Final IK Release Notes

Version 1.5

Improvements

1. Added the "Two Handed Prop" demo scene and script.
2. Added the "Third Person Shooter (Recoil)" demo scene, update AnimatorController3rdPersonIK.cs to support Recoil.
3. Added a "Hands Pull Body" toggle to FBBIKHeadEffector. Disabling it will give full priority to the head effector and the hands will not be able to pull the head away. Also, disabling it will significantly improve the performance.
4. Added VRIK (Beta), a new full body solver designed specifically for contemporary VR requirements in inverse kinematics.

Fixes

1. Fixed a bug that broke LookAtIK when the bones assigned to it were removed and other bones assigned.
2. Extended Posers from SolverManager, which will make them work properly with AnimatePhysics.
3. Added "Aim IK Solved Last" toggle to Recoil.cs, which will enable the procedure to be used if AimIK is solved after FBBIK.

Changes

1. Removed "Time Step" from all solvers.

Version 1.4 - 15.06.2016

Improvements

5. Added LeapMotion (Orion) integration package to Plugins/RootMotion/FinalIK/_Integrations.
6. Made FPSAiming work with Recoil, added the "First Person Shooter (Recoil)" demo scene.
7. Added the "Head Effector (Hand Controllers)" demo scene.
8. Added TwistRelaxer.cs, a tool for relaxing twist bones after solving IK.

Fixes

4. Fixed Grounders moving the feet of the characters to Vector3.zero in the first frame.
5. GrounderQuadruped can now be used on a spherical planet. Update GrounderQuadruped.gravity to always point towards the center of the planet. The magnitude of the vector is irrelevant.
6. Fixed a bug with the CharacterThirdPerson that enabled jumping in air when the ground was too far.
7. Aded public bool TriggerInteraction(int index, bool interrupt, out InteractionObject interactionObject) and public bool TriggerInteraction(int index, bool interrupt, out InteractionTarget interactionTarget) to InteractionSystem as an easy way to retrieve InteractionObjects/Targets when triggering interactions.
8. Fixed some bugs with GrounderQuadruped root rotation.
9. Fixed a bug with FBBIKHeadEffector ignoring body, thigh and shoulder effector positionOffsets.
10. CharacterThirdPerson.cs now supports arbitrary gravity.

Version 1.3

Improvements

1. Simplified FBIKBoxing.cs script.
2. HeadEffector will use FBBIK.fixTransforms, meaning you will be able to use it with unanimated characters.
3. Rotation Limits now support multiple object editing.
4. Added the Playmaker actions to "Plugins/RootMotion/FinalIK/_Integration" as a unitypackage. Double-click to import the actions when you have Playmaker already imported.
5. Added a seated example to the "Head Effector" demo.

Fixes

11. You can now easily move the root to where the ragdoll is before getting up, when using the RagdollUtility. See the RagdollUtilityDemo.cs script.
12. InteractionSystem will not change any FBBIK settings that not used by the InteractionObject.
13. FBBIKHeadEffector now accounts for FBBIK solver weight and can be blended out correctly
14. LimbIK.avatarIKGoal can now be changed after the solver has initiated.
15. Removed tooltips from arrays in InteractionObject and the Grounders. A bug in Unity causes tooltipped arrays to fail the Editor sometimes.
16. Fixed a bug that didn't initiate the IK solver when the IK component was disabled in Awake.
17. FixTransforms will not be applied when solver weight <= 0f.
18. InteractionSystem will ignore InteractionTriggers that are disabled or deactivated.
19. Renamed InteractionSystem.collider and InteractionSystem.camera to get rid of new keyword warnings when building projects.
20. Changing InteractionObject curve lengths will now update interaction length as expected.

Changes

1. ShoulderRotator.cs moved to RootMotion.FinalIK namespace.

Version 1.2 - 11.11.2015

Learning

6. All components are now using the HelpURL attribute so you can get to the best learning resource by clicking on the help button of each component.

