

## Project 4

### Keytime Animation

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#### Description:

To achieve the key time animation for every 10 seconds, I created an animation where a dog and cat (for extra credit) play the ball game. The animation has 23 quantities with a minimum of 6 key times. Below are the steps of what I did for normal and extra credit requirements.

1. Grid Creation:
  - a. Created a grid with dimensions of 10 units on the X-axis and 14 units on the Z-axis.
  - b. Applied the "SetMaterial" function to the grid, allowing it to change its color based on the lighting conditions.
2. Ball Creation:
  - a. Used an OsuSphere as the ball and applied keyframes to make it rotate in a semi-circle motion.
  - b. Implemented scaling for the sphere to create a squash and stretch effect during certain keyframes.
  - c. Altered the material color of the sphere using keyframes to match the scene's lighting.
3. Dog Object, Cat Object, and their motion:
  - a. Imported 3D models of the dog and cat using OBJ files and manipulated their material colors through keyframes.
  - b. Utilized keyframes to rotate and translate the dog and cat, giving the appearance that they are jumping and interacting with the ball at specific time intervals.
4. Light Source:
  - a. Defined the light source's position at different keyframes, ensuring it illuminates the scene effectively based on the animation's progress.
5. View Position:
  - a. Adjusted the look-at coordinates, enabling the viewer's perspective to circle around and move up and down, enhancing the overall experience of the animation.

I listed down the animated quantities for normal and extra credit as "**required**" and my own animated quantities are marked as "**own**". Also, I defined the headings in the Key times for readability.

#### Animated Quantities for Dog (2-required, 3-own):

Rotation (1 Quantity), Translation (1 Quantity), Material Color (3 Quantities).

**Animated Quantities for Cat (Extra Credit 2-required 3-own):**

Rotation (1 Quantity), Translation (1 Quantity), Material Color (3 Quantities).

**Animated Quantities for Ball (Own):**

Scaling (1 Quantity), Rotation (1 Quantity), Material Color (3 Quantities)

**Animated Quantities for Light Source (2-required, 4-own):**

Material Color (3 Quantities), Translation (3 Quantities)

**Animated Quantities for View(2-required):**

Rotation (1 Quantity), Translation (1 Quantity)

**Key times**

//For Rotating in Semi Circle – Ball Motion #Position (Rotation) - 1 Quantity

BallRotationInX.Init();

BallRotationInX.AddTimeValue(0.0, 0.000);

BallRotationInX.AddTimeValue(1.0, 0.75);

BallRotationInX.AddTimeValue(2.0, 1.25);

BallRotationInX.AddTimeValue(4.0, 2.5);

BallRotationInX.AddTimeValue(5.0, 3.0);

BallRotationInX.AddTimeValue(6.0, 2.5);

BallRotationInX.AddTimeValue(8.0, 1.5);

BallRotationInX.AddTimeValue(9.0, 1.);

BallRotationInX.AddTimeValue(10.0, 0.000);

//For Sphere Material Color - #Color – 3 Quantities

ColorKeyTimeRed.Init();

ColorKeyTimeRed.AddTimeValue(0.0, 1.0);

ColorKeyTimeRed.AddTimeValue(1.0, 1.0);

ColorKeyTimeRed.AddTimeValue(4.9, 1.0);

