

# PuppetMaster Release Notes

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## Version 0.81

### Improvements

1. Added support for having Physics.autoSimulation disabled and updating PuppetMaster together with Physics.Simulate().

### Fixes

1. When BehaviourPuppet activates with PuppetMaster pin weight less than 1, will set to unpinned state.
2. Fixed puppets losing balance immediately on respawn.
3. Fixed prefab error with setting up puppets in Unity 2018.3.

## Version 0.8

### Improvements

2. Demo character can double-jump now.
3. Added OnCollision delegate to BehaviourPuppet to enable you to get collision event calls from the muscles even if those collisions have not resulted in a loss of pinning for the puppet.
4. Added PuppetMaster.Rebuild() to patch up puppets that have any number of their muscles removed.
5. Support for adding muscles to puppets in Kinematic mode.
6. Updated Ootii's Third Person Motion Controller integration package to version 2.73.
7. Updated Invector's Third Person Controller integration package (Basic Locomotion FREE v1.0c).
8. Added Opsive's Third Person Controller v1.3.10 integration package.
9. Added the "NavMesh" demo about how Puppets can be used with Unity Navigation and a custom navigator.
10. Added the "NavMeshAgent" demo about how Puppets can be used with NavMeshAgents.
11. Added a VR Boxing demo scene for Oculus (find it under Plugins/RootMotion/PuppetMaster/\_Integration).
12. Added Rigidbody flight prediction methods to PhysXTools.

### Fixes

4. Props can be created by script in runtime now.
5. Fixed dropping props in Disabled mode.
6. AnimationBlocker will be removed from the target when detached muscles are reattached.
7. Fixed a bug that did not set joint x/y/zMotion to locked again when a detached muscle was reattached.
8. Sometimes Unity raycasting can out a NaN value for RaycastHit.point. Added protective measures to prevent BehaviourPuppet from moving the puppet to a NaN position when it gets up.
9. Fixed mapping problems when PuppetMaster's "Pin Weight" is less than 1 and BehaviourPuppet is in "Unmapped" mode.
10. Fixed the board flipping in X-Boarding demo in Unity versions 2017 and later.

## Version 0.71

### Fixes

11. Fixed a puppet velocity bug when switching to BehaviourFall.

## Version 0.7

### Upgrade Guide

1. **MAKE A BACKUP!** Open a new scene, delete “Plugins/RootMotion” and reimport. Also reimport Final-IK if you had that in your project.
2. If you were using any of the integration packages, reimport them from “Plugins/RootMotion/PuppetMaster/\_Integration”.

### Improvements

13. Reworked the puppet teleporting/resetting code, deprecated BehaviourPuppet.Reset, replaced it with PuppetMaster.Teleport(Vector3 position, Quaternion rotation, bool moveToTarget). That works with or without puppet behaviours and is much more reliable.
14. Added public static void AddFromToTorque(Rigidbody r, Quaternion toR, ForceMode forceMode) to PhysXTools.cs. Can be used to drive the rotation of a Rigidbody through AddTorque.
15. Improved BipedRagdollCreator invalid references handling.
16. Added an integration package for Invector’s Third Person Controller.
17. Added “Ragdoll Aiming” demo to the Final-IK integration package. Demonstrates how you can make a ragdoll keep aiming at a target.
18. Added the “X-Boarding” demo to help get started with all kinds of boarding games.
19. Added blocking functionality to CameraController.cs.
20. Updated the UNet integration package to be able to make the puppets collide with each other (move one of the puppets with WASD), also added the Fall behaviour to the puppets.

### Fixes

12. Fixed errors when calling BehaviourPuppet.SetState(BehaviourPuppet.State.Unpinned) from a collision event callback.

13. Fixed a bug with removing muscles by joint break force/torque.
14. Fixed a `NullReferenceException` when teleporting networked puppets.
15. Fixed the demo character controller rotation bug in Unity 2017.2.
16. Fixed velocity inheritance on BehaviourFall activation.
17. Updated UMA integration to support version 2.6.2.

