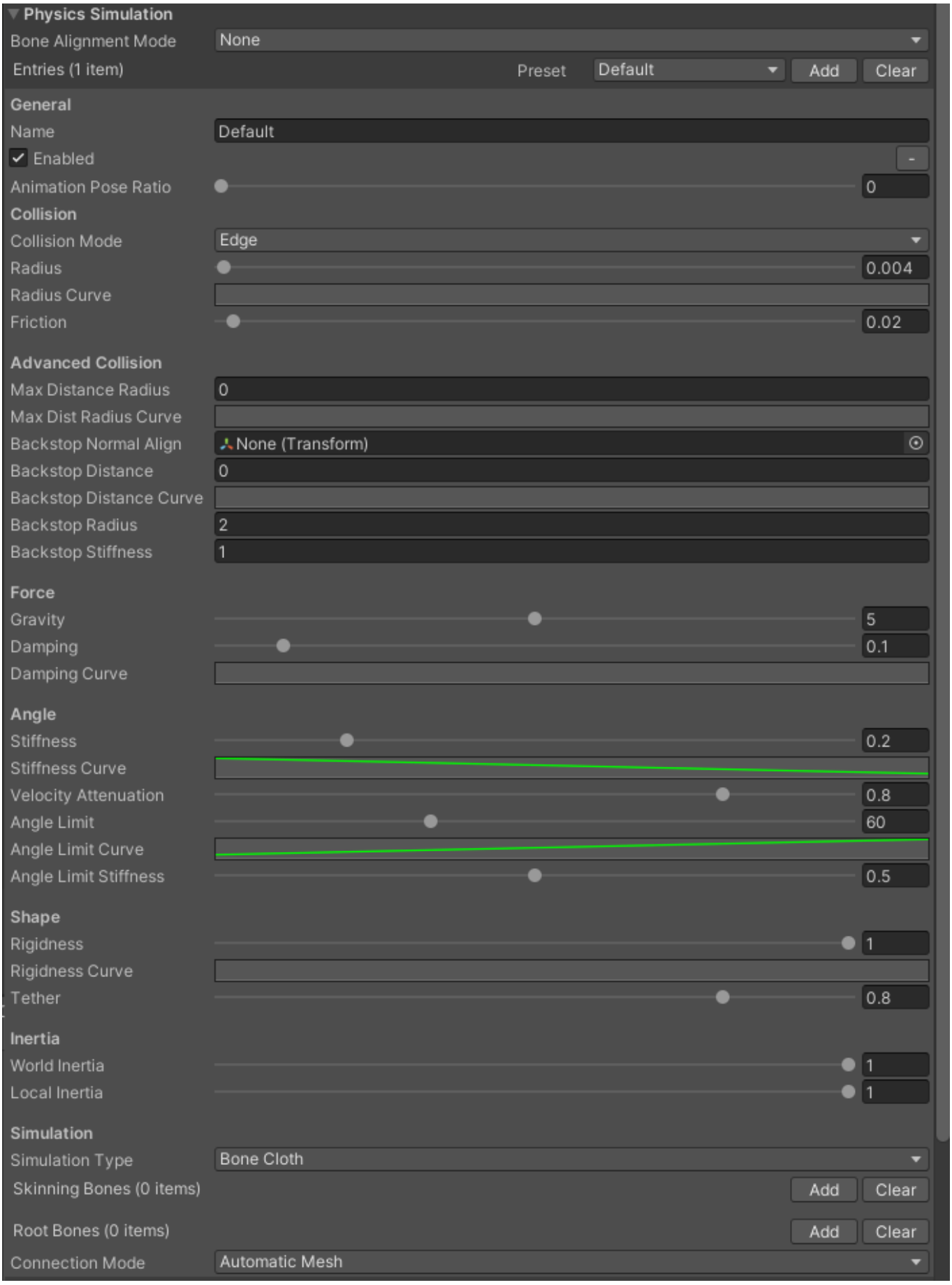
Use Mod Creator to add simulations to the object.

When adding a new simulation entry you can choose out of several presets with optimized settings for some commonly used items. The amount of presets available will grow as we add additional built-in items to the game.