ColorKeyTimeRed.AddTimeValue(5.0, 0.0);

```
ColorKeyTimeRed.AddTimeValue(8.0, 1.0);  
ColorKeyTimeRed.AddTimeValue(9.9, 0.0);  
ColorKeyTimeRed.AddTimeValue(10.0, 1.0);
```

```
ColorKeyTimeGreen.Init();  
ColorKeyTimeGreen.AddTimeValue(0.0, 1.0);  
ColorKeyTimeGreen.AddTimeValue(1.0, 0.0);  
ColorKeyTimeGreen.AddTimeValue(4.9, 1.0);  
ColorKeyTimeGreen.AddTimeValue(5.0, 1.0);  
ColorKeyTimeGreen.AddTimeValue(8.0, 1.0);  
ColorKeyTimeGreen.AddTimeValue(9.9, 1.0);  
ColorKeyTimeGreen.AddTimeValue(10.0, 1.0);
```

```
ColorKeyTimeBlue.Init();  
ColorKeyTimeBlue.AddTimeValue(0.0, 1.0);  
ColorKeyTimeBlue.AddTimeValue(1.0, 0.5);  
ColorKeyTimeBlue.AddTimeValue(4.9, 1.0);  
ColorKeyTimeBlue.AddTimeValue(5.0, 0.0);  
ColorKeyTimeBlue.AddTimeValue(8.0, 1.0);  
ColorKeyTimeBlue.AddTimeValue(9.9, 0.0);  
ColorKeyTimeBlue.AddTimeValue(10.0, 1.0);
```

```
//For Light Source Color - #Color – 3 Quantities  
LightSourceKeyTimeRed.Init();  
LightSourceKeyTimeRed.AddTimeValue(0.0, 1.0);  
LightSourceKeyTimeRed.AddTimeValue(1.0, 1.0);  
LightSourceKeyTimeRed.AddTimeValue(2.0, 0.0);  
LightSourceKeyTimeRed.AddTimeValue(5.0, 0.0);  
LightSourceKeyTimeRed.AddTimeValue(8.0, 1.0);
```

```
LightSourceKeyTimeRed.AddTimeValue(10.0, 1.0);
```

```
LightSourceKeyTimeGreen.Init();
```

```
LightSourceKeyTimeGreen.AddTimeValue(0.0, 1.0);
```

```
LightSourceKeyTimeGreen.AddTimeValue(1.0, 0.0);
```

```
LightSourceKeyTimeGreen.AddTimeValue(2.0, 1.0);
```

```
LightSourceKeyTimeGreen.AddTimeValue(5.0, 0.0);
```

```
LightSourceKeyTimeGreen.AddTimeValue(8.0, 1.0);
```

```
LightSourceKeyTimeGreen.AddTimeValue(10.0, 1.0);
```

```
LightSourceKeyTimeBlue.Init();
```

```
LightSourceKeyTimeBlue.AddTimeValue(0.0, 1.0);
```

```
LightSourceKeyTimeBlue.AddTimeValue(1.0, 0.0);
```

```
LightSourceKeyTimeBlue.AddTimeValue(2.0, 0.0);
```

```
LightSourceKeyTimeBlue.AddTimeValue(5.0, 1.0);
```

```
LightSourceKeyTimeBlue.AddTimeValue(8.0, 0.0);
```

```
LightSourceKeyTimeBlue.AddTimeValue(10.0, 1.0);
```

```
//For Light Source Motion - Up and Down - #Position - 3 Quantities
```

```
LightSourceUpAndDownX.Init();
```

```
LightSourceUpAndDownX.AddTimeValue(0.0, -2.0);
```

```
LightSourceUpAndDownX.AddTimeValue(2.0, 2.);
```

```
LightSourceUpAndDownX.AddTimeValue(4.0, 2.);
```

```
LightSourceUpAndDownX.AddTimeValue(6.0, -2.);
```

```
LightSourceUpAndDownX.AddTimeValue(8.0, -2.);
```

```
LightSourceUpAndDownX.AddTimeValue(10.0, -2.0);
```

```
LightSourceUpAndDownY.Init();
```

```
LightSourceUpAndDownY.AddTimeValue(0.0, 3.0);
```

```
LightSourceUpAndDownY.AddTimeValue(2.0, 3.);
LightSourceUpAndDownY.AddTimeValue(4.0, 3.);
LightSourceUpAndDownY.AddTimeValue(6.0, 3.);
LightSourceUpAndDownY.AddTimeValue(8.0, 3.);
LightSourceUpAndDownY.AddTimeValue(10.0, 3.0);
```

```
LightSourceUpAndDownZ.Init();
LightSourceUpAndDownZ.AddTimeValue(0.0, 2.0);
LightSourceUpAndDownZ.AddTimeValue(2.0, 2.);
LightSourceUpAndDownZ.AddTimeValue(4.0, -2.);
LightSourceUpAndDownZ.AddTimeValue(6.0, -2.);
LightSourceUpAndDownZ.AddTimeValue(8.0, 2.);
LightSourceUpAndDownZ.AddTimeValue(10.0, 2.0);
```

```
//For Dog Rotation and Translation - Object 1 Orientation - 2 Quantities
```

```
DogMotionRotation.Init();
DogMotionRotation.AddTimeValue(0.0, 0.0);
DogMotionRotation.AddTimeValue(1.0, 0.);
DogMotionRotation.AddTimeValue(2.0, 0.);
DogMotionRotation.AddTimeValue(4., 30.);
DogMotionRotation.AddTimeValue(5.0, 0.);
DogMotionRotation.AddTimeValue(8.0, 0.);
DogMotionRotation.AddTimeValue(10.0, 0.0);
```

```
DogMotionTranslation.Init();
DogMotionTranslation.AddTimeValue(0.0, 0.0);
DogMotionTranslation.AddTimeValue(1.0, 0.00);
DogMotionTranslation.AddTimeValue(2.0, 0.00);
```

```
DogMotionTranslation.AddTimeValue(5.0, 0.2);  
DogMotionTranslation.AddTimeValue(7.0, 0.00);  
DogMotionTranslation.AddTimeValue(8.0, 0.00);  
DogMotionTranslation.AddTimeValue(10.0, 0.0);
```

```
//For Cat Rotation and Translation - Object 2 Orientation – 2 Quantities
```

```
CatMotionRotation.Init();  
CatMotionRotation.AddTimeValue(0.0, 30.0);  
CatMotionRotation.AddTimeValue(1.0, 0.);  
CatMotionRotation.AddTimeValue(2.0, 0.);  
CatMotionRotation.AddTimeValue(4., 0);  
CatMotionRotation.AddTimeValue(5.0, 0.);  
CatMotionRotation.AddTimeValue(8.0, 0.);  
CatMotionRotation.AddTimeValue(10.0, 30.0);
```

```
CatMotionTranslation.Init();  
CatMotionTranslation.AddTimeValue(0.0, 0.2);  
CatMotionTranslation.AddTimeValue(1.0, 0.10);  
CatMotionTranslation.AddTimeValue(2.0, 0.00);  
CatMotionTranslation.AddTimeValue(5.0, 0.0);  
CatMotionTranslation.AddTimeValue(7.0, 0.00);  
CatMotionTranslation.AddTimeValue(8.0, 0.10);  
CatMotionTranslation.AddTimeValue(10.0, 0.2);
```

```
//For Scaling of the ball – Scaling - 1 Quantity
```

```
BallScaleX.Init();  
BallScaleX.AddTimeValue(0.0, 0.8);  
BallScaleX.AddTimeValue(0.5, 0.9);
```

```
BallScaleX.AddTimeValue(1.0, 1.0);  
BallScaleX.AddTimeValue(4.9, 1.0);  
BallScaleX.AddTimeValue(5.0, 0.8);  
BallScaleX.AddTimeValue(5.5, 0.9);  
BallScaleX.AddTimeValue(6.0, 1.0);  
BallScaleX.AddTimeValue(9.9, 1.0);  
BallScaleX.AddTimeValue(10.0, 0.8);
```

```
//Dog Material Color - Color 3 quantities
```

```
SetMaterialDogR.Init();  
SetMaterialDogR.AddTimeValue(0.0, 1.00);  
SetMaterialDogR.AddTimeValue(2.0, 1.0);  
SetMaterialDogR.AddTimeValue(5.0, 0.00);  
SetMaterialDogR.AddTimeValue(7.0, 0.00);  
SetMaterialDogR.AddTimeValue(9.0, 1.0);  
SetMaterialDogR.AddTimeValue(10.0, 1.0);
```

```
SetMaterialDogG.Init();  
SetMaterialDogG.AddTimeValue(0.0, 1.0);  
SetMaterialDogG.AddTimeValue(2.0, 0.0);  
SetMaterialDogG.AddTimeValue(5.0, 1.0);  
SetMaterialDogG.AddTimeValue(7.0, 0.0);  
SetMaterialDogG.AddTimeValue(9.0, 1.0);  
SetMaterialDogG.AddTimeValue(10.0, 0.0);
```

```
SetMaterialDogB.Init();  
SetMaterialDogB.AddTimeValue(0.0, 1.0);  
SetMaterialDogB.AddTimeValue(2.0, 0.0);
```

```
SetMaterialDogB.AddTimeValue(5.0, 0.0);  
SetMaterialDogB.AddTimeValue(7.0, 1.0);  
SetMaterialDogB.AddTimeValue(9.0, 0.0);  
SetMaterialDogB.AddTimeValue(10.0, 1.0);
```

