Assignment 4 File submitted for

UCS-632: 3D Modelling

By

NAME OF STUDENT	*ROLL NUMBER*
Animesh Gupta	101703070

CLASS GROUP: COE-4

SUBMITTED TO

Dr. Shailendra Tiwari

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

PATIALA-147001, PUNJAB, INDIA

Designing an Animated Lamp in Blender

Objective-

Designing a skeleton based body system which can realistically simulate a real word object with an animated version.

A 3D lamp has been used as a design example for this assignment. Multiple steps and procedures have been used to generate a polished rendered output which can be comparable to any real world lamp.

Software Used-

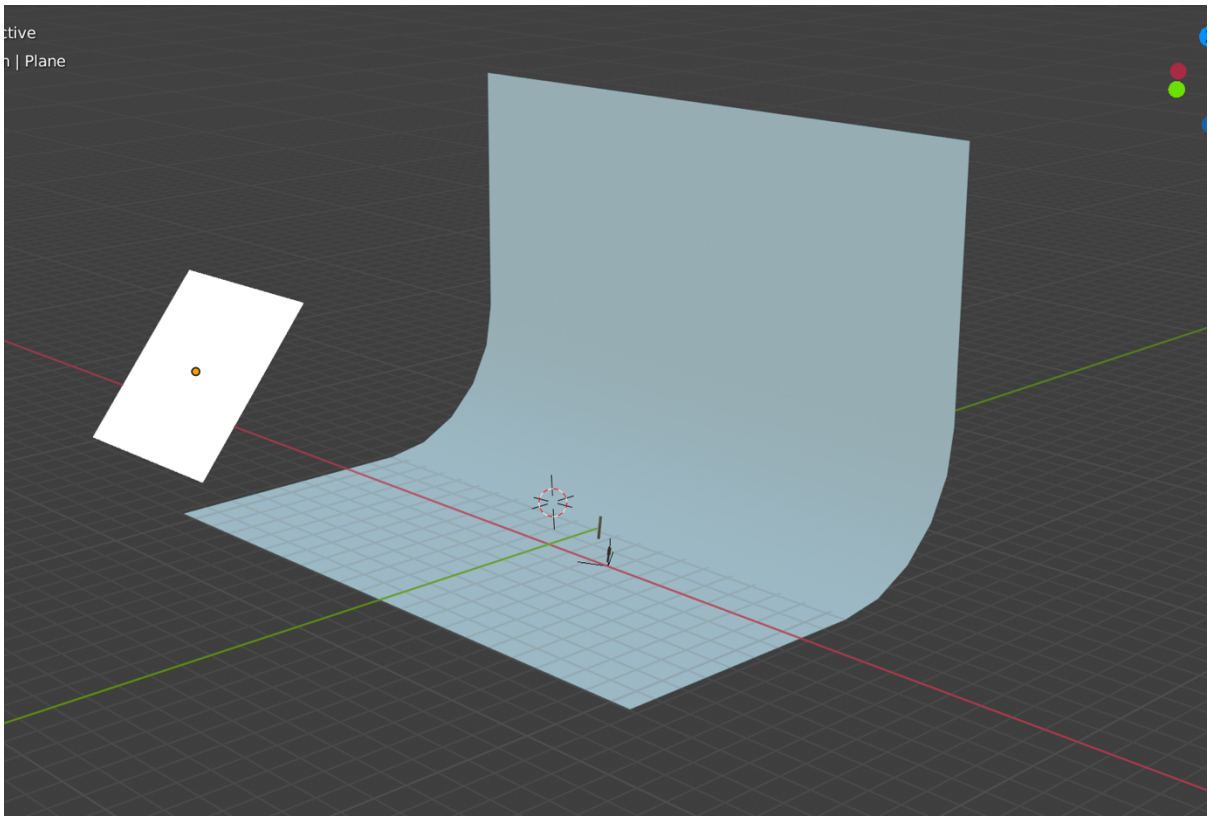
Blender 2.81a, CUDA software(Nvidia Based), Unity, Cycles Render Engine

Lean model based design has been used here. Also, all the measurements done are in Blender Units (BU). Hence, the model is freely scalable as per the use case needed.

