

Assignment 4 submitted
for 3D Modelling and Animation (UCS636)
by
Darshneet Juneja 101903115

Submitted to
Dr. Shailendra Tiwari



DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, (A DEEMED TO BE
UNIVERSITY), PATIALA, PUNJAB
INDIA
January-May 2022

Rigging Assignment

Aim: Design an animated lamp/robotic arm/or any animated objects using blender.

This assignment is primarily based on rigging (animation). Based on your creativity, you have complete freedom to choose any free assets environment to explore yourself and then add the animation to that model. Marks is totally based on your creativity, aesthetics, lighting effects, rigging, 3d view (camera motion) and keyframe animation.

Follow the steps mentioned below to complete the assigned task:

1. Design an animated lamp, robotic arm, or any animated objects (characters) using the Bezier curve tool on cycle render engine.
2. Apply the invisible skeleton on inside the lamp, robotic arm, or any animated objects handle using inverse kinematics (super powerful tool) that allow to move the model.
3. Apply the proper texture and material.
4. Export the models with material in Unity and other Game engine such as Unreal. Take a snapshot of Exported model and append in submitted report.
5. Create a small video of your rendered animation and send the video clip and blend file of your own created model and attached some Final rendered image (Final Scene) in the report with proper designing steps.

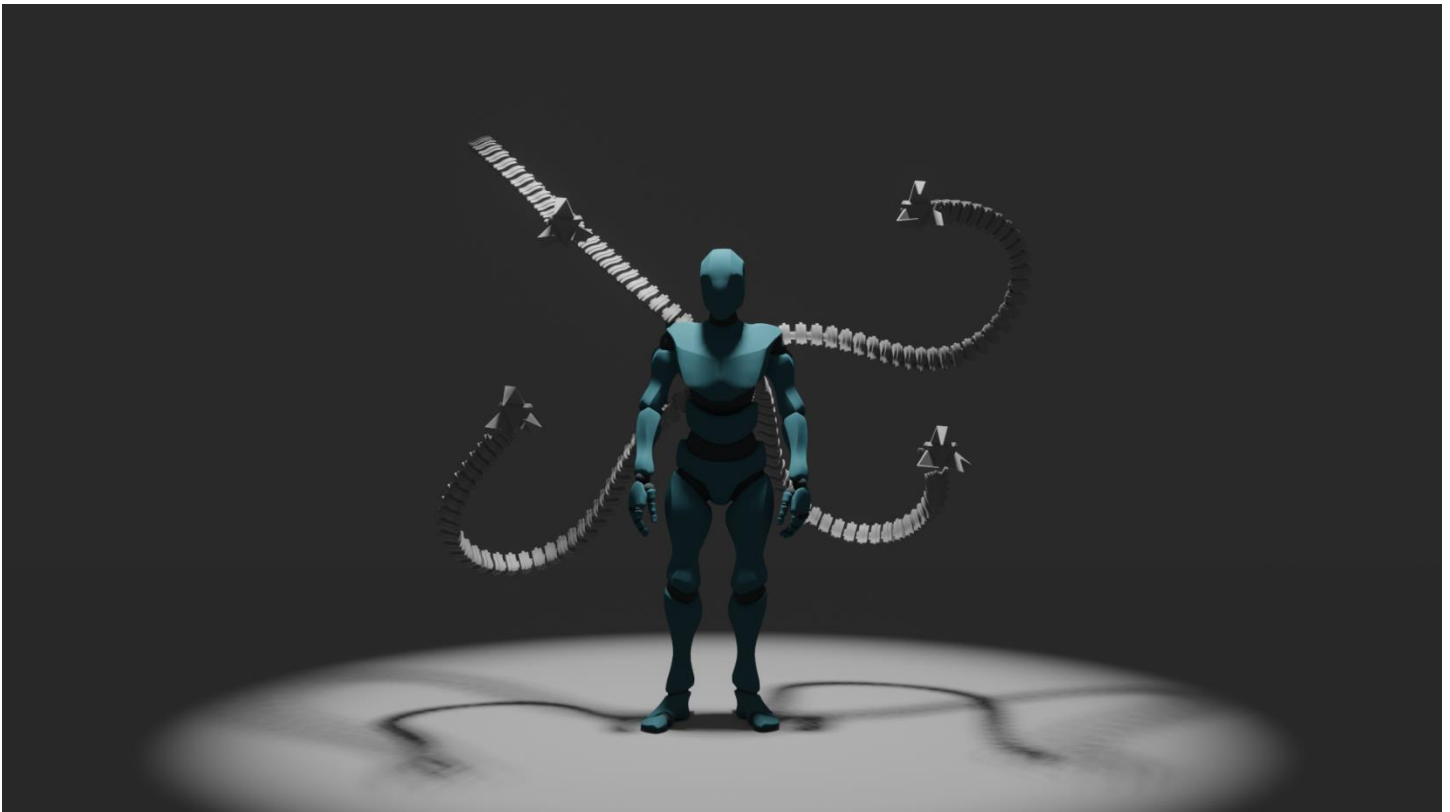


Figure 1: Final Rendered Image of the Final Scene

Steps for Designing the model:

- First open a new project in blender and delete the default objects on the screen.
- Then add a new circle to the scene, lower down the vertices to 3 so that it becomes a triangle. Rename the triangle as Robot Arm 000.
- Duplicate the triangle and rename it as claw duplicator and hide it for the time being.
- Go to the Edit mode. Right click on the triangle and subdivide. Set the number of cuts to 2.
- Select vertices and rotate them to get a new shape. Press F to add a new face to the triangle. I further changed the shape by selecting different cuts and applying rotation and scaling to them.
- Go back to the Object Mode and add a subdivision surface modifier with a level of 2 to make the vertices smoother.
- Right click on the triangle and convert it to mesh.
- Head back to Edit Mode. Select all points on the face and press E to extrude it along z axis. I have extruded it to 1m initially.
- Add 2 horizontal loop cuts to the figure. Delete the rest of the vertices except the ones in between these two cuts.
- Select to vertices of top and bottom faces of this new figure and press E to extrude, S to scale and shift+Z to exclude Z axis. This gives us a new figure with 0.5m height if viewed from front. Further I applied extrusion and scaling to z axis on this new figure to give it a height of 1m. The new figure should look like a plus sign if viewed from the front.
- Select the loop cut in the middle and bevel it. Further extrude it, and scale it up.
- Duplicate this robot arm 40 times so that they stack on top of each other perfectly.
- To rig the object, add a new armature to the scene. Go to object data properties, viewport display and set it in front so that it is visible.
- Go to Edit Mode and take this armature up to 40 m by pressing G. Subdivide this bone 39 times so that each segment has its own bone.
- Go back to Object mode and select everything. Make sure armature is highlighted. Press ctrl+P to parent. Under armature deform set it to with automatic weights.
- Head over to pose mode, select all the bones, go to pose, select inverse kinematics, press on add IK to bone and select to new empty object.
- Go to Object Mode, open bone constraint properties and enable rotation. I have renamed the empty object to IK target.
- Now for working on the claw attached to the arm, hide all the elements present in the scene and unhide the claw duplicator (Triangle).
- Head to Edit Mode, rotate the claw by -90 degrees on x axis. Fill the face by pressing F, scale it down a bit and extrude it.
- Add a new plane and merge its vertices at center. Extrude this on the y axis by 2m. Add skin modifier to it. Adjust its vertex data to make it like a triangular plane. Subdivide the vertices further. Enable create armature in the skin modifier. Adjust the location and rotation of this plane appropriately.
- Add an array modifier of count 3 disable the relative offset and enable the object offset

setting the object as claw duplicator. Rotate it by 120 degrees.

- Unhide all segments and align the claw with the robot arm's head. Select claw and IK target and parent to object.
- Next, I imported a human character in my scene, scaled down my robot arm and aligned the arm to the back of the human model.
- Select the human and head over to the pose mode, further select the bone which we want to bind with the arm. Go back to object mode and parent the arm to human's bone.
- I added a pole target to the arm to give it a bit of stability, but it reduces functionality. So, if I remove it, it might make the arm a bit buggy.
- I made 2 collections, placed the arm in one and human in other to ease the working.
- Select one of the joints of the arm and add bevel modifier to it. Shade smooth the joint. Add edge split modifier.
- Apply these modifications to all the joints by link data transfer menu and select copy modifiers. Shade smooth all the joints.
- Insert a location and rotation keyframe for the arm. Vertically split the screen and open graph editor on the other screen.
- Select X location keyframe and add noise modifier to it. Adjust the strength and scale of the modifier as per choice. Copy the F-modifier and paste it in all other keyframes. Randomly change the phases of each keyframe to get the desired motion.
- I have similarly added procedural noise to the claw. Firstly, go to the pose mode and change the quaternion rotation to XYZ Euler. Insert a rotation keyframe for both the bones. Apply the noise modifier again and randomly change the phases for the bones.
- Duplicate the arm thrice and attach it to the human's back bone. Select the duplicated arms and insert a new location keyframe.
- Further to desynchronize the movement, I changed the phases of all the arms' transformation variables randomly.
- Then I added location and rotation keyframes at every 50 frames to give the arms the desired motion.
- To add the lighting effects, I added a spotlight on top of the scene.
- Finally, I used camera walk technique to get the cinematic shots.