Improvements

1. HandPoser and GenericPoser now have a "Fix Transforms" option like the IK components. That will help with doing interactions with unanimated characters.
7. MechSpider can now be easily scaled by changing the MechSpider.scale value.
8. CharacterThirdPerson now also rotates the character around the Y axis with moving platforms and transfers root rotation to the controller.
9. Reduced package size by 20%, improving downloading and importing times.
10. Made Final-IK compatible with PuppetMaster.

Fixes

1. Fixed empty warning when adding FBBIK in runtime.
2. InteractionSystem LookAt function continue looking at objects when the interaction is paused.
3. Fixed a bug with FABRIKRoot not considering FABRIK chain targets.
4. Fixed error message when adding GrounderFBBIK.
5. Fixed RotationLimitSpline Scene View tool.
6. Removed warnings in Unity 5.3.

Version 1.1 - 14.09.2015

Changes

11. IK.Disable() is deprecated. Use enabled = false instead.
12. Moved AimPoser, Amplifier, BodyTilt, HitReaction, Inertia, OffsetModifier, OffsetPose and Recoil to the RootMotion.FinalIK namespace.
13. Converted folder structure to :
    Main Contents: `Assets/Plugins/RootMotion/…`
    Editor Scripts: `Assets/Plugins/Editor/RootMotion/...`
    This will make Final IK available for all compilation passes/languages, speed up compilation times and make it easier for other Asset Store developers to create compatible tools.

FullBodyBipedIK

1. FBBIK solver now survives assembly reload and can be updated in editor mode.
2. Fixed blending solver weight when using bend goals.
3. Added public bool ReferencesError(ref string errorMessage) and public bool ReferencesWarning(ref string warningMessage) so you can check if the FBBIK references are OK from your own scripts.
4. Fixed RagdollUtility for Unity 5.2 (worked around a 5.2 Mecanim bug)

VR

5. VR demos now check if "Virtual Reality Supported" is enabled in the Player Settings to avoid confusion.
6. Renamed OculusSetup to VRSetup and script names containing OVR to VR to get rid of device discrimination.

Grounder

7. Fixed a bug with GrounderFBBIK that created problems when updating FBBIK manually in FixedUpdate.
8. Fixed a bug with the "Third Person Humanoid" Animator Controller that appeared when jumping up from idle animation.

9. Added Grounder.Reset() that enables you to teleport a grounded character without problems.

Demos

1. Fixed joint ranges of the ragdolls in "Mapping To Ragdoll" and "Ragdoll Utility".
2. Fixed a bug in MechSpiderLeg.cs that might have set footsteps to wrong height.
3. MechSpider.cs "Min Height" parameter works as expected now.

Common

4. Added video tutorial links to the context menu of FullBodyBipedIK, AimIK and InteractionSystem components (others coming).

Editor

1. Reviewed the warning system. Solver setup warnings will be displayed in a warning box in the Inspector, no more "What's wrong?" button logging in the console.

Version 1.0 - 25.06.2015

Interaction System

14. Fixed a bug with picking up objects, where they were parented with a random offset.
15. When the InteractionObject is destroyed in the middle of interaction, will smoothly reset the interacting effectors to defaults.
16. Fixed a bug with the InteractionSystem.speed value, it can now be used without problems when pausing/picking up objects.

