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Easy Physics Chains Asset Package

Readme and Quick Start Guide

June 3rd, 2020

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1 | About this package

This package contains everything you need to generate linked chains of objects constrained by Unity's physics system. The goal of the system is to provide a convenient package for level designers, artists and developers to create realistic chain-like objects in their Unity scene.

The package comes with everything you need to get started, but please note that the models used in the chain as well as the sound effects provided can and should be customized or replaced to fit your needs.

We hope this asset helps you maximize your creative vision while minimizing your technical burdens. To that end, feel free to email us at studio@norcat.org if you have any questions or issues.

Good luck, and have fun!

2 | Getting Started

For a full-yet minimal example (We hate bloated Unity store assets too!) please see the **Example/PhysicsChainExample scene** that comes with this package. There you will find an empty scene with a single pre-generated chain. Feel free to experiment here and learn how the system works.

If you'd like to take things into your own hands and start creating chains in your own scene, then simply follow the following quick steps:

- **Create a new Game Object in your scene**
- **Add the Chain Generator component to your object**
- **Set the "Chain Link Prefab" to the included "ChainLink Simple"**
- **Push the "Generate Chain" button**

Done! You should now have a fully simulated physics chain.

From here, you will likely want to modify how the chain looks, as well as how it behaves. We have included plenty of options in the inspector to help you accomplish just that. These options are detailed in the "Inspector Properties" section.

In addition: **Please pay attention to all warnings present in the bottom of the inspector.**

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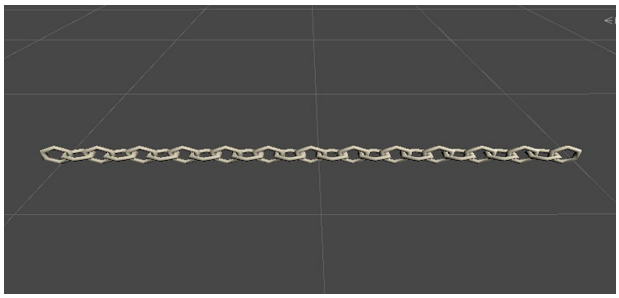
3 | Adding Slack at Generation

One feature of Easy Physics Chains is the ability to easily add slack to a chain while keeping it fixed at both ends.



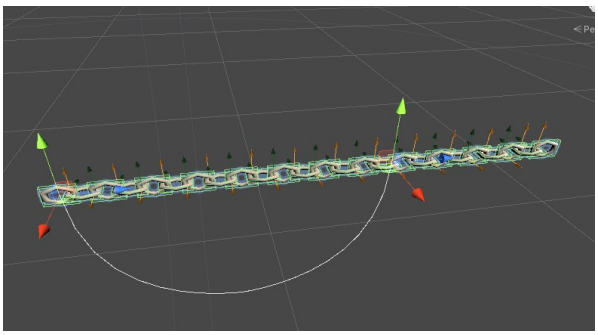
Chain Generated with no slack

Chain, fixed at both ends, with slack.

In this case the chain will continue to be simulated as normal but will start fixed in place at both ends. If the end point that the chain is fixed to causes slack to be formed, the chain will be generated with that extra slack represented. This not only looks good but prevents Unity from creating physics instabilities as it attempts to solve an impossible system.

To generate your chain with slack while keeping it attached at two ends:

- **Check off the "Attach End of Chain" checkbox on a Chain Generator component.**
- **A second Transform handle will appear. Move this around in the editor to determine the endpoint position**
- **The white line in the scene view represents the path the chain will take.**
- **When you are happy with the result, press the "Generate Chain" button and watch the magic.**



The process of starting a chain with slack

4 | Dynamic Sound FX

Easy Physics Chains also includes the ability to add sound to your generated chains. These sound effects will automatically play when an object collides with the chain links. This allows for a fairly dynamic system that we hope you'll find works quite well at bringing your chains to life.

To add dynamic sound to your chain, check off **"Use Sound Effects"** and include at least one **"Random Chain Sound"**.

Also ensure that you re-generate your chain. Upon generation, your chain will be setup for sound effect generation.

From here, you may feel free to modify the generated Audio Source (in the "Chain Audio" game object) to configure the sound settings as you see fit using Unity's inbuilt audio system.

Please see the "Inspector Properties" section for details on how to configure your dynamic sound.

5 | Performance Notes

Simulating links of objects is a very performance intensive task, and thus as you add more links to your chain, you may notice your framerate begin to drop, or worse yet, your physics system is unable to keep up and exploding into a fiery mess of flying, tangled chain links and chaos.

We hope at a later date to support newer physics implementations such as Unity's DOTs physics or Havok, however at this time we must simply ask users to consider using fewer chain links, or perhaps consider removing the dynamic audio component.

Additionally, as you increase your link count, you may notice a warning:

This occurs if the number of chain links would create a physics system that can't be simulated in the current physics timestep. **You will either need to decrease your timestep as directed (Which will also decrease your performance) or use fewer links.**

At this time, we cannot promise this asset will work well/at all on mobile. We apologize for this limitation.

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6 | Inspector Properties

- **Chain Link Prefab**
  The game object to instantiate for each link.
  This is typically a prefab that includes the model of the chain link. It should be aligned such that its forward (blue axis) points in the direction it should link. Please see the included prefab ChainLink_Simple for an example.

- **Number of Links in Chain**
  The number of links in the chain. Increase to create a bigger chain.
  The larger this number, the bigger the chain. However, be cautious as chains can be very difficult to simulate. Please see the performance note above. A warning will be generated if your current physics settings cannot support the number of links.

- **Space Between Links**
  The amount of space between each chain link, in Unity's world units.
  The default is setup so that a chain generated as a root object using the ChainLink_Simple prefab will look correct. You will need to increase or decrease this to fit with your chain model.

- **Space Between Links**
  The amount of angular drag to apply to each chain link.
  In general, a larger number results in a slower and stiffer chain. Lower values are more appropriate for smaller chains or rope simulation.

- **Space Between Links**
  If true, both the start of the chain and the end of the chain will be frozen in space.
  This also enables the second transform handle, which you can use to position the end point in space. If the endpoint creates an impossible configuration, it is either constrained or slack is added to the chain's path.

- **Space Between Links**
  If on, the chain will be generated with dynamic sound effects that play when a chain link has a collision. This comes at some performance cost.

- **Space Between Links**
  Used to limit the performance cost of dynamic audio.
  At 100% every chain link will be simulated with dynamic audio. If at 25%, only one in four links are simulated with audio.

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7 | Common Bugs FAQ

- **When I start the game, my chain just flies apart!**
  Please make sure your physics timestep is set to a low enough number to simulate the chain. In addition, make sure that your chain is not forced to move to an impossible configuration either through outside forces, or by needing to start in a collision.

  My custom chain prefab moves as slow as molasses!
  This usually happens either because there is too much drag applied, or your custom prefab does not include a collider. Please make sure your prefab has at least one collider present.

  When I generate a chain it appears elsewhere. Help!
  Make sure your chain generator is a root object, and not a child of another game object.

- **I have checked off "Attach chain end" but I don't see the second handle.**
  Please ensure that your gizmo settings are enabled and include "Handles"

- **The audio from collisions sounds choppy and gets cuts out.**
  Usually this happens when too many collision sounds are playing at the same time. Consider lowering the percent of links with sound effects to the 20-30% range.

- **I don't see the white line that shows where my chain will be generated.**
  Please ensure that your gizmos are enabled in the scene view.

8 | Support and Questions

For all questions, feature requests, error reports, or even just to send a copy of your favorite recipe, please contact us at:

Studio Norcat
studio@norcat.org