## Version 0.6.1 - 11.04.2017

### Upgrade Guide

3. **MAKE A BACKUP!** Open a new scene, delete “Plugins/RootMotion” and reimport. Also reimport Final-IK if you had that in your project.
4. If you were using any of the integration packages, reimport them from “Plugins/RootMotion/PuppetMaster/\_Integration”.

### Improvements

21. Significantly improved the accuracy at which puppets are able to follow the target animation, puppets will not fall behind as much if the character controller is moving fast.
22. Removed muscle.offset to improve performance and stability.
23. When Puppets are created, “Map Position” will be set true for all leg/foot muscles to improve mapping quality.
24. Animated momentum will be transferred to the rigidbodies when switching from Kinematic to Active mode. Will enable you to set state to Dead immediately from Kinematic mode and still preserve animated momentum.
25. Added “Collision Threshold” to the Collision Resistance Multipliers so you could override “Collision Threshold” for specific layers.
26. Added the “Scaling” demo scene and PuppetScaling.cs script.
27. Improved puppet behaviour activation. If all behaviours are enabled, will start with BehaviourPuppet. If not, will start with the enabled behaviour instead of forcing BehaviourPuppet. If all behaviours are disabled, will not force activation.
28. Added “Pin Weight Threshold” to BehaviourPuppet. If a muscle has drifted farther than ‘Knock Out Distance’, will only unpin the puppet if it’s pin weight is less than this value. Lowering this value will make puppets less likely to lose balance on minor collisions.
29. Added “Unpinned Muscle Knockout” to BehaviourPuppet. If false, will not unbalance the puppet by muscles that have their pin weight set to 0 in PuppetMaster muscle settings.

### Fixes

18. Trigger colliders on muscles will not be added to PuppetMaster collider management.
19. Fixed a bug that killed the velocity of the puppet when set to Dead state when more than 1 FixedUpdate called per frame.
20. Fixed a bug with BehaviourPuppet’s “Collision Threshold” not working with collision resistance multipliers.
21. OnCollisionImpulse is also called for collisions with impulse below “Collision Threshold”.
22. Fixed editor script obsolete API warnings in Unity 5.6.

## Version 0.6 - 07.03.2016

### Upgrade Guide

5. **MAKE A BACKUP!** Open a new scene, delete the previous version and reimport
6. Collision Resistance value may have to be tweaked, especially when you have puppets of various mass (see Fix no 2).

### Improvements

30. Improved the performance and reliability of blending from ragdoll to getting up.
31. Added "Force Layers" toggle to Props. Disabling will make PM not force the prop's layers to match the puppet's when it is picked up.
32. Added BehaviourBipedStagger and "Stagger" demo to the Final-IK integration package.
33. Added PhysXTools.cs, a helper for calculating forces, torques, inertia tensors and such.
34. Added PressureSensor.cs, can be used for detecting if a Rigidbody is in contact with anything and determining that collision's center of pressure.
35. BehaviourPuppet will not force muscle.state.immunity or impulseMlp to any values unless Boosters are used, so those values can be manipulated directly if necessary.
36. New and cleaner default values for BehaviourPuppet. See the "Puppet" and "Puppet (with Fall)" prefabs.
37. Added PuppetMasterHumanoidConfig ScriptableObject and the "Humanoid Config" demo scene. This enables you to easily share PuppetMaster properties, including individual muscle props between humanoid puppets.
38. Added maxRigidbodyVelocity to BehaviourPuppet to prevent ragdolls shooting off to space when the character controller goes through supernatural acceleration (starting to jump or changing direction fast) and the puppet collides with something and gets unpinned at that time.

### Fixes

23. Fixed a null reference error with target mapped state when an object was removed from target hierarchy.
24. Muscle mass will be accounted for in collision damage calculations, which will make heavier puppets more resistant as expected.
25. Fixed a bug with multiple MuscleCollisionBroadcaster components added to the muscles.
26. Fixed a bug with Unity5.5 requiring using UnityEngine.Profiling to be added to PuppetMaster.



27. Puppets will always get up successfully if they have not collided with anything on the damage layers.
28. Fixed a bug that did not let puppet Rigidbodies sleep if mode was set to Dead.
29. Fixed hanging limbs infinitely dangling about when muscle weight set to 0 and muscle damper > 0.
30. Fixed SubBehaviourCOM Array out of range errors when muscles added to the puppet.