Demos

1. Restructured the 3rdPersionDummy demo. Made it use a simple upper-body aiming pose instead of 2 wasteful FBBIK passes.
2. Restructured CharacterThirdPerson, made the character controllers in the Grounder demo smoother and more responsive.
3. Removed CharacterControllerSimpleAim.cs (it is not needed anymore as IK solvers have "Target" properties).
4. Added the "Ragdoll Utility" demo scene.
5. Improved the "Mapping To Ragdoll" demo scripts to support smoothly blending in and out of the mapping.
6. Converted the "Aim Weapon" demo to Mecanim.
7. Deleted CarryBoxDemo.cs, just assigned the hand IK targets to the effector target slots.
8. Added "CCD IK 2D" and "FABRIK 2D" demo scenes.
9. Added the "Finger Rig" demo scene.
10. Converted the "Hit Reaction" demo to Mecanim.
11. Converted the "Full Body FPS" demo to Mecanim.
12. Converted all Viking demos to Humanoid.
13. Removed Generic Dummy and his animations and Animator Controllers, all using Humanoid now.
14. Cleaned up many unused demo assets, reducing considerably the size of the package and import time.
15. Renamed most of the demo assets for better readability and consistency.
16. Removed the old and very confusing Legacy-based demo character controllers (CharacterControllerBase.cs, CharacterControllerDefault.cs, CharacterControllerLegacy.cs, CharacterAnimationSimpleLegacy.cs). Replaced them all with SimpleLocomotion.cs that works on Mecanim.

2D

1. Added a "2D" toggle to all Heuristic solvers (CCD, Aim, FABRIK). If toggled, the chains will be solved only on the XY plane, meaning bones will be rotated around the Z axis only.

Finger Rig

1. Created the FingerRig component. Add it to the hand GameObject, fill in the Fingers (or right-click on the component header and have them automatically detected). See the "Finger Rig" demo scene.

VR

1. Updated all FinalIK VR Demos and scripts to Unity5.1, merged the external VR package into the main project.

FullBodyBipedIK

1. Auto-detecting bone references for Humanoid characters is more reliable (using Animator.GetBoneTransform()).
2. Fixed a bug with FBBIKHeadEffector, that did not disable it's behaviour when the component was deactivated or disabled.
3. Fixed ShoulderRotator.cs to account for FBBIK solver weight.
4. Fixed a bug with limb mapping, where the right shoulder was dislocated under extreme solver stress.
5. FBBIKHeadEffector.cs can now be added in runtime without errors.

Common

1. Added RagdollUtility.cs that can be used to smoothly blend a character between animated and ragdoll modes. It also enables you to apply IK to make kinematic adjustments on a ragdoll pose (see the "Ragdoll Utility" demo scene).
2. Moved some demo assets (that will be also used in other packages in the future) to RootMotion/Shared Demo Assets.
3. Moved HandPoser.cs, GenericPoser.cs, IKExecutionOrder.cs to the RootMotion.FinalIK namespace.

Upgrade Guide

1. **Backup your project before upgrading!**
2. **Open a new empty scene, remove the existing RootMotion folder, reimport from the Asset Store.**
3. Namespace RootMotion.FinalIK.Demos was renamed to RootMotion.Demos to support sharing demo scripts with other RootMotion packages in the future. You will have to replace "using RootMotion.FinalIK.Demos;" with "using RootMotion.Demos" in your own scripts if you are referring to any of the demo scripts.

Version 0.5 - 24.02.2015

FullBodyBipedIK

17. Added the FBBIKHeadEffector script and the Head Effector demo scene
18. Added the "Soccer Kick" demo scene
19. Added the "Recoil" demo scene and scripts
20. Added the AnimationWarping script. This enables you to warp an effector from animation space to world space (see the "Soccer Kick" demo).

Interaction System

1. Restructured InteractionTrigger. Each trigger can now specify the ranges for both character position and camera position for triggering interactions. This is most useful for VR and first person rigs.

OVR

1. Made a separate package containing OVR demos and helpful scripts about full body mapping to the head controller, aiming and interactions.

Documentation

1. Added Search to the Script Reference.

Common

1. Moved all Editor scripts to RootMotion/FinalIK/Editor and RootMotion/Editor folders to make things easier for Javascript users
2. Added tooltips to the Interaction System and Grounder components and reusable demo scripts
3. Removed or made unique all conflicting assets from Unity's Sample Assets package
4. Restructured character controller scripts in the Grounder demo
5. Fixed a bug with MechSpiderLeg.cs

6. Removed skyboxes to reduce size of package

Upgrade Guide

4. **Backup your project before upgrading!**
5. **Open a new empty scene, remove the existing RootMotion folder, reimport from the Asset Store.**
6. All InteractionTriggers will be broken because of restructuring and have to be filled in again. Unfortunately this was unavoidable.

