

# BENDING GRASS

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# 1 - Introduction

## 1.1 What is this?

This is a very simple Unity package that makes the grass in your games react to dynamic objects. It's designed to work with Unity's default detail and terrain system, with few setup steps. We were using a basic version of this system in an actual game, but sadly the project was interrupted. So I decided to improve this a little bit and submit it to the asset store.

**Note:** since performing precise calculations on grass might be very performance expensive, this is just an approximation of grass simulation, it's not meant to be 100% accurate.

Also, mobile is not officially supported. I don't think you can get decent framerates. You can still experiment with it if you want.

**You need at least Unity 2017**, in order to use this package.

## 1.2 Why?

Unity's grass is nice, but sometimes you may want some more interaction with the environment, to improve player's immersion or gaming experience.

A little rabbit running in tall grass, a big helicopter landing in the meadow, or just your character walking. All those things will probably feel much better in dynamic grass.

## 1.3 Features

As I already said, it allows your GameObject to interact with the standard Unity grass (it doesn't matter if it's an already painted terrain or not).

The package is really small. There are 2 main components : GrassBender and PermanentBendingVolume.

It comes with an example scene with a terrain and some benders.

## 2 - Components

### 2.1 Vertex Bending

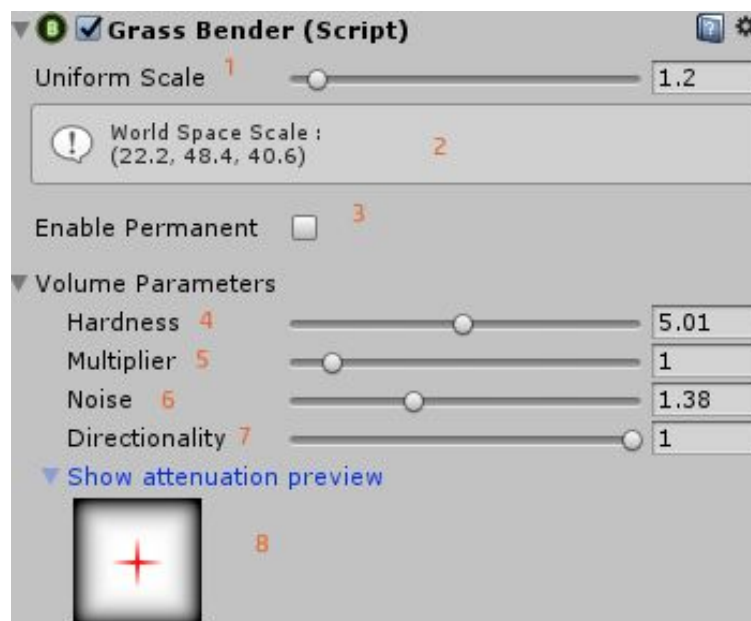
It's one of the two modes supported. The grass vertex shader will calculate the appropriate bend. This alone works fine most of the time, and has no limit on the number of terrains supported. Vertex Bending is on by default, and you only need GrassBenders to make it work.

### 2.2 Permanent Bending

It's the other mode supported, it will track the grass bending changes and eventually permanent flattening some chunks of grass, if needed. To enable this mode you need a PermanentBendingVolume.

### 2.3 GrassBender

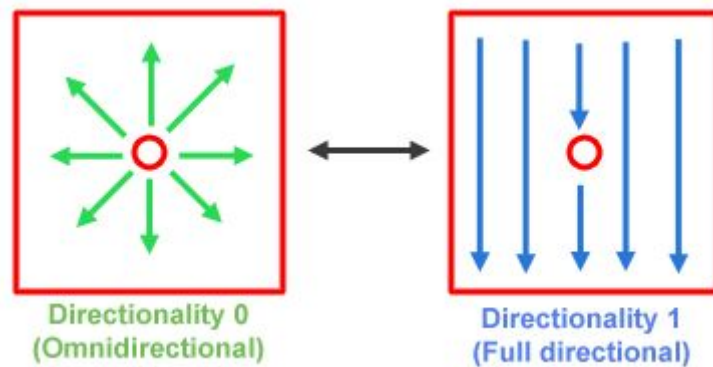
This is basically 80% of what you will need. It's a script that you attach to a GameObject and it define the properties of that specific object. If Unity correctly imports the package, you should see your grass interact with that object as soon as you attach the script to it (only vertex bending). You can create it in the Create>BendinGrass menu too, with various presets.