## Changes

1. BehaviourPuppet will unbalance if muscle state pinWeightMlp < 1 instead of 0.5. The old value caused puppets to not unbalance sometimes even if they drifted very far from their target.
2. BehaviourPuppet will unbalance if muscles that have their pin weight set to 0 drift past knock out distance from their targets.
3. Updated minimum supported Unity version to 5.3.6f1.

## Version 0.5 (13.10.2016)

### Upgrade Guide

7. **MAKE A BACKUP!** Open a new scene, delete the previous version and reimport.

### Improvements

39. Added the “Melee Grab” demo scene and Grab.cs to demonstrate grabbing other puppets.
40. Added “Blend Mapping Speed” to BehaviourFall to make it possible to edit the speed at which the behaviour will blend in mapping weight on activation.
41. Added PropRoot.DropImmediate() and a prop root swapping example using that to the “Prop” demo.
42. Joint breaks will automatically remove muscles from PuppetMaster.
43. Added “blockTargetAnimation” bool to PuppetMaster.RemoveMuscleRecursive(), that will block Mecanim from animating detached bones.
44. Added “removeMode” enum to PuppetMaster.RemoveMuscleRecursive(), that will enable you to choose between Sever, Explode and Numb options.
45. Added the “Remove Muscles” scene to demonstrate shooting of puppet body parts.

### Fixes

1. Fixed a bug with “Dead Muscle Weight” not applied when setting PuppetMaster.state to Dead for an unpinned puppet.
2. No more error when all muscles removed from PuppetMaster.
3. Fixes to muscle adding and removing.
4. PuppetMaster will not change the layer of props anymore when they are picked up.

## Version 0.4 - (20.06.2016)

### Upgrade Guide

8. **MAKE A BACKUP!** Open a new scene, delete the previous version and reimport.

### Improvements

46. Added the Goblin Archer (2.5D Puppet) integration package to "Plugins/RootMotion/PuppetMaster/\_Integration". Import the free "Goblin Archer Cartoon Character" [package](#) from the Asset Store.
47. Added "Puppet Respawnning" demo scene and Respawnning.cs demo script.
48. Removed BehaviourPuppet.muscleRelativeToPinWeight AnimationCurve. Use BehaviourPuppet.unpinnedMuscleWeightMlp instead for better performance and simplicity.
49. BehaviourPuppet and BehaviourFall can now be used in arbitrary gravity worlds.
50. Added the "Melee Spherical" demo scene.
51. Added the "Death Procedures" demo scene.
52. Added the "UNet" integration package.

### Fixes

5. Removed BehaviourPuppet.state from the Inspector, it was accidentally left editable there.
6. Fixed a bug with changing BehaviourPuppet.canGetUp while PuppetMaster.state was Dead.
7. Fixed bugs with deactivating/activating characters by parenting them to inactive hierarchies or calling SetActive(false).
8. Fixed bugs that broke PuppetMaster when state/mode switching was interrupted.
9. Fixed 1 frame flicker that might have occurred when Animator updateMode was set to AnimatePhysics and state was switched from Dead to Alive in a non-fixed frame.

## Version 0.3 (22.01.2016)

### Upgrade Guide

9. **MAKE A BACKUP!** Open a new scene, delete the previous version and reimport.
10. If you were using BehaviourPuppet.canActivate, you should set BehaviourPuppet.normalMode to "Kinematic".
11. If you were using BehaviourPuppet.mapOnlyOnContact, you should set BehaviourPuppet.normalMode to "Unmapped".
12. To get rid of multiple expensive SendMessage/ BroadcastMessage calls per frame, OnPuppetMasterRead, OnPuppetMasterWrite and OnPuppetMasterFixTransforms will not be called anymore. Use PuppetMaster.OnRead, PuppetMaster.OnWrite and PuppetMaster.OnFixTransforms delegates instead. See the IKBeforePhysics.cs and IKAfterPhysics.cs for reference. If you add any IK components to the Target hierarchy in runtime after PuppetMaster has initiated, you need to add them manually to the PuppetMaster.solvers generic list.
13. If you are using Final-IK, wait until Final-IK 1.3 becomes available (will be updated simultaneously) and import the latest Final-IK Bridge from the unitypackage in Plugins/RootMotion/PuppetMaster/\_Integration.
14. If your puppet starts sliding when getting up, set "Get Up Offset Prone" and "Get Up Offset Supine" to Vector3.zero in BehaviourPuppet.
15. If you have used the CharacterMeleeDemo character controller, change UserControlPuppet to UserControlMelee and assign the "Hit Key".

