

Computer Graphics Lab: Spring 2010

A1. Implement the following menus and submenus using OpenGL procedures (Keyboard shortcuts have to be implemented also, strictly as mentioned):

	Menu	Submenu	Details	Keyboard shortcut
(a)	File	1. Open a file	File formats: PLY, OBJ – both ASCII and Raw, as applicable.	<Ctrl>o O
		2. Save a file	File formats: As in Open.	<Ctrl>s S
		3. Take a snapshot	Image format: png, jpg.	
(b)	Edit	1. Change a vertex	User will “left click” to select a (projected) vertex; its present coordinates should be shown rightly in a textbox; user will specify the new coordinates in that textbox.	<Ctrl>v V
		2. Delete a vertex	As b1. User should be cautioned (Yes/No) before final deletion.	<Ctrl>d D
		3*. Merge coplanar and contiguous triangles	User specification: <i>Planarity factor</i> , f_n .	<Ctrl>m M
		4. Insert a new vertex	Check: The new vertex v should not coincide with an existing vertex. Find the triangle in which v lies and insert it accordingly.	<Ctrl>i I
		5. Color a triangle	User clicks on the view-port/ screen. Find the proper triangle and fill it by a color as specified by the user. <i>Note:</i> User may specify multiple triangles to be colored in same or different colors, and your program should do it efficiently with minimum user-input.	
(c)	Display	1. Background color	Simulate RGB palette and also textbox input for the user.	<Ctrl>b B
		2. Object color	Solid object, color provision for the user as background.	<Ctrl>c C To toggle from solid to wire-frame
		3. Object wire-frame		
		4. Rotation	About x-axis, anticlockwise	<Alt>x
			About x-axis, clockwise	<Shift><Alt>x
			About y-axis, anticlockwise	<Alt>y

			About y-axis, clockwise	<Shift><Alt>y
			About z-axis, anticlockwise	<Alt>z
			About z-axis, clockwise	<Shift><Alt>z
		5. Zoom	Zoom in	<Ctrl>↑
			Zoom out	<Ctrl>↓
		6. Pan	Pan left, right, up, down	<Ctrl>←, →, ↑, ↓
		7*. Floor	As specified by the user. <i>Specs.:</i> Continuous or tiled. Tile params: dimensions, color, texture or pattern, tile gallery. Domino or triomino-shaped tiles.	
(d)	Render	1. Illumination	Input: Number of light sources, their positions, colors (RGB palette), and intensities.	
		2. Ambience	Input: Parameters of diffuse reflection.	
		3. Specular reflection	Input: Specular parameters.	
		4*. Transparency	Input: Necessary parameters.	
		5*. Shadow	Input: Necessary parameters.	
(e)	Geometry	1. Triangle normal	All triangle normals drawn outwards.	
		2. Vertex normal	All vertex normals to be drawn outwards. Normal at a vertex v = mean of normals of all the triangles incident at v .	
			Weighted normal at a vertex v = weighted mean of normals of all the triangles incident at v , where weight corresponds to the triangle area.	