PhysKit: Ballistics

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Ballistics API: PhysKit:
Ballistics offers an easy-to-use Ballistics API that enables developers to perform 2D or 3D calculations, determine flight time, perform ray casting for collision detection, and more. The API goes beyond simple parabolic trajectory calculations and allows developers to dictate arc height and flight speed. The API returns initial velocity and gravity to meet the desired flight path as a physically simulated object, enabling developers to meet the demands of design teams, whether or not those demands conform to traditional physics.

Trick Shot component:
The Trick Shot component is an easy-to-use feature that can be added to a GameObject for predicting the path of a projectile, launching it, and managing it along its path with standard collision detection. With this component, developers can ensure that the path is followed while also handling moving objects. This feature is perfect for puzzle games featuring a shooting mechanic.

Path Line tool:
The Path Line tool extends the Trick Shot component to draw the predicted path with a standard Unity Line Renderer suitable for both 3D and 2D paths. This tool allows developers to visualize the predicted trajectory of the projectile, making it easier to fine-tune the path. The Path Line tool is an ideal tool for both novice and experienced developers, who can benefit from its ability to create custom trajectories quickly and easily.

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API

Learn more on this topic in the Heathen Knowledge Base

The namespace HeathenEngineering.PhysKit.API contains the Ballistics static class. This class provides the following methods.

Note every method has a 2D alternative for use with 2D Physics.

Solution

This has 4 main versions taking different inputs depending on what information you have available to you you may choose to use any of these and get the same accurate results.

For example if you know the start, end and projectile speed our solution will return back the quaternion rotation for both the high and low attack angle required to hit the target if any solution is available.

A more common need in fantasy games in particular is to find the speed and gravity to apply to a projectile to meet a defined arc hight and travel time, we have a solution method you can call for that as well.

In addition we have a “Time on Target” style solution that will find the launch velocity of a projectile to hit the target at the designated time. In all cases the method is simply called “Solution” and has different inputs and outputs to meet your needs whatever they are.

Raycast and Sphere/Circle cast

The Ballistics API can perform a raycast or Sphere (3D) or Circle (2D) cast given projectile and target data. This can be used to predict flight paths and detect collisions and the resulting data can be used to draw these paths.

Components

These are scripts that can be attached to GameObjects for quick and easy use. They all use the Ballistics API to do what they do so anything you see here can be done without the need of a GameObject in the case your working with DOTs or some other structure.

Trick Shot

The Trick Shot tool uses Sphere or Circle cast to predict trajectory optionally with several bounces planned as well. The tool can be used to “Shoot” a projectile and will ensure that projectile follows the path as defined e.g. deterministic.

This system will account for dynamic collisions caused by moving objects in the world and will report OnCollisionEnter messages just like any other physical object. At the end of the planned path the object can be let go to resume normal Dynamic movement.

Trick Shot Line

The Trick Shot line component can be added to a Trick Shot GameObject to cause the predicted path to be drawn by a standard Unity Line Renderer. This is demonstrated in our 3D and 2D sample scenes.