

CS 474 – Computer Graphics Assignment

Lights... Camera... Action...

A polygon based 3D Rendering and Animation Package

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Description

The software is a polygon based 3D rendering and animation framework. It is implemented in JAVA and has many features and has many features which make it interesting to work with.

Algos Implemented

1. Perspective View
2. 3D Transformations
3. Illumination Models including Ambient , Diffusion and Specular
4. 3D objects stored as polygons
5. Wireframe generation of desired accuracy for smooth shading
6. Basic objects like cuboid , sphere , cylinder , cone etc. generated using wireframes.
7. Solid Object Generation includes other objects like a donut (torus) , superellipses of various kinds.
8. 3D Fractal Terrain Generation with adjustable roughness
9. 3D Fractal Trees of various kinds
10. 3D Animation including straight line and curvilinear motion.
11. Hidden surface removal using Normal method and Sorting Techniques

Features

1. **Renders and animates** a scene which can include multiple objects , multiple lights with camera at desired position.
2. Features a **complete scripting language** using which the scene can be described and animation parameters per object can be described.
3. Supports multiple lights which can also be animated to produce lighting effects.
4. Animation using Camera Rotation
5. Features a GUI Interface having various facilities like :
 - Manual Camera Rotation
 - Zoom In , Zoom out of scene
 - Translate 3D Scene on screen
 - Animation by rotating Camera
 - WireFrame display on / off
 - Axis Display on / off
6. Has a lighting configuration option using which multiple lights can be added in the scene of different colours and lighting parameters like K_a , K_s , etc. can be adjusted.
7. Various sample scripts provided as examples showing various features.

Description of objects

An object definition looks like this :

```
object  
  
colour 255 128 128 # specify colour for object  
wireframe 16      # specify wireframe accuracy  
sphere 0 0 0 10   # generate wireframe for sphere  
  
end_object
```

3D Transformations

After defining each object , it can also be transformed in 3D.
For transformation following commands are provided :

```
translate  
rotatex      # Rotate around X –Axis  
rotatey      # Rotate around Y –Axis  
rotatez      # Rotate around Z –Axis
```

Please see the Demo files to see the how these commands work.

Animation

Each object can be animated individually. After defining the object ,
a translation path can be specified along which to move the object.

Besides translation , the object can also be rotated around the desired axis.

Please see the DEMO files for more details for lots of other features and commands.