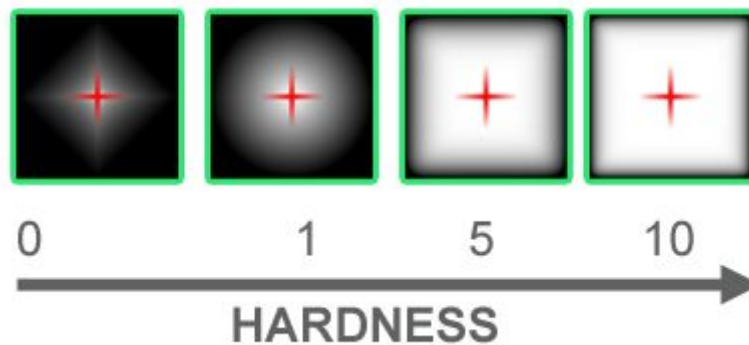
1. **Uniform Scale:** It's just a scale multiplier, useful if you wanna avoid child transforms.
2. **Info box:** Shows some additional informations.
3. **Enable Permanent:** Will this object be a part of the Permanent Bending simulation?

- 4. **Hardness:** Basically the shape of this volume.
- 5. **Multiplier:** Just a total value multiplier.
- 6. **Noise:** Add some noise in this volume.
- 7. **Directionality:** Will this bender push in all the directions or just one (local z-axis)?
- 8. **Attenuation preview:** To better understand the bender parameters, an image will be generated in the editor, based on 4,5 and 6 parameters. The red cross is the center of the object and the white area is the bending intensity.

#### DIRECTIONALITY



#### HARDNESS



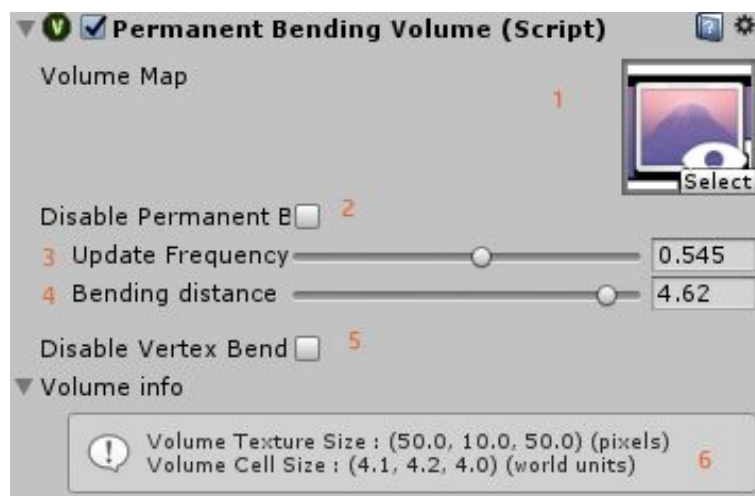
For more info on the attenuation function : [Attenuation Curve](#)

## 2.4 PermanentBendingVolume

It's not needed if you want to use only the Vertex Bending, but you will need it for the Permanent Bending.

Make sure to that this volume contains all the scene parts that need permanent bending.

**IMPORTANT! At the moment, only 1 volume is supported. Multiple ones will probably come in the future.**



1. **Volume Map:** You have to assign a CustomRenderTexture on this slot.
2. **Disable Permanent Bending:** Pretty self-explaining.
3. **Update Frequency:** How often the volumetric map will be updated (*0 is never, 1 every frame*).
4. **Bending distance:** Since the shader does not know how tall is your grass, you have to set the max bending distance here.
5. **Disable Vertex Bending:** Self-explaining.
6. **Volume Info:** Display some additional informations.

## 3 - Setup

### 3.1 Download

Obviously, the first thing to do is to download the package from the Asset Store and import it. Always check for eventually console warnings.

### 3.2 Setup your scene

Attach a *GrassBender* scripts to the objects you want to interact with grass. Change the parameters of the scripts as you prefer ([read more](#)).

#### **Permanent bending:**

Create a new GameObject, attach a *PermanentBendingVolume* script to it. Scale this object to encapsulate all the volume you need (usually the whole level). Notice that it shows some of the voxels cube (1 row of each axis), so you can have an see the voxel size. Those cubes will store the informations about permanent bending, so make sure you use an appropriate size (smaller cubes are more accurate, but more expensive to compute).

You will have to adjust the 3D CustomRenderTexture resolution to adjust the voxels size, or use the inspector button, that does it for you.

### 3.3 That's it!

Yeah, that's it, you don't really need anything else to setup to make it work. However, you will probably need to play around with parameters to achieve the best results.

### 3.4 Tips

- For characters, you may want to use a child transform with the z-axis pointed down and medium directional value.
- For better looking results on characters, is usually better to scale the benders a little bit more than the model.
- Disable permanent bending for benders with Multiplier set to  $< 1.0$ .
- Ideally, the voxel cell size should be around half or a third of the smaller of your benders. It also should have the same size on every axis. This situation is not realistically possible in some cases, keep an eye on the performance too.



## 4 - Technical stuff

### 4.1 Vertex Bending

Vertex bending is entirely calculated in the vertex shader, so it will always be based on the bender-vertex distance. Similar to how the Unity windy grass works, the alpha color of the vertex will change the simulation (0.0 ignored - 1.0 fully affected).

It's on by default. The shader keyword to disable it is

**DISABLE\_GRASS\_VERTEX\_BEND**

### 4.2 Permanent Bending

Permanent bending use a texture to track the grass bending over the terrain. It's off by default, but you can enable it by placing a PermanentBendingVolume. If you activate it the PermanentBendingVolume will feed your GrassBenders to a compute shader, that will calculate the intensity and the direction for each voxel.

The shader keyword to enable is **GRASS\_PERMANENT\_BEND**

If you want to create a new CustomRenderTexture to assign to this component, it must be **point** filtering, **non sRGB**, **ARGB32**, **double buffered**, **3D**.

### 4.3 Grass Bender

Up to 64 are supported by default. One of the benders will work as the master (red one), and it will be the one who sends the data of the other benders to the grass shader. If you disable, destroy or whatever the master a new one will be selected.

### 4.4 Resources and other important files

Grass settings (the one you can edit in the GrassSettings window) are stored in an asset in "**Resource/BendinGrass/Settings**" folder. This is because it may be useful in future updates, in case GrassSettings preset are needed. At the moment it's not that useful because there are very few parameters.

There is another CustomRenderTexture file in "**Resource/BendinGrass/Preview**" that is used to render the editor preview of the GrassBenders. Currently creating a CustomRenderTexture from script makes the editor crash. This file is going away as soon as the bug is fixed or i figure out a workaround for that. Same thing for the VolumeMap 3D texture.



## 4.5 Customization

I know my package isn't suitable for all kind of games, as it was designed for a particular type of game. However, often you can solve this problem just by changing the code a little bit. You can customize or use part of this package as you want (for example creating new shaders based on BendinGrass / changing the scripts), but just for your own personal use. Please do not resell or redistribute anything that includes this package.

# 5 - Support

## 5.1 FAQ:

**Q:** The grass shader it's not working right after importing it.

**A:** Restart the Unity editor to load the new grass shader.

**Q:** Only vertex bending is working.

**A:** Check that you have a PermanentVolumeBending in your scene, and it's big enough to contains everything you need. Also, make sure permanent mode is enabled on both the GrassSettings window and PermanentVolumeBending GameObject.

**Q:** Objects too small don't work properly.

**A:** Sadly, you can do nothing about this. Just enlarge the bender. Your bender volume has to contain the grass vertex in order to move it.

(I will add here some more FAQs)

## 5.2 Contacts:

Read the documentation and FAQs before asking for help, usually it contains everything you need.

If for some reason you can't make it work properly, you can contact me:

Discord : <https://discord.gg/WhHSPfy>

Email : [rompipapera@gmail.com](mailto:rompipapera@gmail.com)

If you want to suggest something you'd like to see in the package, you can suggest it here : <https://discord.gg/QrgT4NG>

BendinGrass is a relatively new package, so there will be some bugs.

If you find a bug, please report it by email or discord channel :

<https://discord.gg/mRcuHcY>