Version 0.41 - 22.09.2014

FullBodyBipedIK

21. Redesigned the Hit Reaction component and demo scene
22. Fixed a bug that did not allow for scaling characters after they had been initiated

AimIK

1. Fixed a bug with the solver that always used Vector3.forward as the Pole Axis
2. Added the AimIK Pole demo scene

Version 0.4 - 07.08.2014

AimIK

23. Fixed error when Clamp Weight was 1
24. Added polePosition, poleWeight and poleTarget to the solver. This enables us to keep another axis of the Aim Transform oriented at a position in world space

FullBodyBipedIK

1. About 20% performance improvement
2. Fixed initiation error when manually setting up the bone references in the Editor
3. Improved bend direction stabilization
4. Added FBIKChain.push and FBIKChain pushParent
5. New custom editor
6. FBBIK iterations can be now set to 0. In that case, full body effect is disabled and only trigonometric passes will be calculated.
7. Added effector target transforms. You can now assign them in the Editor or write ik.leftHandEffector.target = transform. FBBIK will automatically set effector position and rotation to match the target transform's. It will overwrite IKEffector.position = something.
8. Added the Full Body FPS demo scene and scripts
9. Added the Pendulum demo scene to demonstrate how a character could be mapped to a ghost ragdoll with FBBIK

Interaction System

1. InteractionObject now also works with Legacy
2. Icons for all Interaction System components
3. Added Push and PushParent to InteractionObject weight curve types
4. All InteractionSystem methods now return a bool value notifying if the operation was actually carried out or not. So if StartInteraction() returns false, the interaction did not start (maybe because the effector was already in interaction).
5. Integrated InteractionLookAt to IntegrationSystem to reduce the number of components. All used InteractionLookAt components need to be removed, Unity will give a warning if it finds any.
6. Added InteractionObject.WeightCurve.Type.PoserWeight. That will be used to determine weight of the hand posers.
7. Added picking up spherical objects to the Interaction PickUp2Handed demo
8. Restructured InteractionObject to add events that are easier to understand.

Common

1. Added IKExecutionOrder for easy editing of the order in which the IK components update their solvers.
2. All components of Final IK now have "User Manual" and "Script Reference" buttons in their context menu.
3. All component custom inspectors have a warning box now to inform you of invalid/incomplete setups without spamming the console.
4. Many bugfixes for custom inspectors
5. Revised component menu structure
6. Improved scene view handle and button scaling
7. Added range sliders to inspectors
8. Fixed the bug with IK components that found the wrong Animator/Animation component from the character hierarchy to get the Animate Physics value from
9. Improved the MechSpider demo, the spider is now capable of climbing vertical surfaces

LimbIK

1. Changed IKRotation to match the orientation of the last bone, like FBBIK effectorRotation
2. SetBendGoalPosition now takes a weight parameter.
3. Added the "Goal" bend modifier that allows you to assign a bend goal Transform.

Grounder

1. Small fixes, Grounder components can be added in runtime without errors
2. Added lowerPelvisWeight and liftPelvisWeight to the Grounding solver
3. Added horizontal wall running to the demo scene
4. Enabled strafing for the biped character controller in the demo scene (switch Move Mode to Strafe)
5. Added OnPreGrounder and OnPostGrounder delegates to the Grounder components

BipedIK

1. Simplified Pelvis constraints. Instead of bipedIK.solvers.pelvis.positionConstraint.position you can now use bipedIK.solvers.pelvis.position. Same with positionWeight, positionOffset, rotation, rotationWeight and rotationOffset.