Procedure

The procedure to design and animate this lamp required multiple steps. These have been described in brief detail as follows-

1. Designing proper background/backdrop for accurate lighting-

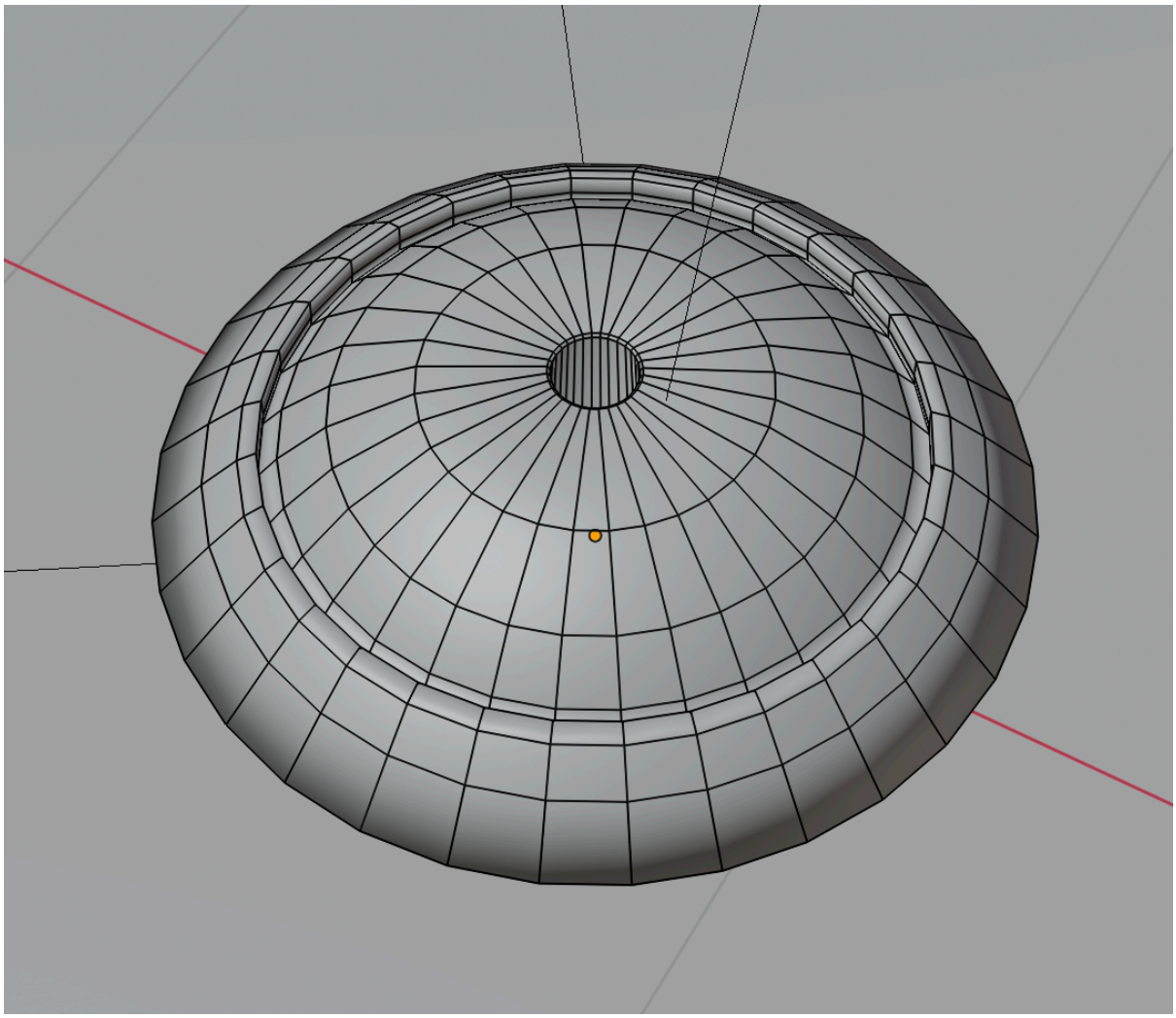


A proper backdrop is essential for reliable information being displayed onscreen. Hence, a two dimensional plane has been selected for the same.

