VRM Animation????

- VRM Animation
- VRM-Animation ??
- VRM-Animation ??
- ??????????

VRM Animation

https://github.com/vrm-c/vrm-specification/tree/master/specification/VRMC_vrm_animation-1.0

???“VRM Animation”?

VRM Animation ??????????? VRM ????????????

- ??? VRM Animation ??**?????? VRM ??**?
- ????? **glTF** ??????**???**???
- UniVRM **???? Unity ?????? VRM Animation ???????**?

?????

- ?????? **glTF animation**?
- ??????**? VRM ?????????????? glTF ?????**????
  - ? `VRMC_vrm_animation` ??????
  - ???? `.vrma` ????
- **? ???? Humanoid bone animation (?????**
  - ?????? glTF ????? Humanoid ??????
  - ??????????????????????? VRM?
- ? **???? Expression animation (????)**
  - ???????????????? glTF ??????
  - ?? VRM ???????????? VRM ???????????? custom expressions?????????
- ? **???? Gaze control animation??????**
  - ????????????????? glTF ???

VRM Animation ???

?? VRM Animation?**????????????????????????**

????? VRM Animation ????????

- ???? VRM Animation ? authoring tools ????
- ???????????? motion capture ?????
- ? live streaming ? photo ??????? VRM Animation ?????
- ??? VRM Animation ??????? Metaverse????????????????
- ? game engines ??? VRM Animation ????? game development ???

?? VRM Animation ?????

showcase

> ??
> ????????????????? VRM Animation ? draft ??????????VRM Animation ?????????????????? draft
> ????????????????????????????????

> ??
> ????????????????????
> ??? GitHub ?? issues ? Pull Request?
> ????????????????????

- UniVRM
- @pixiv/three-vrm
- VRM Add-on for Blender
- bvh2vrma
- VRoid Hub
- AnimationClipToVrmaSample
- VMagicMirror
- VRM Posing Desktop
- VRM ??????????????
- VRMA, BVH ????????? VRM ??????

?? VRM Animation ??????

VRM-1.0 ??? VRM-Animation?

import

??? import(????) ? retarget(????)?

export

????? Unity ??? humanoid ?????????? VRM-Animation?

> EDITOR ??

??? export(????)?

VRM-Animation ??

?????VRM10Viewer(????????)

VRM-Animation ??

?????? BVH Converter

- `menu` - `VRM1` - `Experimental` - `Convert BVH to VRM-Animation...`

`Assets/VRM10/Editor/VrmAnimationMenu.cs`

??

??

???? VrmAnimation????????

- ?? humanoid ??????? hierarchy(??) ???
- ??????? hierarchy(??) ???? T-Pose ???
- ????????humanoid ?????????????

?????????????????bvh ?????

> **???**
> ?? BVH ??????? T-Pose?????????

> **UNITY HUMANOID ?????**
> ?? Animator.GetBoneTransform ?????

???

VRM Animation exporter ????

```
Transform humanoid_hierarchy;


var data = new ExportingGltfData();
using var exporter = new VrmAnimationExporter(
            data, new GltfExportSettings());
exporter.Prepare(humanoid_hierarchy.gameObject);
```

VRM Animation exporter ????

```
exporter.Export((VrmAnimationExporter vrma) =>
{
```

```
    // get human bones
    var map = new Dictionary<HumanBodyBones, Transform>();
    var animator = bvh.Root.GetComponent<Animator>();
    foreach (HumanBodyBones bone in Enum.GetValues(typeof(HumanBodyBones)))
    {
        if (bone == HumanBodyBones.LastBone)
        {
            continue;
        }
        var t = animator.GetBoneTransform(bone);
        if (t == null)
        {
            continue;
        }
        map.Add(bone, t);
    }

    vrma.SetPositionBoneAndParent(map[HumanBodyBones.Hips], bvh.Root.transform);

    foreach (var kv in map)
    {
        var vrmBone = Vrm10HumanoidBoneSpecification.ConvertFromUnityBone(kv.Key);
        var parent = GetParentBone(map, vrmBone) ?? bvh.Root.transform;
        vrma.AddRotationBoneAndParent(kv.Key, kv.Value, parent);
    }
```

????????

```
// get animation
    var animation = bvh.Root.gameObject.GetComponent<Animation>();
    var clip = animation.clip;
    var state = animation[clip.name];

    var time = default(TimeSpan);
    for (int i = 0; i < bvh.Bvh.FrameCount; ++i, time += bvh.Bvh.FrameTime)
    {
        state.time = (float)time.TotalSeconds;
        animation.Sample();
```

```
        vrma.AddFrame(time);
    }
```

??

```
});
var glb =  data.ToGlbBytes();
```

> **??**
> ?????? glb ?????? VRMC_vrm_animation ???

??????????

> ???VRM-0.X??????????????????????????...
> - ????
> - ????
>
> ???VRM??????T-Pose????????????

?? UniVRM ???????

? UniVRM ? vrm-1.0 ????? ControlRig ??????????????????????????????ControlRig????????????

?? ControlRig ??????????????????

> **???? UNITY ? MECANIM HUMANOID ??**
> ?????????????? `humanoid avatar`

????

? UniVRM ?????????????

https://github.com/vrm-c/vrm-specification/blob/master/specification/VRMC_vrm_animation-1.0/how_to_transform_human_pose.ja.md

???????????? HumanoidBone ????? T-Pose????????