FABRIK

1. 2-3 times faster constrained FABRIK chains.
2. Removed IKSolverFABRIK.updateBoneLengths. It will always update bone lengths and axes now, making it possible to skip animated bones in the hierarchy.

Third Party Support

1. Playmaker actions for all IK components and the Interaction System

Upgrade Guide

7. **Backup your project before upgrading!**
8. LimbIK IKRotation has been changed to match the orientation of the last bone like FBBIK effectorRotation. If you are using LimbIK or BipedIK somewhere, you will have to rotate the targets to match the exact desired rotations of the hand bones. This change will simplify setting up IK targets in the future (just copy the hand bone, pose it and use it as the target).
9. If you have used BipedIK pelvis constraints, you need to change bipedIK.solvers.pelvis.positionConstraint.position to bipedIK.solvers.pelvis.position. Same with positionWeight, positionOffset, rotation, rotationWeight and rotationOffset.
10. Integrated InteractionLookAt to IntegrationSystem to reduce the number of components. All used InteractionLookAt components need to be removed, Unity will give a warning if it finds any.
11. All InteractionObjects will need to specify PoserWeight curve or multiplier if you wish to use HandPosers.
12. Restructured InteractionObject to an event based system. Some properties like triggerTime, releaseTime, the animations and message recipients will have to be reassigned for the events.

Version 0.3 - 07.04.2014

FullBodyBipedIK

1. Added OffsetEffector.cs and demo scene
2. Added Interaction Walls demo scene and script
3. Fixed FixTransforms bug that was causing some twitching on some unanimated rigs
4. Improved spine mapping performance and accuracy. Not all spine bones need to be included in the spine references. It works the fastest if spine length is 2, first bone in the spine is the root node and the other is the last spine bone.
5. Improved solver weight blending. You can now weigh out the solver without dislocating the limbs even when the effectors are pinned
6. Improved the custom inspector and the validation of the biped references.

FABRIK

1. Improved solver stability under constraints.

LimbIK

1. Animated bones can be skipped in the hierarchy when assigning bones for LimbIK and TrigonometricIK. The last bone will still be solved to the correct position.

Grounder

1. Added the GrounderFBBIK, GrounderBipedIK, GrounderIK and GrounderQuadruped components and the Grounder demo scene.

Common

1. Added OnPreInitiate, OnPostInitiate, OnPreUpdate and OnPostUpdate delegates to all IK solvers.
2. IK Component inspectors draw the scene view handles for disabled IK components
3. All IK components not will look up the hierarchy to find the first Animation/Animator component to know if animatePhysics is on or off for the character.
4. Improved CameraController demo script

Upgrade Guide

1. **Backup your project before upgrading!**

Version 0.22 - 13.03.2014

FullBodyBipedIK

1. ShoulderRotator now works for characters that have animatePhysics enabled.
2. Added BipedLimbOrientations. It is now very easy to fix limb bending directions for UMA, 3ds Max and other skeleton types if necessary (ik.solver.SetLimbOrientations(BipedLimbOrientations.UMA);). Removed IKConstraintBend.SetBendDirection() and IKMappingLimb.SetBendDirection().
3. Switched FBBIK limbs from 1DOF joints to 3DOF joints. This does not enforce the limbs to behave like hinge joints anymore and will allow for lossless solving and mapping of the limbs, meaning that if you have FBBIK on with 0 effector weights, the animation will remain the same.
4. Removed IKConstraintBend.BendBone because it is not necessary anymore after switching to 3DOF joints.
5. Restructured FBBIK chain structure to remove object composition cycle. This change is required for upgrading to Unity 4.6 (Beta).