The plane is curved so as to avoid the crease that forms when light falls on the border of the backdrop. For this, loop cut has been used to create a seamless transitional plane.

Also, a second plane has been used with an emissive material property in order to generate uniform and consistent lightning with the rendered animation. This plane is kept at an angle of 45 degrees for proper lighting.

2. Designing the base of the lamp-

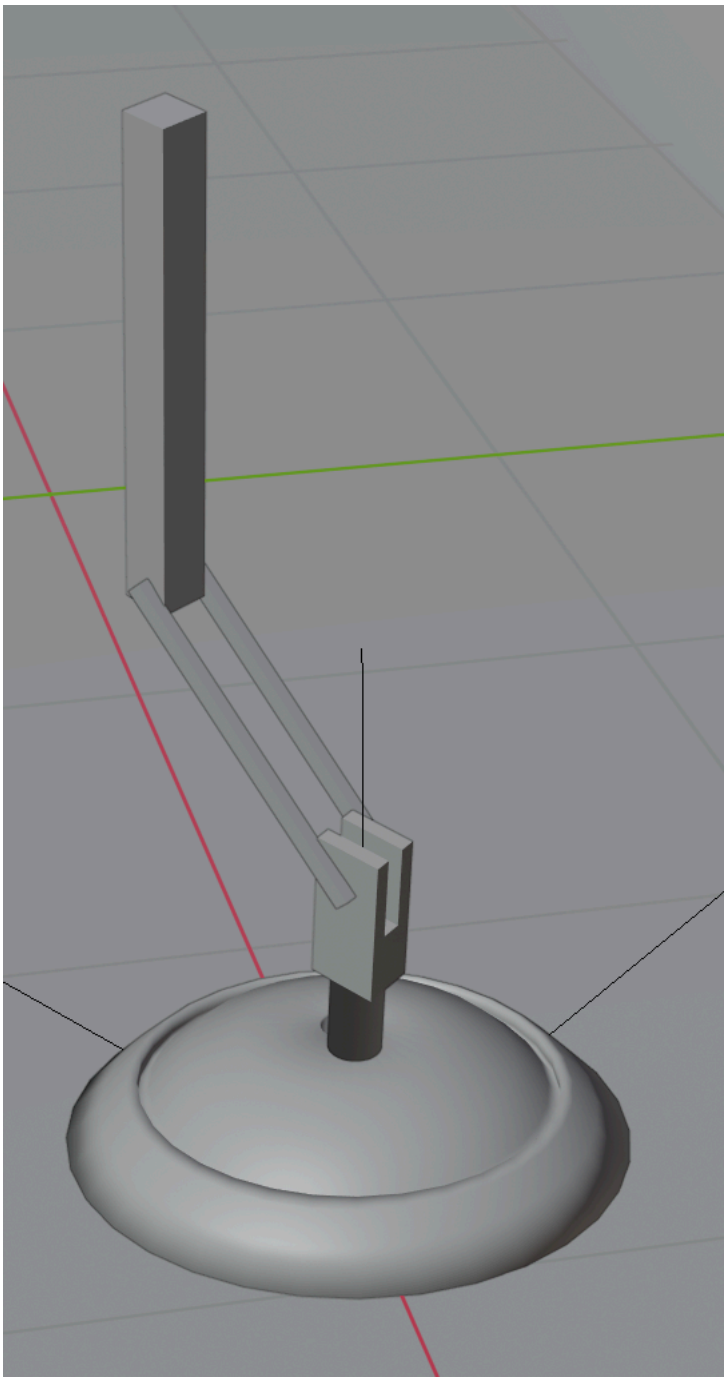


The foundation of the lamp needed to be perfect for further designing. To create a distinct base, the concept of Bezier curve and outlining has been used. A Bezier curve has been outlined onto a Bezier circle which generates the base of the lamp. Subdividing the curve enabled to have proper control of the base of the geometry.