### Improvements

53. Created the first version of the [bridge between PM and UMA2](#). Import to a project with both PuppetMaster and UMA2.
54. Added a warning if Target position doesn't match with the PuppetMaster's position at initiation.
55. Added a warning if any of the muscle joint positions don't match with their target's positions (right-click on the PuppetMaster component's header and select "Fix Muscle Positions" to fix this issue).
56. Added a warning if mass variation between the ragdoll Rigidbodies is greater than 100.
57. Added a warning if one of the "Ground Layers" is included in the "Collision Layers" of BehaviourPuppet.
58. Added a warning if one of the ragdoll bones is on the same layer as the character controller.
59. Added a warning if one of the ragdoll bones is on a layer that is not set to ignore the character controller layer.

60. Improved blending from ragdoll to getting up. Puppets can now get up with much less `BehaviourPuppet.getUpKnockOutDistanceMlp`, increasing collision-reaction fidelity while getting up.
61. Considerably improved the performance and stability of `BehaviourPuppet`.
62. Named the “Muscle Group Overrides” in `BehaviourPuppet`’s Editor so the right one could be more easily found.
63. New larger header attributes (easier to read, especially when dealing with edited prefabs that have some fields in bold).
64. `BehaviourPuppet` will activate itself on initiation only if it is enabled at that time. That enables you to start from another behaviour such as `Fall` when you disable `BehaviourPuppet` in the Editor.
65. Added “Max Collisions” value for `BehaviourPuppet` as an optimisation. The behaviour will not process more collisions than this in each physics step.
66. Added the “LookAtIK” demo to the Final-IK Bridge.
67. Added the “AimIK” demo to the Final-IK Bridge.
68. The demo character models can now be replaced with any Humanoid character in the scene, fbx or ragdoll simply by going to the “Character Controller” gameobject, assigning a “Replace Character Model” and clicking on “Replace”.
69. Improved puppet-puppet head-on collision handling, no more bouncing back from the standing bot.
70. Added the “Creating Ragdolls In Runtime” demo scene and script.
71. `BehaviourFall` now keeps the Target close to the ragdoll. That will help with camera scripts and `SkinnedMeshRenderer` culling.
72. Added `PuppetMaster.state` to make it as easy as possible to switch between Alive, Dead and Frozen states. Frozen means all physics components will be deactivated when the puppet is killed and rigidbody velocities below a threshold and unnecessary calculations skipped.
73. Added the “Killing” demo scene.
74. Added an interpolated puppet example to the “Puppet Extended” demo scene.
75. Added warnings to `PuppetMaster` when `Animator.cullingMode` is not “Always Animate” or `SkinnedMeshRenderer` “Update When Offscreen” is false.
76. Simplified the Prop component.
77. Extended the Melee demo, added walls, collision objects and the Teddy to demonstrate bumping into larger and heavier characters.
78. Added the Final-IK Bridge, UMA2, Ootii’s Motion Controller v2 and others to “Plugins/RootMotion/PuppetMaster/\_Integration” as unitypackages.

## Fixes

1. `BipedRagdollCreator` now forces joint anchors to `Vector3.zero`.
2. Behaviours will not fail when UMA replaces the Animator in runtime.
3. Removed `JointDriveMode` warnings from Unity 5.3 and later.
4. Fixed Grounding the Target when getting up.

