

Hand Physics Controller documentation

Overview

Main part of this asset is the several components which are:

- **Hand Physics Controller**

Responds for physics simulation and objects picking. Also receives input values for forearm movement and rotation, wrist rotation and fingers bending.

Variables

Forearm	Forearm movement and rotation configuration. Movement is controlled by velocity and rotation is controlled by Configurable Joint attached to Forearm bone. * Fix Axis allows to hold position and prevent from falling at specified axis while heavy object is holding * Position Limits allows to specify limits so forearm will never be outside of specified bounds
Wrist	Wrist rotation configuration. Rotation is controlled by Configurable Joint component attached to Wrist bone
Fingers	Fingers rotation configuration. Fingers rotation is controlled by changing transform directly
Parts	Links to all hand parts
DrawGizmos	If enabled, Position Limits and hand bones connections will be visualized in Editor

Public properties

IsForearmMoving	Returns true while MoveForearm is currently called by input manager
IsForearmRotating	Returns true while RotateForearm is currently called by input manager
IsWristRotating	Returns true while RotateWrist is currently called by input manager
AttachedObject	Returns Rigidbody which is currently holding by hand and has Attached Object component. Otherwise returns null

Public functions

UpdatePositionLimits	Call it when you need to apply position limits configuration during runtime
MoveForearm	Moves forearm at specified direction
RotateForearm	Rotates forearm around joint X axis by input value
RotateWrist	Rotates wrist around joint X axis by input value
StartBendFingers	Starts bending all fingers
StopBendFingers	Stops bending all fingers

StartBendFinger	Starts bending specified finger
StopBendFinger	Stops bending specified finger

Messages

OnObjectTouched	Called each time when any finger part collides with Non-kinematic Rigidbody
OnObjectAttached	Called when Rigidbody is attached to hand via fixed joint. Returns Rigidbody with AttachedObject component
OnObjectDetached	Called after attached object being detached or destroyed

- **Hand Part**

Attached to Wrist and Forearm bones as hand parts

- **Finger**

Attached to each first finger bone and responds for controlling finger parts

- **Finger Part**

Attached to each finger bone and responds for bending / unbending. Also have several useful properties like **RotationValue**, **IsRotating**, **IsTouchingAnyObject** and **TouchingObjects**.

- **Finger Part Trigger**

Attached as child object to each finger bone and responds for sending collision events to finger parts

Tips

- You may adapt hand size by simply scaling the whole prefab or Forearm bone. Do not use negative scale values so it may cause unexpected physics behavior.
- You may change the mass of Forearm and Wrist bones to adapt it to other object on the scene.
- You may change Forearm and Wrist bones Joints configuration as you like instead of changing axis vector
- You may use other type of collider attached to all hand parts

Q&A

Can I use my own hand model?

If you want to make your own hand model you should first look at **Hand_left** and **Hand_right** models from *HandPhysicsController/Models* folder. Depending on which type of hand you need to replace, open one of these FBX models in your 3D modelling software and simply remove the mesh. Create your own mesh based on each bone position and skin it. Now you can import newly created model in your project and reference to it in **Skinned Mesh Renderer**.

Why hand is too twitchy?

Cause hand is not fully driven by physics. Reducing **Fixed Timestep** value in Project Settings / Time may reduce twitching.