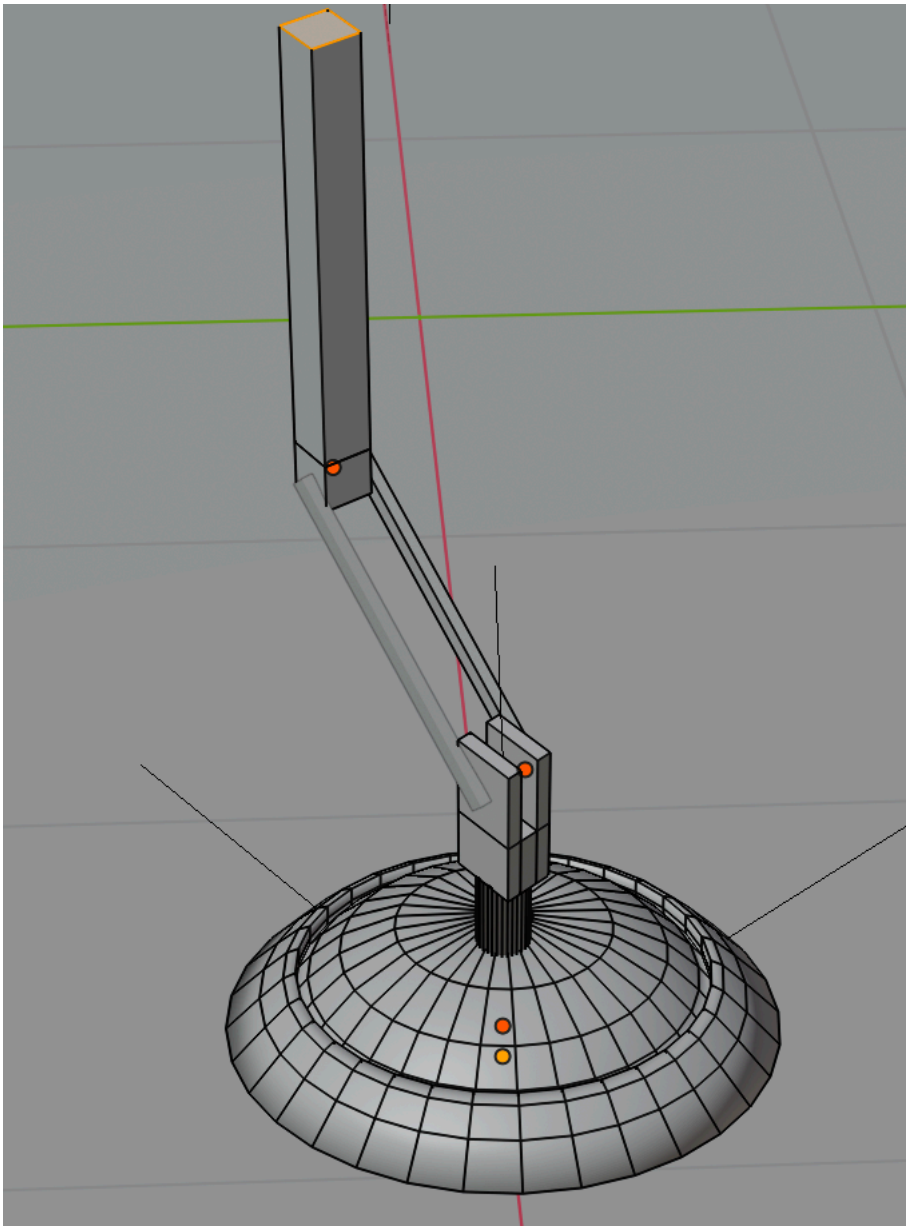
Ridge pattern has also been generated in the same way. Also, the final design has multiple double vertices and extra geometry which needs to be removed or isolated. The same has been done by filling in the details in Edit mode. It has been taken into account that not all detail is lost in this process.

Also, the hole based cavity has been generated by shifting the curve from its initial position to the new one by shifting by 0.1 BU. Final base has been generated above.

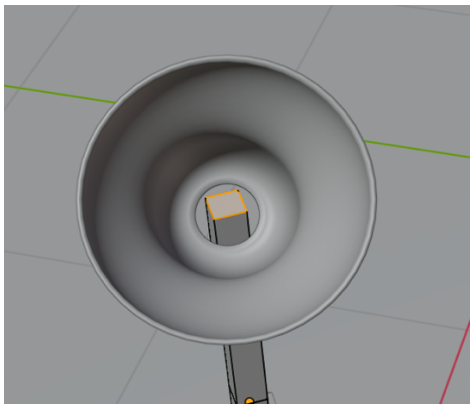
3. Armature based upper and lower stem design-

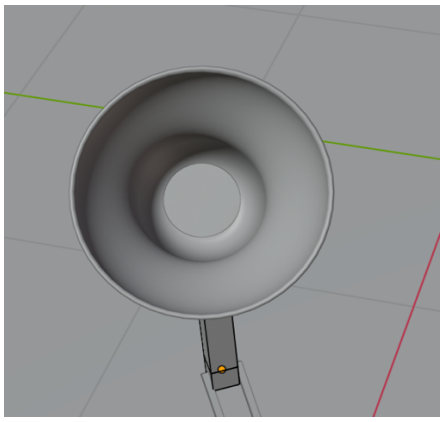


Lower stem has been designed by extruding the stem rod from the base of the curve. Then, mirror modifier has been applied to generate the duplicate stem of the lamp. These are joined by an adjoining plane along the axis of the stem.



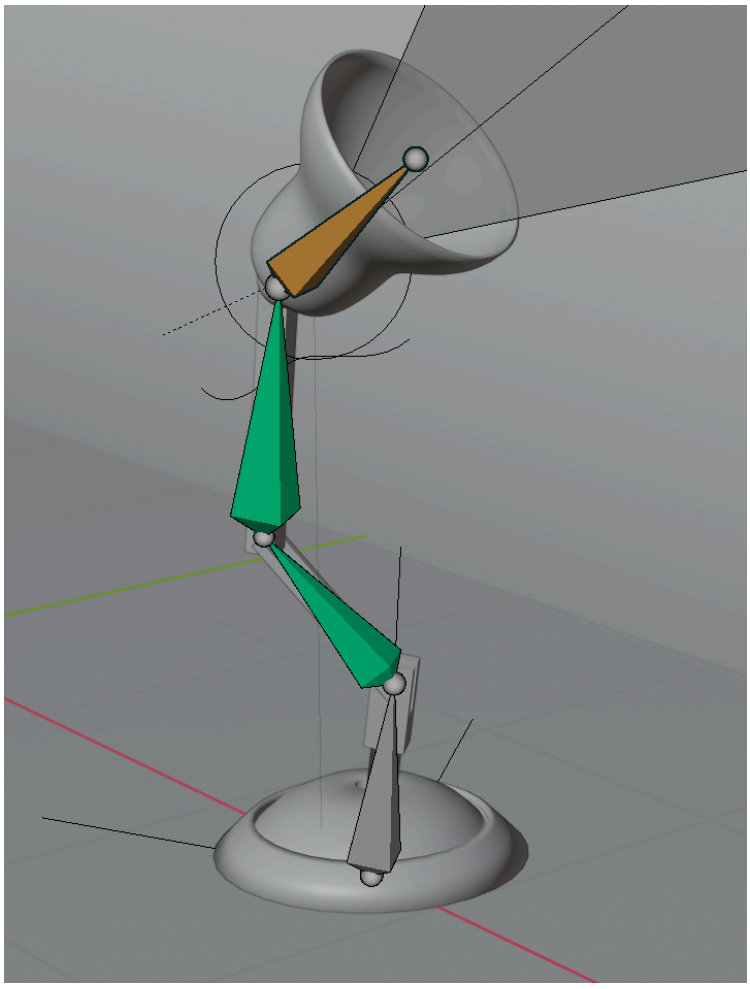
4. Designing the lampshade-





The lampshade design has been made using Bezier transform and Bezier circle overlay operations. A light source has been made out of a circle with emissive property. A UV sphere has been used to cover the hole behind the lampshade.