5. Fixed a bug that twitched the puppet when “Can Activate” and “Deactivate Automatically” were selected.
6. Fixed a Null Reference Exception when a Booster was created in runtime.
7. Fixed negative collider sizes created by BipedReaderCreator that were a problem with Unity 5.4.0B1.
8. BipedReaderCreator will not let itself to be added on any other gameobject but the root of the character.
9. Fixed a bug with PropRoot and assigning currentProp at Start();
10. PuppetMaster will notify you if you try to run it in Unity 5.1 (requires at least 5.2.2).
11. Fixed a bug with the Target not mapped to the ragdoll each frame when ragdoll bones were set to interpolate.
12. FixTransforms will work for Props even when PuppetMaster.fixTransforms == false, because they are most likely always unanimated.
13. Removed PuppetMaster.broadcastGroundCollisions.
14. Muscles with Pin Weight set to 0 will also unpin the puppet when they get too far.
15. Disabled a bug with internal collisions not being ingored when internalCollisions == false and switching from Disabled to Active or Kinematic mode.
16. Setting PuppetMaster.mode to Disabled or Kinematic will only execute when the behaviours allow it. That means you will be able to safely Disable a puppet based on distance to another puppet without the puppet getting disabled while in Fall behaviour or getting up.
17. Fixed BehaviourPuppet.unpinnedMuscleWeight not working when BehaviourFall was also used.
18. Made BipedReaderCreator work when “Optimize Game Objects” used.

## Changes

1. Changed BehaviourPuppet.canActivate and BehaviourPuppet.deactivateAutomatically to a single enum: BehaviourPuppet.normalMode.
2. To get rid of multiple expensive SendMessage/ BroadcastMessage calls per frame, OnPuppetMasterRead, OnPuppetMasterWrite and OnPuppetMasterFixTransforms will not be called anymore. Use PuppetMaster.OnRead, PuppetMaster.OnWrite and PuppetMaster.OnFixTransforms delegates instead. See the IKBeforePhysics.cs and IKAfterPhysics.cs for reference. If you add any IK components to the Target hierarchy in runtime after PuppetMaster has initiated, you need to add them manually to the PuppetMaster.solvers generic list.
3. Moved SolverManager to RootMotion namespace, allowing it to be used by other assets besides Final IK.

## Version 0.2 (10.12.2015)

### Upgrade Guide

16. **MAKE A BACKUP! Open a new scene, delete the previous version and reimport.**
17. “Collision Layers”, “Collision Threshold” and “Walkable Layers” have been moved from PuppetMaster to BehaviourPuppet (“Walkable Layers” renamed to “Ground Layers”). They need to be reassigned so before importing 0.2, make a note of those settings in PuppetMaster.

### Improvements

18. Added Collision Resistance Multipliers to the BehaviourPuppet. You can now specify how much objects unpin the puppet based on their layers.
19. PuppetMaster “Target Root” disappeared from the Inspector. It will now be found automatically. This simplifies setup process for custom rigs.
20. PuppetMaster “Behaviour Root” disappeared from the Inspector. It will now be found automatically. This simplifies setup process for custom rigs.
21. Final IK components and your own scripts using OnPuppetMasterRead/Write can now be added to every gameobject in the Target hierarchy (disable this by setting puppetMaster.broadcastMessages to false to improve performance, but all IK/script then need to be on the root gameobject of the Target hierarchy).

### Fixes

19. Fixed some bugs with removing components when setting up PuppetMaster.
20. Removed JointDriveMode obsolete warnings from Unity 5.3.
21. BipedRagdollCreator now looks for an Animator in the entire hierarchy.
22. Setting up PuppetMaster now parents the rig to the same parent that the PuppetMaster gameobject was parented to.
23. Setting up PuppetMaster will not remove Cloth colliders on in the target rig.

## Changes

1. Moved the animator states required by BehaviourPuppet and BehaviourFall to Sub-State Machines in the demo AnimatorControllers so they are easier to copy to your own controllers. When you copy the “BehaviourPuppet” Sub-State Machine to your own controller, just make a transition from it to the state you wish to go to when the puppet has got up. No need to make a transition from the “BehaviourFall” SSM.
2. Moved collision and ground layer masks and collision threshold from PuppetMaster to BehaviourPuppet. This simplifies setup process for custom rigs and improves performance.



**BETA (0.1) - 18.11.2015**

Initial Release