

**SCHOOL OF COMPUTER SCIENCE AND ENGINEERING**

CZ2003 Computer Graphics & Visualization Lab 1 Submission

Visualization Using Polygons

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Table of Contents

[Lab 1 Tasks 3](#_Toc6798466)

[Lab 1 Files 3](#_Toc6798467)

[Task 1: Display a Simple Polygon Mesh 3](#_Toc6798468)

[Task 2: Explore different Graphics Mode 4](#_Toc6798469)

[Task 3: Examine How DiffuseColor Affect Color of Shape 4](#_Toc6798470)

[Task 4: Changing Polygon Mesh to Other Shapes 5](#_Toc6798471)

[Task 5: Notice How Order of Vertices Affects Polygons 7](#_Toc6798472)

# Lab 1 Tasks

1. Display a simple polygon mesh as it is illustrated in Fig. 3 (download polygons.wrl)
2. Explore different Graphics Modes of the VRML browser (Wireframe, Vertices, Flat). Make sure OpenGL is selected in Settings/Renderer when you right-click at the VRML browser window.
3. Examine how the color of the shape defined in diffuseColor field can be changed. Note that the color values must be real numbers between 0 and 1. See what happens if the color values are less than 0 or greater than 1.
4. Change the displayed polygon mesh (a pyramid) to anything else by adding new vertices and polygons. Make a 2D regular hexagon (six-sided equilateral and equiangular polygon https://en.wikipedia.org/wiki/Hexagon) and a 3D cube.
5. Notice how the order of vertices changes the visible side of polygons.
6. Create a folder with name Lab1 and copy there all the FVRML files you have experimented with.
7. Write a brief report explaining what each file defines and also copy it to Lab1 folder.

# Lab 1 Files

1. Task 1 > Pyramid > polygons.wrl
2. Task 4 > 2D Hexagon > 2D hexagon.wrl
3. Task 4 > 2D Equiangular > 2D equiangular.wrl
4. Task 4 > 3D Cube > 3D cube.wrl

# Task 1: Display a Simple Polygon Mesh

**Displaying a polygon from polygon.wrl**

|  |  |  |
| --- | --- | --- |
| **Front View** | **Isometric View** | **Reversed Axis Isometric View** |
|  |  |  |

# Task 2: Explore different Graphics Mode

**Display polygon.wrl with different graphics mode**

|  |  |  |
| --- | --- | --- |
| **Wireframe** | **Vertices** | **Flat** |
|  |  |  |

Note: Vertices look like it is empty as the points marked are extremely small

# Task 3: Examine How DiffuseColor Affect Color of Shape

The numbers in diffuseColor field represents RGB normalized decimal numbers, when the numbers are changed, the color of the shape will change accordingly. We were given with (1 0 0) for the polygon, which represents red = 1, green = 0, blue = 0.

We can change the color of the shape by changing the numbers to 1 to 0. When numbers are lesser than 0, the VRML browser will take the number as if it is 0, if the number is larger than 1, is will take the number as if it is 1.

Below are some of the polygon with their shape color changed.

|  |  |  |
| --- | --- | --- |
| **Green (0 1 0)** | **Blue (0 0 1)** | **Pink (1 0.5 1)** |
|  |  |  |

# Task 4: Changing Polygon Mesh to Other Shapes

**2D Hexagon**

|  |  |
| --- | --- |
| **2D Hexagon** | **Coordinates** |
|  |  |

**2D equiangular**

|  |  |
| --- | --- |
| **2D equiangular** | **Coordinates** |
|  |  |

**3D Cube**

|  |  |
| --- | --- |
| **Front View** | **Isometric** |
|  |  |
| **Coordinates** | |
|  | |

# Task 5: Notice How Order of Vertices Affects Polygons

The order of vertices is important as it will affect the visibility of the polygon’s faces. Having wrong order of vertex point can result in the polygon having a half or none visible face.

**Correct Order**

|  |  |
| --- | --- |
| **Correct Order** | **Coordinates** |
|  |  |

**Wrong Order**

|  |  |
| --- | --- |
| **Face Not Visible** | **Coordinates** |
|  |  |

|  |  |
| --- | --- |
| **Face Half Visible** | **Coordinates** |
|  |  |