5. Applying armature and skeletal bones for free movement animation-

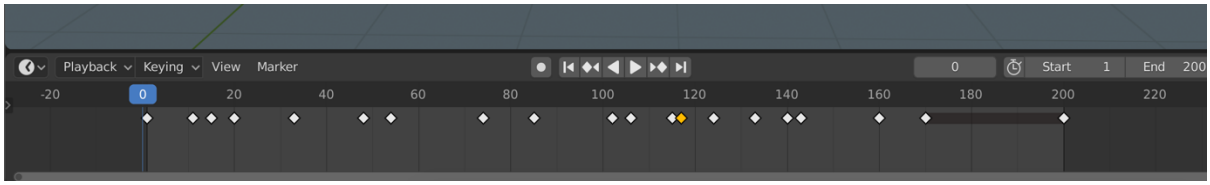


In Pose mode, bones have been used in the lower stem, the upper stem and the shade part in order to have proper geometry. Each bone has been made a parent of their required mesh based objects. Constraints have been applied on the free angle dislocation possible for each bone. Then all the bones have been combined in order to change motion of one bone if the other is changed. **Auto Inverse Kinematics (IK)** has been used for the same purpose.

6. Applied materials-

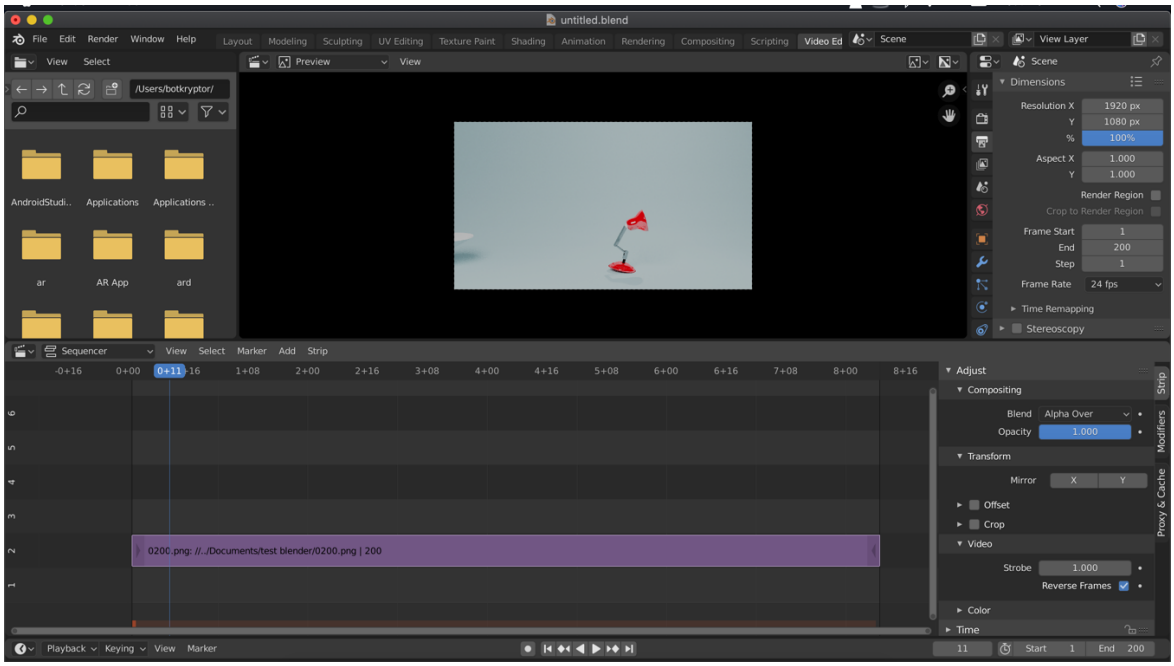
For the application of materials on the lamp, node editor has been used. In the node editor, a combination of Diffused BSDF, Glossy BSDF and Mix shader has been used in a combination to generate the glossy subsurface of the base and shade. The upper and lower stems have a combination of diffused and metal based material in order to give an eccentric feel to it. Solidify modifier has also been used to have a solid base to the lampshade in this model too.