//Cat Material Color – Color – 3 quantities

```
SetMaterialCatR.Init();  
SetMaterialCatR.AddTimeValue(0.0, 1.0);  
SetMaterialCatR.AddTimeValue(2.0, 0.5);  
SetMaterialCatR.AddTimeValue(5.0, 1.0);  
SetMaterialCatR.AddTimeValue(7.0, 0.6);  
SetMaterialCatR.AddTimeValue(9.0, 0.6);  
SetMaterialCatR.AddTimeValue(10.0, 1.0);
```

```
SetMaterialCatG.Init();  
SetMaterialCatG.AddTimeValue(0.0, 0.5);  
SetMaterialCatG.AddTimeValue(2.0, 0.5);  
SetMaterialCatG.AddTimeValue(5.0, 0.5);  
SetMaterialCatG.AddTimeValue(7.0, 0.4);  
SetMaterialCatG.AddTimeValue(9.0, 0.4);  
SetMaterialCatG.AddTimeValue(10.0, 1.0);
```

```
SetMaterialCatB.Init();  
SetMaterialCatB.AddTimeValue(0.0, 0.0);  
SetMaterialCatB.AddTimeValue(2.0, 1.0);  
SetMaterialCatB.AddTimeValue(5.0, 0.5);  
SetMaterialCatB.AddTimeValue(7.0, 0.2);  
SetMaterialCatB.AddTimeValue(9.0, 0.2);  
SetMaterialCatB.AddTimeValue(10.0, 1.0);
```