Physics Simulation
Bone Alignment Mode
None
Entries (1 item)
Preset
Default
Add
Clear
General
Name
Default
Enabled
-
Animation Pose Ratio
0
Collision
Collision Mode
Edge
Radius
0.004
Radius Curve
Friction
0.02
Advanced Collision
Max Distance Radius
0
Max Dist Radius Curve
Backstop Normal Align
None (Transform)
Backstop Distance
0
Backstop Distance Curve
Backstop Radius
2
Backstop Stiffness
1
Force
Gravity
5
Damping
0.1
Damping Curve
Angle
Stiffness
0.2
Stiffness Curve
Velocity Attenuation
0.8
Angle Limit
60
Angle Limit Curve
Angle Limit Stiffness
0.5
Shape
Rigidness
1
Rigidness Curve
Tether
0.8
Inertia
World Inertia
1
Local Inertia
1
Simulation
Simulation Type
Bone Cloth
Skinning Bones (0 items)
Add
Clear
Root Bones (0 items)
Add
Clear
Connection Mode
Automatic Mesh

Some settings allow for an additional curve to be set up. The base value will be modified over the course of the curve.

When constructing the simulation mesh, a baseline of immovable vertices is created. The curve values are applied linearly from the baseline over subsequent vertices towards the end of the mesh.

Using curves, you can fine-tune some parameters of the simulation.

Example:
If you set up a stiffness value of [1] and additionally set a linear curve moving from [1] to [0], the baseline vertices will have a stiffness of [1] while the vertices at the edge of the mesh will have a stiffness value of [0].

Setting	Values	Description
BoneAlignmentMode	enum	Decides how this objects armature will be handled when preparing simulations. **None:** Do Nothing. Mostly used for non skinned accessories with no armature present. **Attach Only:** Attach the object to a specific bone on the characters armature. Refer to Reparentable setting, which enables or disables the `DefaultParent` field, which is used to determine the targeteted transform. **Full:** The objects armature follows the structure of the characters armature. Reassigns all bones of this armature to the bones of the target. Bones not present on the target will be created automatically, effectively extending the base mesh armature.

Common Simulation Settings

Setting	Values	Description
Name	string	Give a name to this simulation. Useful when running multiple simulations on a single object.
Enabled	bool	Enable or disable the simulation.
Animation Pose Ratio	float	Ratio between the current animation posture and initial posture, which will be considered for some calculations. Recommended setting is [**0**] unless you run into problems. Affects `Angle Settings` and `Shape Settings`.

Collision Specific Settings

Setting	Values	Description
Collision Mode	enum	Enable collision of the simulation mesh against predefined colliders on the character. There are two modes available: **Vertex**: Each vertex of the simulation mesh is a node that will be taken into consideration for calculating collision. **Edge**: Additionally, any connections between these vertices can collide with the character. Prevents events where parts of the object 'slip through' the body.
Radius	float	Collision radius around vertices and edges.

Setting	Values	Description
Radius Curve	AnimationCurve	Apply `Radius` using curve values.
Friction	float	Friction between a collider and a collision node when they come into contact. Think of it as how 'slippery' the collider is during contact.

Additionally there are advanced collision settings available. These will not be considered for Bone Spring.

Setting	Values	Description
Max Distance Radius	float	Set up a collision sphere around the vertex using this value, preventing the vertex from leaving it. Set to 0 to disable.
Max Distance Radius Curve	AnimationCurve	Apply `Max Distance Radius` using curve values.
Backstop Normal Alignment	Transform	Radially adjusts the normals of the simulation mesh - making them face away from the transform. As outlined previously, the simulation mesh is constructed at runtime using information about bones/vertices of the original mesh. The normals are calculated using interpolations. In some cases, these results are not accurate.
Backstop Radius	float	Backstop is a technique that limits movement of the simulation mesh and is based on the vertex normals. It works by setting up a collision sphere behind each vertex. The vertex will not be able to enter it. This setting specifies the radius of the backstop collision sphere. BackstopDistance + BackstopRadius = Center of backstop collision sphere. Set to 0 to disable backstop.
Backstop Distance	float	The distance from the original vertex position to the outer edge of the backstop collision sphere. The direction is the inverted vertex normal. Backstop Distance + Backstop Radius = Center of backstop collision sphere. Setting the value to [0] prevents the vertex from moving in the opposite direction of the vertex normal at all.
Backstop Distance Curve	AnimationCurve	Apply `Backstop Distance` using curve values.
Backstop Stiffness	float	Repulsion strength. Lowering the value will make vertices move away softer from the backstop collision sphere.

Force Settings

Setting	Values	Description
Gravity	float	Gravitational pull on the item.
Damping	float	Damping is the rate at which applied force to the item will lose its energy. Can be considered as 'Air Resistance'.
Damping Curve	AnimationCurve	Apply `Damping` using curve values.