7. Animation-



Animating the lamp involves keyframe based animating the lamp and sequencing the same. Frame rate has been set at 24 frames per second. A total of 200 frames have been used for animation. Keyframes have been dropped at necessary frames, and animation has been adjusted accordingly.

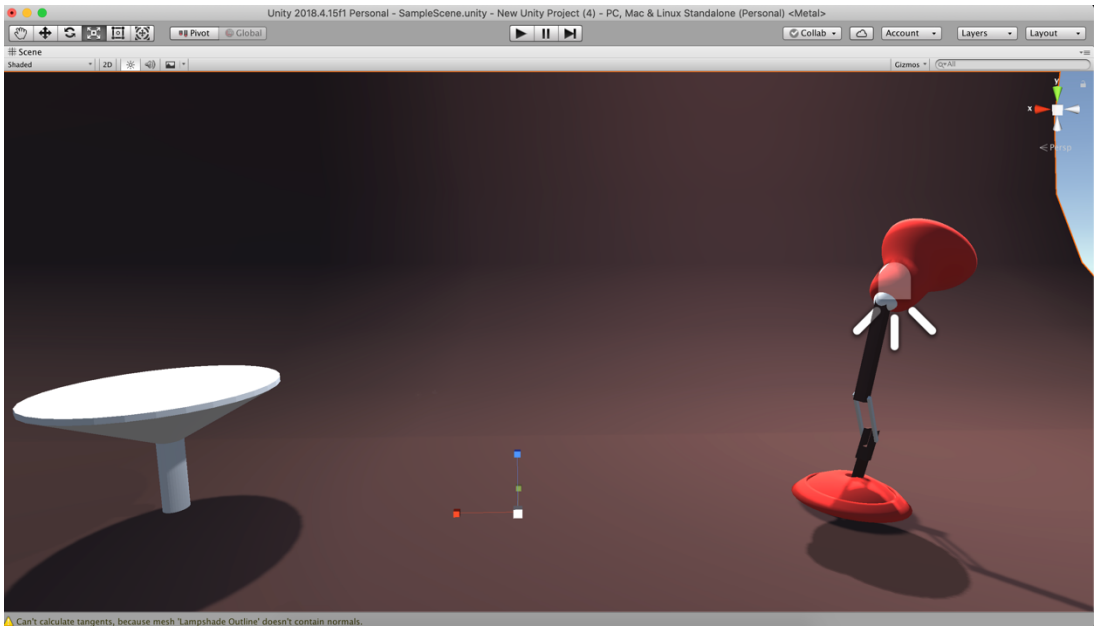
8. Exporting the final video-



Rendering the animation and saving it in any needed folder generates the required frames for animation. Then importing these frames in the video editing section and exporting in AVI file format generates the final output video in the required folder. Hence, the final animation has been generated. The steps are as follows-

1. Open the video editing section in blender.
2. Import all the frames rendered in the animation.
3. Click on reverse frames in order to render the animation from the beginning.
4. In the video section, select h.264 as codec and AVI as file format.
5. Click on export button in the section. The video will be saved in the required folder.

9. Exporting in Unity



The final model needs to be exported in .FBX file format and then imported in Unity or Unreal as per the user's choice. Then, after importing, the models need to be placed in the scene and played accordingly.

Conclusion

This assignment has been extensively important in imparting knowledge of 3-D real modelling in Blender. The novel concepts of bezel curve and rigging the parts of the model in Pose mode can be useful in further understanding the concepts of animation. Also, keyframe based animation helps in generating smooth transitional animated videos which is also an important tool in 3D modelling. Overall, the above assignment has been crucial in my conceptual development of 3D modelling.