Component: Trampoline

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Introduction

The trampoline is a fun and bouncy object. Reminds me of bouncing into the floating apple boxes in the original Crash Bandicoot.

Fig. 1: A Crash Bandicoot bouncy box.

Usage

To add the trampoline to a Unity project as a git submodule, perform the following steps:

1. git clone https://github.com/itcgames/RWM1920-C00220868.git
2. Navigate to and open:
   RWM1920-C00220868\Unity Technologies\Demo\SampleScene.unity
3. Click Play in unity
4. OR navigate to and copy:

5. RWM1920-C00220868\Unity Technologies\Assets\Prefabs\Trampoline.prefab along with everything in RWM1920-C00220868\Unity Technologies\Assets\Texture, RWM1920-C00220868\Unity Technologies\Assets\Sounds\bounce.wav*,* RWM1920-C00220868\Unity Technologies\Assets\Scripts AND RWM1920-C00220868\Unity Technologies\Assets\Tests …….. to *your own project*
6. Drag the prefab into your 2D unity game

Once you have added the trampoline, you can use it as follows:

1. Drop objects on top of it
2. See and hear it bounce objects into the air
3. After three bounces the trampoline will break.
4. This trampoline **should** be used when you need a simple but effective and convincing bounce in two dimensions
5. This trampoline should **not** be used when you need a more complex trampoline to work in three dimensions or work differently under different weighted objects etc

You can customize its look and feel as follows:

- Similarly to below the look and feel can be customised like the behavior through the code and variables which would change the animation, elasticity etc
- But more than that the entire texture, sound, shader and more could be changed within unity to suit your needs.
- I even had two different looks to the trampoline, one for P2 designed by Wexford student and one for my own P1 retrofitted to match the Crash Bandicoot one - much easier to animate.

You can customize its behaviour as follows:

- Through the public user variables which can be edited directly through unity. E.g bounceAmount value.
- Through editing the Bounce.cs script you can easily tweak even more things like the amount of bounces it takes to break, the speed and look of the animation and even more behavior changes to suit your needs.

Features

Feature #1: Basic Trampoline Functionality [30 points]

Basic trampoline functionality:

- The trampoline can be spawned at some position.
- Objects will bounce into the air on collision (some physics here)
- Elasticity of the trampoline's surface can be adjusted.

If you want an object to bounce on this trampoline you simply need to ensure the object collides with it along the top side of the trampoline, collisions on other sides will not bounce. For example if you want to use trampoline with your playable character:

```
fun jump() {
    if (`jump button pressed`) {
        // move left/right to align bottom of player with trampoline top
    }
}
```

Now to spawn the trampoline simply create a game object from the prefab and drag to position it in your scene. Then the elasticity can be adjusted in unity itself by adjusting the public attribute or through code if you prefer and then this data could be private like so:

```
private float bounceAmount = 999.0f;
```

Source Code: Bounce.cs
Test Code: BounceTest.cs
Video Capture: https://www.youtube.com/watch?v=wmlxjD9CFig
JIRA: http://jira.itcarlow.ie:8080/browse/RWM2-45

Feature #2: Trampoline Animation [25 points]

The trampoline animation...

- The surface of the trampoline will react appropriately.

The trampoline will also go through a physical animation change upon bouncing. You will be able to see the trampoline sort of 'squish' down AND out for a fraction of a second then back to original shape, giving the illusion that it is actually a bouncy box.

```
fun changeAnimation() {
        animation.scale.y.decrement()
        animation.scale.x.increment()
        HangSystem('more or less time') // float value in seconds
        animation.scale.y.increment()
        animation.scale.x.decrement()
}
```

Source Code:
https://github.com/itcgames/RWM1920-C00220868/commit/02a07bdde6e79c2e8fdfd4410d667dba99bf2be2
Test Code:
https://github.com/itcgames/RWM1920-C00220868/commit/9bd6f1286a5293adee54cc4a4d8e5476f70dd48f
Video Capture: https://www.youtube.com/watch?v=wmlxjD9CFig
JIRA: http://jira.itcarlow.ie:8080/browse/RWM2-209

Feature #3: Sound Effects [20 points]

The sound effects...

- The surface of the trampoline will make an appropriate sound.
- The sound can be exaggerated.

Similarly, the trampoline will have some kind of bounce sound that is played along with the bounce script and animation code. This really ties things together and the trampoline starts to feel like a cohesive component.
The sound can then be exaggerated through unity editing of the pitch, volume sliders etc OR through editing the code in a way that the sound would play for longer etc. Also the sound file could be copied and directly edited to be elongated etc.

```
fun useSound() {
    if (`change sound source`) {
        if (!newAudioSource.isLoaded())
            audioSource.Load(newAudioSource)
        audioSource.Play()
    if (`sound is too short`) {
            audioSource.IncreaseLength(`new sounds length to stretch to`)
      }
}
```

Source Code:

- https://github.com/itcgames/RWM1920-C00220868/commit/5f42a37390eddde1ca0917fcdee7aaac2c765d21
- https://github.com/itcgames/RWM1920-C00220868/commit/c72e73f13c448912f083f327e0f54395fd8c3d15

Test Code:
https://github.com/itcgames/RWM1920-C00220868/commit/9bd6f1286a5293adee54cc4a4d8e5476f70dd48f
Video Capture: https://www.youtube.com/watch?v=wmlxjD9CFig
JIRA: http://jira.itcarlow.ie:8080/browse/RWM2-213

Feature #4 : Breakable [25 points]

The trampoline can break...

- The trampoline's surface can visually tear after some number of bounces
- The trampoline's elasticity can stop working after some number of bounces

Finally I decided on three as the number of bounces which the trampoline can take before tearing and breaking. After three bounces from any object the trampoline appearance will now have the addition of a giant black tear all the way down it. At this point the functionality of the trampoline including bounce, animation and sound are all disabled and the trampoline has been broken.

```
fun break() {
    if (`bounce`) {
        if (countBounces() == 3)
          swapTextures()
          disableBounceScript()
```

Source Code:
https://github.com/itcgames/RWM1920-C00220868/commit/d3ebf89188ed9b07ca56ea1293ec5ff28683616b
Test Code:
https://github.com/itcgames/RWM1920-C00220868/commit/9bd6f1286a5293adee54cc4a4d8e5476f70dd48f
Video Capture: https://www.youtube.com/watch?v=wmlxjD9CFig
JIRA: http://jira.itcarlow.ie:8080/browse/RWM2-215