

AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Science and Technology



Project Title:	Desert Highway		
Group No:	01	Date of Submission:	30 June 2025
Course Title:	COMPUTER GRAPHICS		
Course Code:	CSC4118	Section:	M
Semester:	Spring 2024-25	Course Teacher:	Aneem Al Ahsan Rupai

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Group Name/No.: 01

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	Total Marks	

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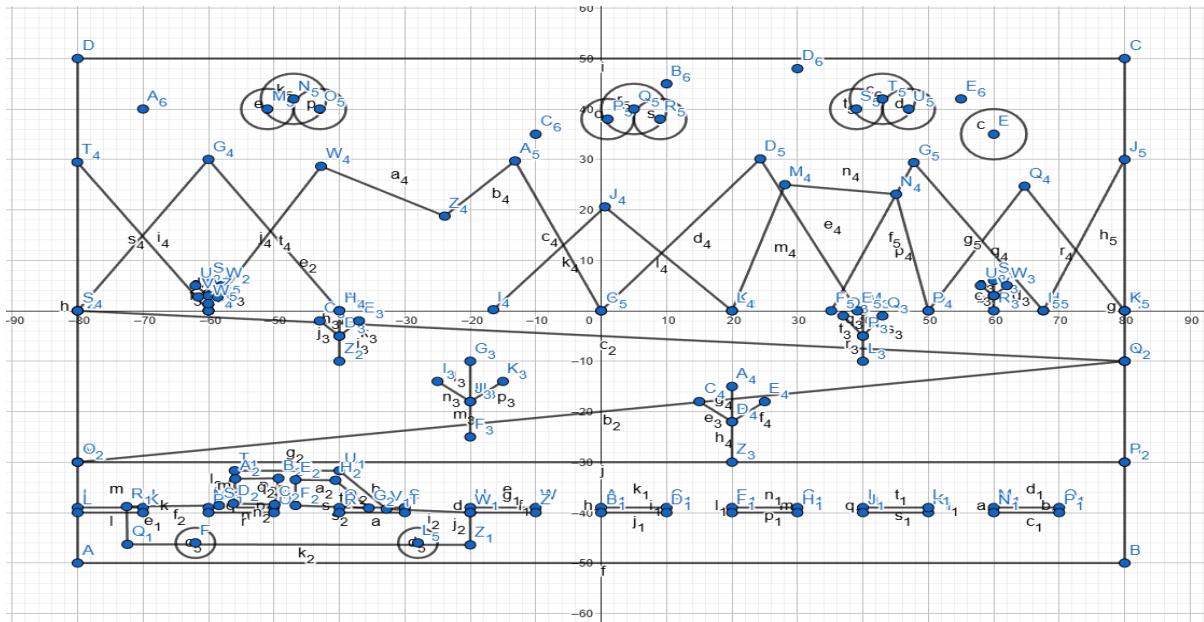
1.Introduction

