Shattering

Shattering can be used to shatter any Gameobject with a MeshRenderer or SkinnedMeshRenderer. Skinned objects can be shattered while an animation is running.

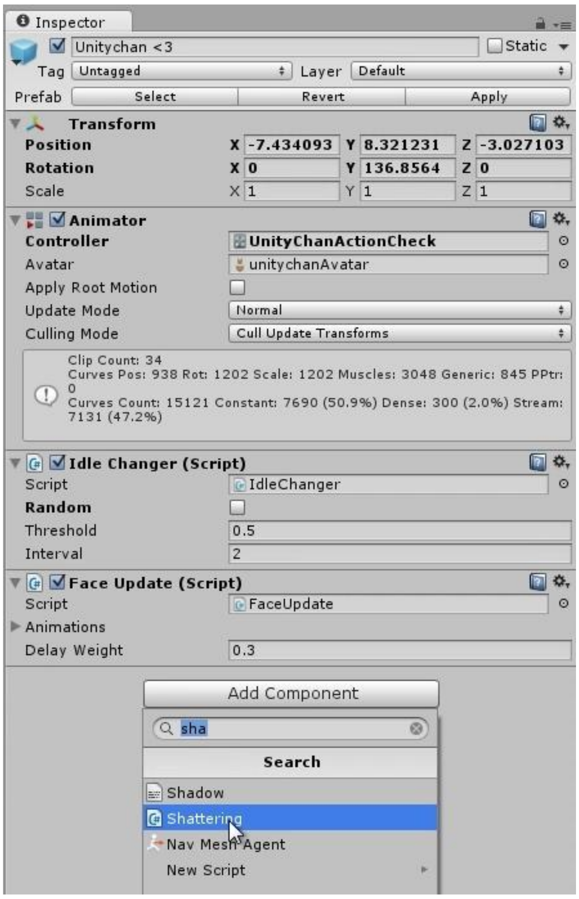
There are 2 different ways to apply the Shattering script :

- You can add the script as a component to the GameObject you want to shatter, it must have a meshRenderer or skinnedMeshRenderer.
- You can add the script to any Gameobject then you add the objects to be shattered in the list named "Models", this is what has been done for the following case of Unity-chan since she is made of multiple gameobjects with skinned and non skinned meshes.

Unity-chan is an asset available for free on Unity Store you can find here if you need it : https://www.assetstore.unity3d.com/en/#!/content/18705

First we add the Shattering script component to a GameObject, a gameobject named "Support" containing the shattered mesh will follow this gameobject's position and rotation so if you want to shatter a moving character it's better to set this script on the gameobject moving.

In this case we need to tell what objects of Unity-chan contains the mesh we want to shatter so we do it, you can just drag and drop the object to Models.



☑ Unitychan <3 □ Static
Tag Untagged Layer Default

Transform
Position X -7.434093 Y 8.321231 Z -3.027103
Rotation X 0 Y 136.8564 Z 0
Scale X 1 Y 1 Z 1

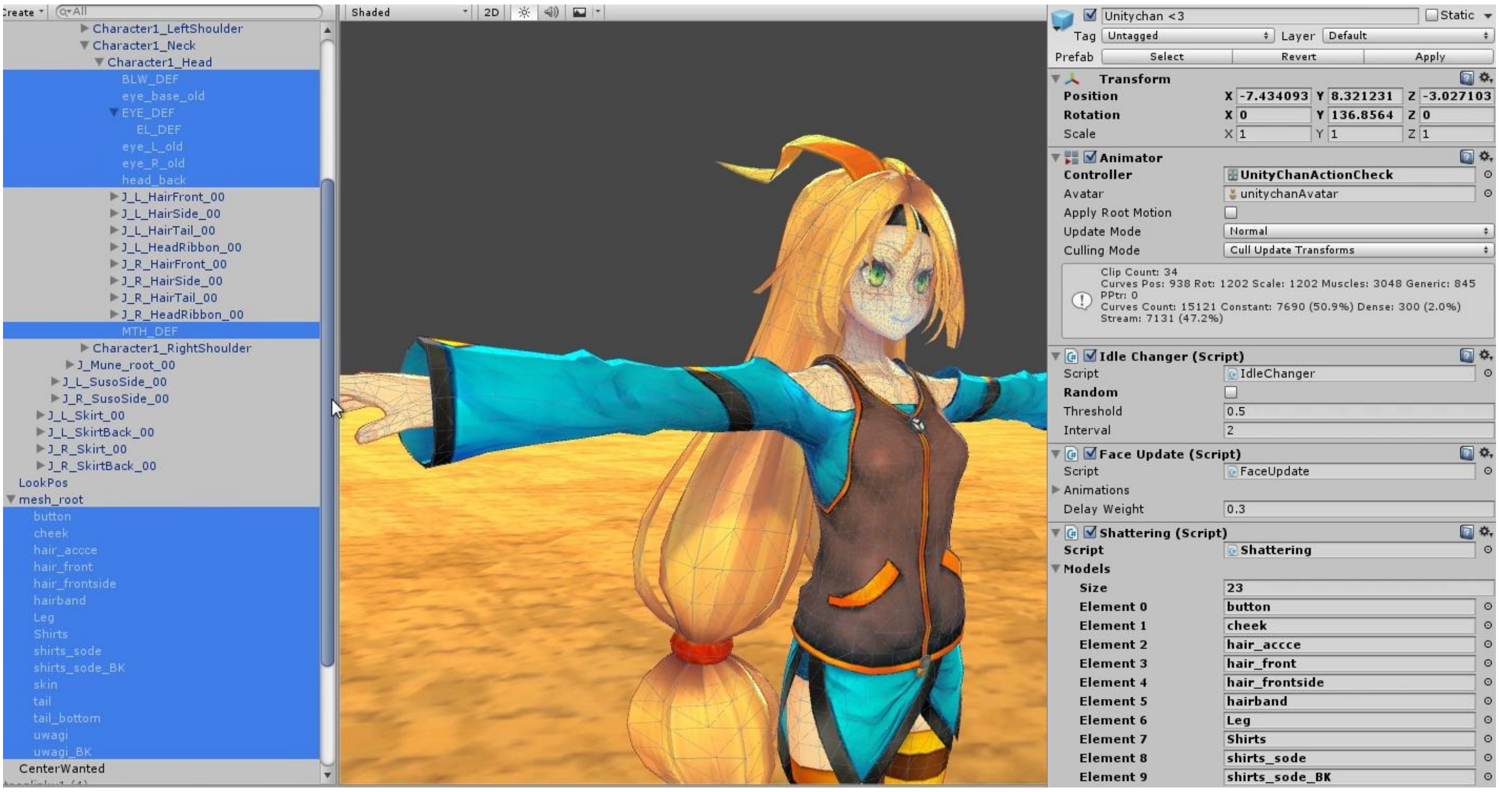
☑ Animator
Controller UnityChanActionCheck
Avatar unitychanAvatar
Apply Root Motion □
Update Mode Normal
Culling Mode Cull Update Transforms

```
Clip Count: 34
Curves Pos: 938 Rot: 1202 Scale: 1202 Muscles: 3048 Generic: 845 PPtr:
0
Curves Count: 15121 Constant: 7690 (50.9%) Dense: 300 (2.0%) Stream:
7131 (47.2%)
```

☑ Idle Changer (Script)
Script IdleChanger
Random □
Threshold 0.5
Interval 2

☑ Face Update (Script)
Script FaceUpdate
Animations
Delay Weight 0.3

Search: sha



```
      Character1_LeftShoulder
      Character1_Neck
        Character1_Head
          BLW_DEF
          eye_base_old
          EYE_DEF
            EL_DEF
          eye_L_old
          eye_R_old
          head_back
          J_L_HairFront_00
          J_L_HairSide_00
          J_L_HairTail_00
          J_L_HeadRibbon_00
          J_R_HairFront_00
          J_R_HairSide_00
          J_R_HairTail_00
          J_R_HeadRibbon_00
          MTH_DEF
      Character1_RightShoulder
    J_Mune_root_00
   J_L_SusoSide_00
   J_R_SusoSide_00
  J_L_Skirt_00
  J_L_SkirtBack_00
  J_R_Skirt_00
  J_R_SkirtBack_00
LookPos
mesh_root
  button
  cheek
  hair_accce
  hair_front
  hair_frontside
  hairband
  Leg
  Shirts
  shirts_sode
  shirts_sode_BK
  skin
  tail
  tail_bottom
  uwagi
  uwagi_BK
CenterWanted
```

☑ Unitychan <3 □ Static
Tag Untagged Layer Default

Transform
Position X -7.434093 Y 8.321231 Z -3.027103
Rotation X 0 Y 136.8564 Z 0
Scale X 1 Y 1 Z 1

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Apply Root Motion □
Update Mode Normal
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☑ Idle Changer (Script)
Script IdleChanger
Random □
Threshold 0.5
Interval 2

☑ Face Update (Script)
Script FaceUpdate
Animations
Delay Weight 0.3

☑ Shattering (Script)
Script Shattering
Models

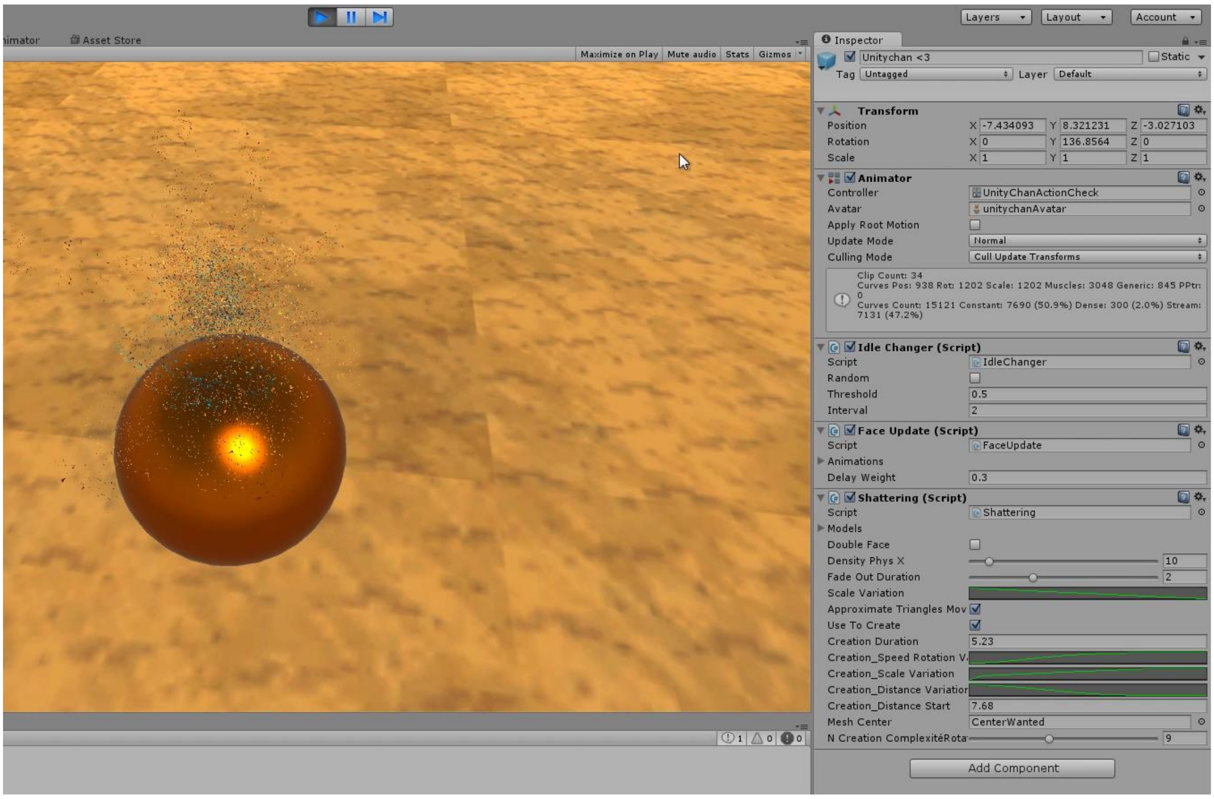
Size	23
Element 0	button
Element 1	cheek
Element 2	hair_accce
Element 3	hair_front
Element 4	hair_frontside
Element 5	hairband
Element 6	Leg
Element 7	Shirts
Element 8	shirts_sode
Element 9	shirts_sode_BK

If your object hasn't a double sided material you can check the box "DoubleFace" to see the triangles recto and verso.

Creation :

When you want to use Shattering to have your objects appear progressively from nowhere you must check the box "Use To Create". Every variable below this box is only related to creation.
During the time set with "CreationDuration" triangles will progressively have their scale go from 0 to 1 so at start they will be too small to be visible. They will rotate around your gameobject at a distance set with "Creation_DistanceStart" and will move closer to the game object to form its normal state.
You can set the duration of this creation and the starting distance of the triangles, try different values for Rotation/Scale/Distance variations to get various effects.

When you use Shattering for spawning, you will have every triangle in your mesh rotating around your object's pivot. You can specify an other pivot if you prefer, usually you will have to create an empty gameobject as a child of your gameobject, in this example it's called CenterWanted and put at half-height to avoid triangles rotating around the default pivot of Unity-chan (her feets). I assigned the gameobject CenterWanted to the variable MeshCenter to do so.



☑ Unitychan <3 □ Static
Tag Untagged Layer Default

Transform
Position X -7.434093 Y 8.321231 Z -3.027103
Rotation X 0 Y 136.8564 Z 0
Scale X 1 Y 1 Z 1

☑ Animator
Controller UnityChanActionCheck
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☑ Idle Changer (Script)
Script IdleChanger
Random □
Threshold 0.5
Interval 2

☑ Face Update (Script)
Script FaceUpdate
Animations
Delay Weight 0.3

☑ Shattering (Script)
Script Shattering
Models
Double Face □
Density Phys X 10
Fade Out Duration 2
Scale Variation
Approximate Triangles Mov ☑
Use To Create ☑
Creation Duration 5.23
Creation_Speed Rotation V
Creation_Scale Variation
Creation_Distance Variatior
Creation_Distance Start 7.68
Mesh Center CenterWanted
N Creation ComplexitéRota 9

Destruction :

The gameobject Support_name is a clone of your source object(s) and covered by rigidbodies.
When you want your object to be shattered you can just call the function **Explode()**, it will scatter across the floor since the rigidbodies are affected by gravity.
After calling the Explode function you can control the rigidbodies movements, to handle them you can use the physics function overlapSphere.

Let's say your character is hit by a sword and you know the vector picturing the sword last movement, you can just use AddForce or AddExplosionForce on each rigidbody collected with overlapSphere and you will see your character's mesh explode following the sword movement.
If you use a bomb to destroy the mesh you just have to know the direction between the bomb and each rigidbody (rb.transform.position - Bomb.transform.position).

Those rigidbodies are an instance of the gameobject "PhysXMesh" located at Eclats>Resources>PhysXMesh. You can change the physic properties of this gameobject from its Inspector panel.