//Look-At motion in a circle - View – 1 Quantity

EyePositionCircle.Init();

EyePositionCircle.AddTimeValue(0.0, 0.0);

EyePositionCircle.AddTimeValue(1.0, 36.0);

EyePositionCircle.AddTimeValue(2.0, 72.0);

EyePositionCircle.AddTimeValue(3.0, 108.0);

EyePositionCircle.AddTimeValue(4.0, 144.0);

EyePositionCircle.AddTimeValue(5.0, 180.0);

EyePositionCircle.AddTimeValue(6.0, 216.0);

EyePositionCircle.AddTimeValue(7.0, 252.0);

EyePositionCircle.AddTimeValue(8.0, 288.0);

EyePositionCircle.AddTimeValue(9.0, 324.0);

EyePositionCircle.AddTimeValue(10.0, 360.0);

//Look At Eye Position to move up and down - View - 1 Quantity

EyePositionChangeInY.Init();

EyePositionChangeInY.AddTimeValue(0.0, 3.0);

EyePositionChangeInY.AddTimeValue(2., 2.5);

EyePositionChangeInY.AddTimeValue(3.5, 2.0);

EyePositionChangeInY.AddTimeValue(5.0, 1.0);

EyePositionChangeInY.AddTimeValue(7.5, 2.0);

EyePositionChangeInY.AddTimeValue(8., 2.5);

EyePositionChangeInY.AddTimeValue(10.0, 3.0);

Video Link: [https://media.oregonstate.edu/media/1\\_t24du427](https://media.oregonstate.edu/media/1_t24du427)

Below are the screenshots:



