Bullet Balistics - Documentation

Overview

Ballistic Settings (editor Window):

- Ballistic Quality:
  - Bulletdrop: are the bulltes affected by gravity?
  - Bulletdrag: are the bullets affected by air resistance and wind?
  - Ballistic Materials: will the bullets use the 'BallisticMaterial'-system on impacts?
- Drag Settings:
  - Air Density: density of the ingame air
  - Wind Direction: a Vector3 that defines the direction and strength of the wind
- Material Settings:
  - Name: preview name of the material
  - Energyloss Per Unit: the energy a bullet looses when traveling through 1 unit of this material
  - Spreadangle: spreadangle when the bullet leaves the material
  - Spreadanlge: spreadangle when the bullet is ricochet by the material (ricochet)
  - Ricochet Propability: this curve defines for each impactangle (90°-0° → 0-1) the propability (0%-100% → 0–1) of a bullet being ricochet
  - Impact Game Object: GameObject that is being instantiated on the impact with this material with a script attached that inherites from 'ImpactObject'

Ballistics Manager (editor window):

- Ballistics Settings: Assign a 'BallisticsSettings' file, used for the calculations

Weapon (component):

- General Settings:
    - ◦ Visual Spawnpoint: the transform where the visual representation of the bullet is instantiated at
    - ◦ Bullet Spawnpoint: the transform where the bullet calculations begin
    - ◦ Lifetime of Bullet: the time the bullet automatically gets destroyed after
    - ◦ Muzzle Damage: the damage one bullet deals with maximum velocity
    - ◦ Hit Mask: a LayerMask defining with wich layers the bullet can collide
- Bullet:
    - ◦ BulletPrefab: the visual representation of the bullet (attached scripts should inherit from 'PoolingObject' and use 'ReAwake()' instead of 'Awake()' when trying to perform actions on bulletspawning
    - ◦ Bullet Speed: Muzzlespeed of the bullet in m/s
    - ◦ Random Speed: speed differences between bullets
    - ◦ Mass of Bullet: mass of each bullet in kg
    - ◦ Dragcoefficient: drag coefficient of the bullet for drag calculations. (https://en.wikipedia.org/wiki/Drag_coefficient)
    - ◦ Diameter: diameter of the bullet
- Zeroing:
    - ◦ Barrel Zerodistances: distances at wich zeroing corrections are being calculated

BulletHandler (component):

- Automatically added on gamestart if there is none in the scene already
- Settings:
  - Max Bullet Updates Per Frame:

    the maximal amount of bullets in the query that get processed each frame

    (to set a maximum cpu load if you have a **lot** of bullets in your game)
  - Visual To Real Bullet Movement Time:

    time it takes for the visual bullet to reach its 'physical' position calculated in the backgroun
  - Settings: reference to the BallisticSettings file

Falloff Map Generator (component)

- Attach this component to the camera that draws the scope / to an object at the position from where the camera will look through the scope
- General:
  - My Weapon: reference to the weapon you want to create the falloff map for
  - Gizmo Size: Size of the editor Gizmos
- Zeroing:
  - Scope Distance: the distance in +z-direction from this object, where the falloff map will be created (>0)
  - Barrel Positon: the relative offset of the bulletspawnpoint, represented by a circle-gizmo (you can move the gizmo approximately to the end of the barrel)
  - Texturesize: the size of the generated falloff texture
  - Scope Zeroings: the distances at wich zeroing-markings will be created

Ballistic Object

- contains ballistic material data
- use 'DefaulBallisticObject' or write your own scirpt, that inherites from 'Ballistic Object'
- 'BulletImpact(RayCastHit, BallisticObjectData)' is called by the BulletHandler when the object is hit

Impact Object

- abstract class you can inherit from
- 'Hit(BallisticObjectData, RayCastHit)' gets called by an 'BallisticObject' when it gets hit
- used to play sounds or particleSystems etc. on bullet hits

Setup

Here is a link to a video tutorial on how to set it up:

https://www.youtube.com/watch?v=F9VINJOlnpM

(keep in mind, that this tutorial was created for an older version of this package and some steps might have changed)

- open the 'Ballistics' → 'Ballistic Manager' Window
  - assign or create a new 'Ballistic Settings' -file, if there is not one already
- open the 'Ballistics' → 'Ballistics Settings' Window
  - change the settings to fit your purposes best
  - create your own Ballisticmaterials
- create an empty GameObject and attach a 'BulletHandler' component
  - the scripts are pretty optimized, but if you run into performance problems, you can turn down the 'Max Bullet Updates Per Second' (but you might loose some 'physical accuracy')
- add a 'Weapon' component to your weapon
  - assign the fields as explained above
- for first testing you can add a 'SimpleWeaponInput' and assign your 'Weapon' to it

hint: for example, if your 'maximal kinetic energy' equals 1000J and you have defined a ballisticmaterial with an 'Energyloss Per Unit' value of 990J you will be able to shoot through about 1 unit of this material when standing directly in front of it

Basic Weapon Controller

For an more advanced Weapon behavior you can use the 'Basic Weapon Controller'.

It gives you the possibility to use 'SingleShot', 'Full Auto', 'Brust' and 'Salve' weapons out of the box and also includes interfaces to use a 'SpreadController' and 'MagazineController' (as an example there is a 'DefaultSpreadController' and 'DefaultMagazineController' included)

On the 'Basic Weapon Controller' you have to call the 'Shoot', 'StopShoot' and 'Aim(bool)' methodes to controll shooting. Look inside the 'Basic Player Weapon Input' for an example how to set this up.

Access Weapon directly

Of course you also have the possibility to write a weaponcontroller completely by yourself, if the included one does not fit your purposes.

In order to fire your weapon you only have to call the 'ShootBullet(Vector3 direction)' on your weapon. The 'direction' parameter gives the direction the bullet will be fired in.

The rest will be taken care of by the 'BulletHandler'.

If you should have any problems, bugs, suggestions or questions please contact me:

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Best regards,

Christian