AimIK

1. Added the Aim Swing demo scene.

FABRIKRoot

1. Restructured to remove object composition cycle. This change is required for upgrading to Unity 4.6 (Beta).

Upgrade Guide

1. **Backup your project before upgrading!**
1. IKConstraintBend.BendBone was removed, if you have any code using it, just delete it, will not be necessary anymore.
2. FullBodyBipedIK chain structure was restructured, so all used FBBIK components have to be reinitialized. Just right-click on the FBBIK coponent and select Reinitiate from the context menu. Pull and Reach values of the chains will reset to defaults.
3. FABRIKRoot was restructured and the chains have to be rebuilt in the inspector.

Version 0.21 - 20.02.2014

1. Removed Button.cs, a relic testing script that was unused and not namespaced.

Version 0.2 - 19.02.2014

FullBodyBipedIK

1. Better scaling of the effector handles (for extra large/small characters)
2. Fixed a bend constraint bug that occured with very tiny characters
3. Added shortcuts to limb IK mappings (IKSolverFullBodyBiped.leftArmMapping, IKSolverFullBodyBiped.rightArmMapping, …)
4. Added IKMappingLimb.weight for spherical interpolation of the limbs and for the possibility of disabling the effect of IK for a limb.
5. Added reach smoothing modes (FBIKChain.reachSmoothing).
6. Added IKSolverFullBodyBiped.GetLimbMapping(FullBodyBipedEffector).
7. Added IKConstraintBend.SetBendDirection() and IKMappingLimb.SetBendDirection() to enable you to change the bending direction of the limb.
8. Added Amplifier and a demo scene for it.
9. Added OffsetPose.Apply(IKSolverFullBodyBiped solver, float weight, Quaternion rotation)
10. Fixes to Inertia deltaTime issues.
11. Removed IKEffector.Mode, you can use IKEffector.maintainRelativePositionWeight now for smooth blending between the former MaintainAnimatedPosition and MaintainRelativePosition
12. Added OffsetModifier that will be the base abstract class for Inertia, BodyTilt, Amplifier, EffectorOffset and all other FBBIK effector positionOffset modifiers in the future. OffsetModifier works with animatePhysics, uses delegates safely and makes it easy to apply limits to the offset. It will also make it easier for you to create your custom offset modifiers, check out EffectorOffset.cs.
13. Added the TerrainOffset demo that was used to make the AimIK - Redirecting Animation tutorial.
14. Fixed IKSolverLookAt.SetChain. The LookAt solver now works with no head and nulls can be passed to SetChain.
15. Added GenericPoser, which is similar to HandPoser, but enables you to pose hierarchies that have a different number of bones.
16. Added the Interaction System and with it 3 demo scenes: Interaction, Interaction Character2Character and Interaction PickUp2Handed.

LookAtIK

1. Improved IKSolverLookAt. It now looks better with animations that have strong amplitude on the spine such as running and sprinting.

AimIK

1. RotationLimits can be used on the Aim Transform of AimIK now.

Rotation Limits

1. Fixed RotationLimitAngle twist limit when swing limit is 0.

Common

1. Added V3Tools to help dealing with vector algebra.
2. Added Fix Transforms option to all the IK components. Its now possible to use FBBIK and BipedIK with no Animation/Animator component. With Fix Transforms set to true, there will bo more issues with unanimated bones.
3. Clamped all solver weights to 0-1.

Documentation

1. Updated User Manual and Script Reference to 0.2
2. Added diagrams to the Script Reference

Upgrade Guide

1. **Backup your project before upgrading!**
2. The new Fix Transforms option for IK components will be defaulted to true. You can turn it off for a small performance gain on solvers you don't need it for. It will also make any unanimated IK chain reset to it's initial pose in each Update before solving, so if you need additive solving of your CCD/FABRIK/FABRIKRoot chains, turn it off.
3. IKEffector.Mode was changed to IKEffector.maintainRelativePositionWeight, so if you used MaintainRelativePosition anywhere, you will have to change it to effector.maintainRelativePositionWeight = 1.
4. Changes to BodyTilt behaviour, you may need to adjust the OffsetPoses for tilting.

BETA (0.1) - 15.01.2014

Initial Release