Desert Highway

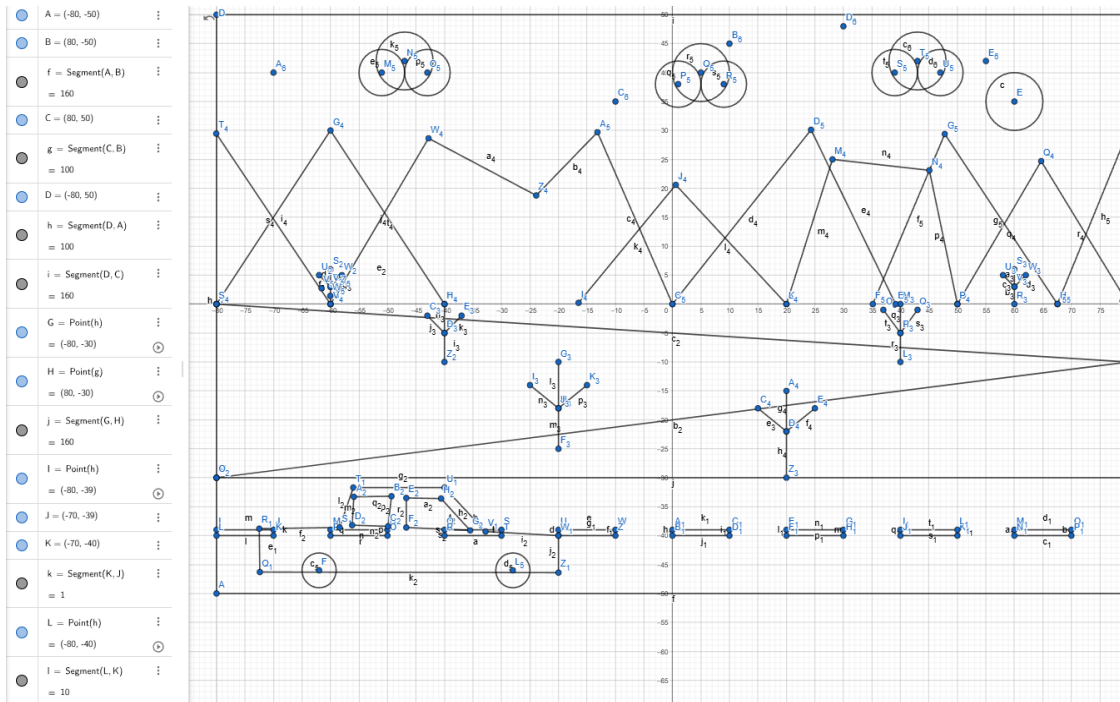
This visual work harmonizes natural and man-made elements to portray a beautiful highway through a desert landscape. The desert landscape has dynamic elements such as layered mountains, random rocks, stylized cactus trees, moving clouds over the sky, and an intense sun—all placed with care to symbolize the dry but vibrant desert landscape.

One of the most robust features of the project is the interactive day and night shift, allowing users to view the desert in different light conditions. An animated bright red car moves down the highway, providing a sense of movement and realism to the scene. The systematic layering of the project—from the sandy ground and hills to the dark brown highway—offers a deep and immersive setting. "Desert Highway" captures not only the technical ability of OpenGL/GLUT to render 2D scenes but also aesthetic storytelling using environment design and animation.

2. Graph



Graph of points



●	$K = (-70, -40)$
●	$k = \text{Segment}(K, J)$ $= 1$
●	$L = \text{Point}(h)$ $= (-80, -40)$
●	$l = \text{Segment}(L, K)$ $= 10$
●	$m = \text{Segment}(J, I)$ $= 10$
●	$M = (-60, -39)$
●	$N = (-50, -39)$
●	$n = \text{Segment}(M, N)$ $= 10$
●	$O = (-50, -40)$
●	$p = \text{Segment}(N, O)$ $= 1$
●	$P = (-60, -40)$
●	$q = \text{Segment}(P, M)$

●	$W = (-10, -39)$
●	$e = \text{Segment}(W, U)$ $= 10$
●	$Z = (-10, -40)$
●	$f_1 = \text{Segment}(W, Z)$ $= 1$
●	$g_1 = \text{Segment}(Z, V)$ $= 10$
●	$A_1 = \text{Point}(yAxis)$ $= (0, -39)$
●	$B_1 = \text{Point}(yAxis)$ $= (0, -40)$
●	$h_1 = \text{Segment}(A_1, B_1)$ $= 1$
●	$C_1 = (10, -39)$
●	$D_1 = (10, -40)$
●	$i_1 = \text{Segment}(C_1, D_1)$ $= 1$
●	$i_1 = \text{Segment}(B_1, D_1)$

●	$r = \text{Segment}(P, O)$ $= 10$
●	$Q = (-40, -39)$
●	$R = (-40, -40)$
●	$s = \text{Segment}(Q, R)$ $= 1$
●	$S = (-30, -39)$
●	$T = (-30, -40)$
●	$t = \text{Segment}(S, T)$ $= 1$
●	$a = \text{Segment}(R, T)$ $= 10$
●	$b = \text{Segment}(S, Q)$ $= 10$
●	$U = (-20, -39)$
●	$V = (-20, -40)$
●	$d = \text{Segment}(U, V)$ $= 1$