Angle Settings

Setting	Values	Description
Stiffness	float	Stiffness is the resistance of the item to bending on its edges. The higher the stiffness value, the faster the original rotation will be restored.
Stiffnes Curve	AnimationCurve	Apply `Stiffness` using curve values.
Velocity Attenuation	float	Used together with stiffness to limit item movement. Similar to 'Damping', attenuation adds a resistance to the effects of the stiffness parameter, making it more natural-looking.
Angle Limit	float	Limit the bending of edges to a fixed maximum angle value.
Angle Limit Curve	AnimationCurve	Apply `Angle Limit` using curve values.
Angle Limit Stiffness	float	Repulsion strengh after reaching the defined AngleLimit. Lowering the value makes for a softer return.

Shape Settings

Ignored when using Bone Spring.

Setting	Values	Description
Rigidness	float	Also 'Stretchiness'. How much each vertex keeps its distance from other connected vertices. Set it to 1 to have no stretch.
Rigidness Curve	AnimationCurve	Apply `Rigidness` using curve values.
Tether	float	How much the item can compress. Limits the distance on how much item vertices can move towards the baseline of the item.

Inertia Settings

Setting	Values	Description
World Inertia	float	How much effect movement through world space (changes to position) has on the item.
Local Inertia	float	How much effect internal movements (such as animations) have on the item.

Simulation Specific Settings

The physics simulation supports different simulation types with varying settings. These are Mesh Cloth, Bone Cloth, and Bone Spring and will be detailed below.

Bone Cloth / Bone Spring Related Settings

Skinning Bones	**Transform[]**	**The simulation works by building a simulation mesh during runtime. If the original mesh is weight painted to the character's armature, the simulation mesh will be skinned the same way and follow animations. Providing additional skinning bones using this array is not needed in this case.** **If the original mesh hasn't been skinned at all (or has only been lightly skinned to the armature), you can add bones from the character's armature to the list of skinning bones here.** **The simulation mesh will be skinned automatically to the specified bones.** **Please note that this feature is not as accurate as manual weight painting by hand.**

Bone Cloth / Bone Spring Related Settings

Setting	Values	Description
Root Bones	Transform[]	Add all starting bones exclusive to the character object. The root bones will be considered the baseline for the simulation.

Mesh Cloth Exclusive Settings

The physics Simulation will be performed by using mesh vertices. No bones are needed. Resource intensive.

In order for mesh cloth to work, you need to adjust some import settings for the mesh:

- **Model**: The `Read/Write` attribute needs to be checked for the mesh.
- **Rig**: Make sure `Optimize Game Objects` is unchecked.

Setting	Values	Description
Reduction	float	Reduce the simulation mesh, increasing performance drastically. The higher the value, the stronger the reduction.
PaintMap	Texture2D	For mesh cloth to properly work, you need to define fixed and freely moving vertices. You can do so by providing a Paint Map based on UV Coordinates. **Green (#00FF00)** Freely moving vertices. **Red (#FF0000)** Unmovable vertices.

Bone Cloth Exclusive Settings

Physics Simulation will be performed by using bones built into the mesh. Fast and simple.

Connection Mode	**enum**	**Select how the bones are connected to each other.** **Line** **Root Bones and child bones are connected, forming a line. No interconnection between root bones.** **AutomaticMesh** **Generates a full mesh out of the root bones and all child bones automatically. The generated mesh will be constructed by connecting nearby bones. Default setting.** **SequentialLoopMesh** **Also generates the mesh automatically, but in the order the root bones have been registered. Then connects the start and end points into a loop. The order in which root bones are specified is important. Avoid bones with multiple child bones for this type.** **SequentialNonLoopMesh** **Same as above, but start and end points will not be connected. Avoid bones with multiple child bones for this type.**

BoneSpring Exclusive Settings

Provides a spring / bouncy effect to bones. Ideal for things like chest movement.

Setting	Values	Description
Spring Strength	float	How strong the spring should be. Lower numbers leads to more jiggle. 0.01 (Soft) | 0.03 (Medium) | 0.06 (Hard).

Setting	Values	Description
Spring Distance	float	Limit the maximum distance bones can move. Works nicely with Local Inertia!
Spring Normal Distance Ratio	float	Ratio of movement relative to the bone normal direction. Great to mimic elliptic movement.
Spring Noise	float	Add noise, desyncing multiple springs handled by this simulation.

Still work in progress. Additional settings to come.