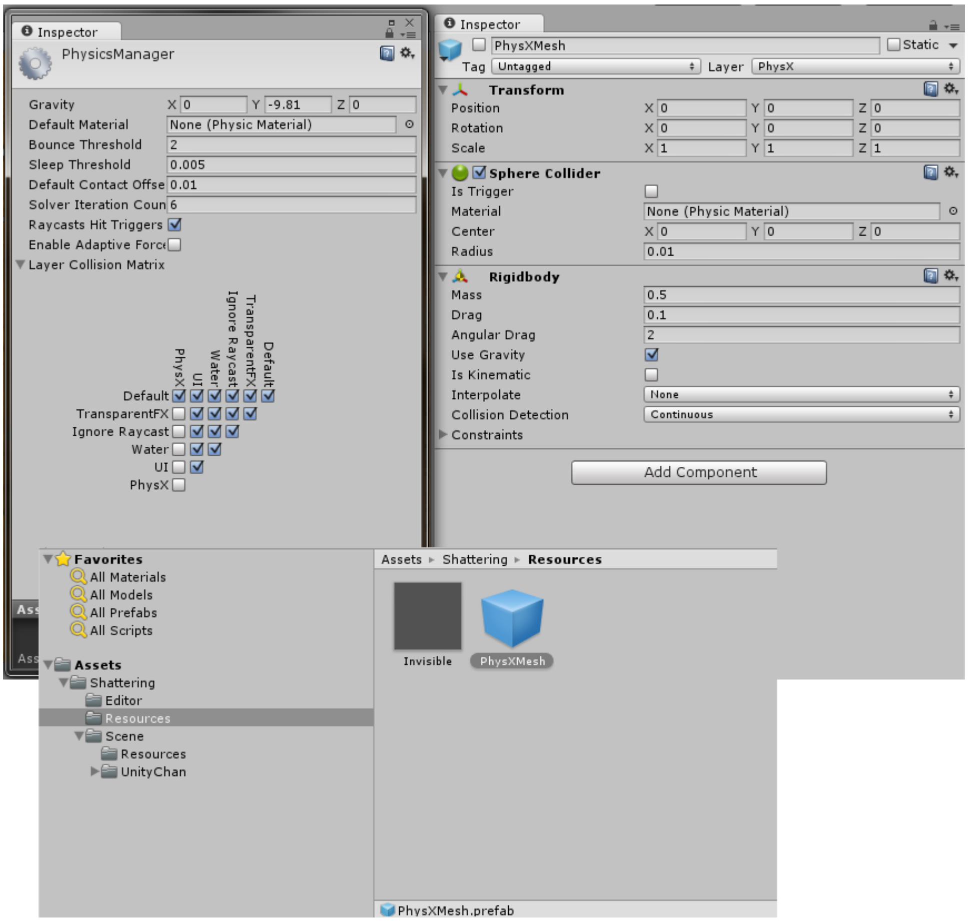
Since those rigidbodies are inactive before you call **Explode()** you could have to wait one frame before **Physics.OverlapSphere()** is able to collect them. To do so you can call Explode inside a coroutine and put "yield return new WaitForFixedUpdate();" after Explode() and before overlapSphere.

The boolean Approximate Triangles Moves will show more triangle if activated but in certain cases their behaviour can be odd. If the floor isn't horizontal I advise to uncheck this box.

PhysXMesh :

You may have to set the layer of this gameobject to avoid conflicts with other colliders. Don't forget to set the collisions you want or don't want in the Physics Manager (Edit>Project Settings>Physics).

The collision detection parameter of its rigidbody has been set to Continuous, the cost is heavier than Discrete but picking Discrete will let fall a lot of PhysXMesh across the floor during the destruction.
When those elements go through the floor it will move triangles incorrectly, if you want to avoid it and use Discrete you will have to uncheck the box "Approximate Triangles Moves" in the Shattering script inspector panel.



Inspector
PhysicsManager

Gravity X 0 Y -9.81 Z 0
Default Material None (Physic Material)
Bounce Threshold 2
Sleep Threshold 0.005
Default Contact Offse 0.01
Solver Iteration Coun 6
Raycasts Hit Triggers ☑
Enable Adaptive Forc ☐
Layer Collision Matrix

	PhysX	UI	Water	Ignore Raycast	TransparentFX	Default
Default	☑	☑	☑	☑	☑	☑
TransparentFX	☐	☑	☑	☑	☑	
Ignore Raycast	☐	☑	☑	☑		
Water	☐	☑	☑			
UI	☐	☑				
PhysX	☐					

Inspector
☐ PhysXMesh ☐ Static
Tag Untagged Layer PhysX

Transform
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

☑ Sphere Collider
Is Trigger ☐
Material None (Physic Material)
Center X 0 Y 0 Z 0
Radius 0.01

Rigidbody
Mass 0.5
Drag 0.1
Angular Drag 2
Use Gravity ☑
Is Kinematic ☐
Interpolate None
Collision Detection Continuous
Constraints