●	$j_1 = \text{Segment}(B_1, D_1)$ $= 10$
●	$k_1 = \text{Segment}(C_1, A_1)$ $= 10$
●	$E_1 = (20, -39)$
●	$F_1 = (20, -40)$
●	$l_1 = \text{Segment}(E_1, F_1)$ $= 1$
●	$G_1 = (30, -39)$
●	$H_1 = (30, -40)$
●	$m_1 = \text{Segment}(G_1, H_1)$ $= 1$
●	$n_1 = \text{Segment}(H_1, F_1)$ $= 10$
●	$p_1 = \text{Segment}(E_1, G_1)$ $= 10$
●	$l_1 = (40, -39)$
●	$J_1 = (40, -40)$

●	$L_2 = (-80, 0)$
●	$M_2 = (-80, -30)$
●	$N_2 = (80, -10)$
●	$O_2 = (-80, -30)$
●	$P_2 = (80, -30)$
●	$Q_2 = (80, -10)$
●	$b_2 = \text{Segment}(G, Q_2)$ $= 161.245154965971$
●	$c_2 = \text{Segment}(L_2, Q_2)$ $= 160.312195418814$
●	$R_2 = (-60, 0)$
●	$S_2 = (-60, 6)$
●	$T_2 = (-60, 3)$
●	$U_2 = (-62, 5)$
●	$V_2 = (-60, 3)$
●	$W_2 = (-58, 5)$
●	$d_2 = \text{Segment}(S_2, V_2)$ $= 3$

●	$m_2 = \text{Segment}(A_2, D_2)$ $= 4.9091750834534$
●	$n_2 = \text{Segment}(D_2, C_2)$ $= 6.3031738037278$
●	$p_2 = \text{Segment}(B_2, C_2)$ $= 5.234500931321$
●	$q_2 = \text{Segment}(A_2, B_2)$ $= 6.6007575322837$
●	$r_2 = \text{Segment}(E_2, F_2)$ $= 5.1$
●	$s_2 = \text{Segment}(F_2, G_2)$ $= 11.2111551590369$
●	$t_2 = \text{Segment}(H_2, G_2)$ $= 7.5006666370397$
●	$a_2 = \text{Segment}(E_2, H_2)$ $= 6.1008196170679$
●	$l_2 = (-80, 0)$
●	$J_2 = (80, 0)$
●	$K_2 = (80, -10)$

●	$H_2 = (-40.6, -33.6)$
●	$e_1 = \text{Segment}(Q_1, R_1)$ $= 7.5006666370397$
●	$g_2 = \text{Segment}(U_1, T_1)$ $= 16$
●	$h_2 = \text{Segment}(U_1, V_1)$ $= 10.4690018626419$
●	$i_2 = \text{Segment}(V_1, W_1)$ $= 12.8191263352851$
●	$j_2 = \text{Segment}(W_1, Z_1)$ $= 6.4$
●	$k_2 = \text{Segment}(Q_1, Z_1)$ $= 52.4000954197605$
●	$f_2 = \text{Segment}(R_1, S_1)$ $= 14.101418368377$
●	$l_2 = \text{Segment}(T_1, S_1)$ $= 7.3054773971316$
●	$m_2 = \text{Segment}(A_2, D_2)$ $= 4.9091750834534$

●	$d_1 = \text{Segment}(O_1, M_1)$ $= 10$
●	$Q_1 = (-72.4, -46.3)$
●	$R_1 = (-72.5, -38.8)$
●	$S_1 = (-58.4, -38.6)$
●	$T_1 = (-56, -31.7)$
●	$U_1 = (-40, -31.7)$
●	$V_1 = (-32.8, -39.3)$
●	$W_1 = (-20, -40)$
●	$Z_1 = (-20, -46.4)$
●	$A_2 = (-55.9, -33.3)$
●	$B_2 = (-49.3, -33.2)$
●	$C_2 = (-49.9, -38.4)$
●	$D_2 = (-56.2, -38.2)$
●	$E_2 = (-46.7, -33.5)$
●	$F_2 = (-46.7, -38.6)$
●	$G_2 = (-35.5, -39.1)$

Output:

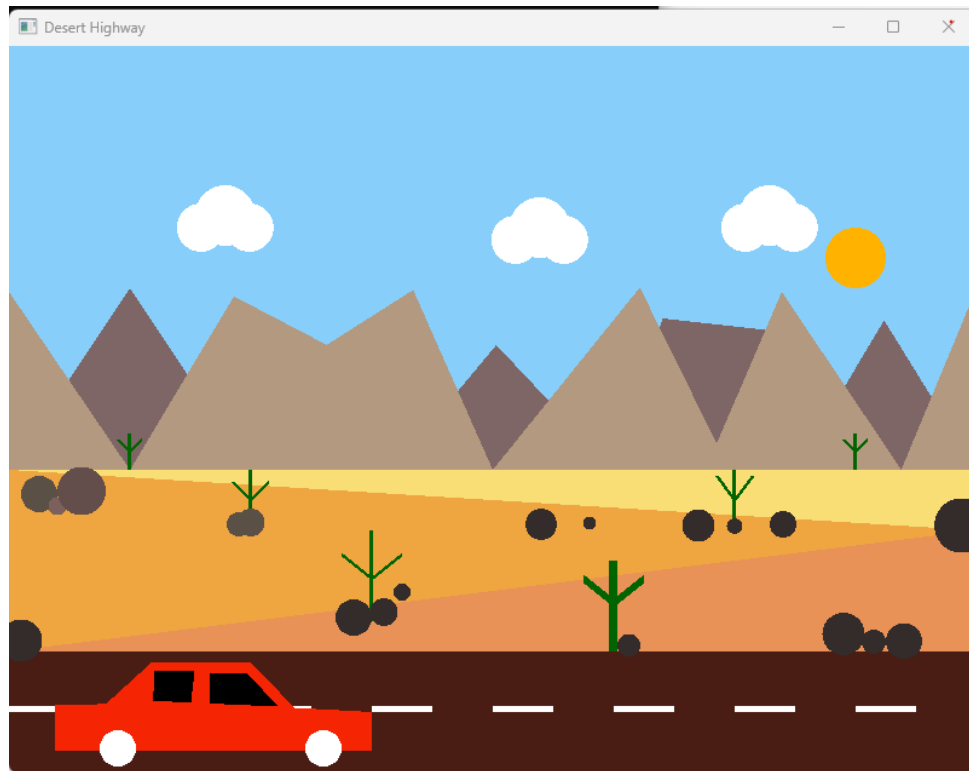


Figure 1: Day

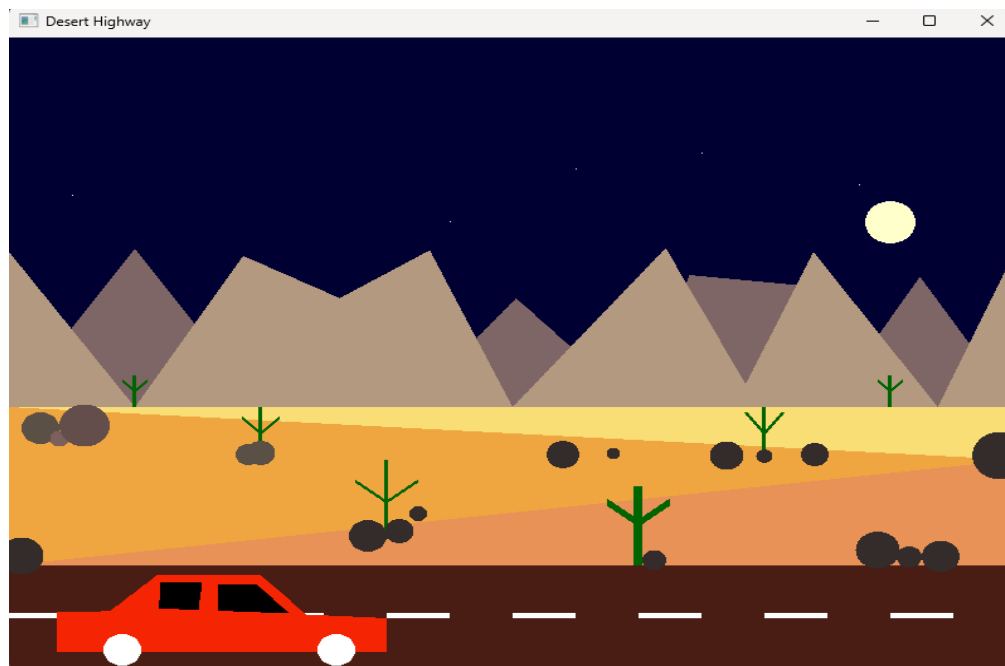


Figure 2: Night

3. List of objects assigning an object ID :

SL#	Object ID	Object Name
1	#Stone 1	Stone
2	#Stone 2	Stone
3	#Stone 3	Stone
4	#Stone 4	Stone
5	#Stone 5	Stone
6	#Stone 6	Stone
7	#Stone 7	Stone
8	#Stone 8	Stone
9	#Stone 9	Stone
10	#Stone 10	Stone
11	#Stone 11	Stone
12	#Stone 12	Stone
13	#Stone 13	Stone
14	#Stone 14	Stone
15	#Stone 15	Stone
16	#Stone16	Stone
17	#Stone17	Stone
18	#Stone19	Stone
19	#Clouds1	Clouds
20	#Clouds2	Clouds
21	#Clouds3	Clouds
22	#Sun	Sun
23	#A_hills 1	Hill
24	#A_hills 2	Hill
25	#A_hills 3	Hill
26	#A_hills 4	Hill
27	#A_hills 5	Hill
28	#A_hills 6	Hill
29	#A_hills 7	Hill
30	#A_hills 8	Hill
31	#A_hills 9	Hill
32	#Grounds1	Grounds
33	#Grounds2	Grounds
34	#Grounds3	Grounds
35	#Tree 1	Tree
36	#Tree 2	Tree
37	#Tree 3	Tree
38	#Tree 4	Tree
39	#Tree 5	Tree
40	#Tree 6	Tree

41	#Car	Car
42	#Road	Road
43	#Roaddivider 1	Road divider
44	#Roaddivider 2	Road divider
45	#Roaddivider 3	Road divider
46	#Roaddivider 4	Road divider
47	#Roaddivider 5	Road divider
48	#Roaddivider 6	Road divider
49	#Roaddivider 7	Road divider
50	#Roaddivider 8	Road divider
51	#Star1	Star
52	#Star2	Star
53	#Star3	Star
54	#Star4	Star
55	#Star5	Star

4. List of Functions To Represent Objects:

SL#	Object Name	Function Name
1	#Stone 1	A_Stones1()
2	#Stone 2	A_Stones2()
3	#Stone 3	A_Stones3()
4	#Stone 4	A_Stones4()
5	#Stone 5	A_Stones5()
6	#Stone 6	A_Stones6()
7	#Stone 7	A_Stones7()
8	#Stone 8	A_Stones8()
9	#Stone 9	A_Stones9()
10	#Stone 10	A_Stones10()
11	#Stone 11	A_Stones11()
12	#Stone 12	A_Stones12()
13	#Stone 13	A_Stones13()
14	#Stone 14	A_Stones14()
15	#Stone 15	A_Stones15()
16	#Stone 16	A_Stones16()
17	#Stone 17	A_Stones17()
18	#Stone 18	A_Stones18()
19	#Stone 19	A_Stones19()
20	#Clouds1	Cloud1()
21	#Clouds2	Cloud2()
22	#Clouds3	Cloud3()
23	#Sun	A_Sun()
24	#A_hills 1	A_hills1()
25	#A_hills 2	A_hills2()
26	#A_hills 3	A_hills3()
27	#A_hills 4	A_hills4()

28	#A_hills 5	A_hills5()
29	#A_hills 6	A_hills6()
30	#A_hills 7	A_hills7()
31	#A_hills 8	A_hills8()
32	#A_hills 9	A_hills9()
33	#Grounds1	A_Groud1()
34	#Grounds2	A_Groud2()
35	#Grounds3	A_Groud3()
36	#Tree 1	A_DesertTrees1()
37	#Tree 2	A_DesertTrees2()
38	#Tree 3	A_DesertTrees3()
39	#Tree 4	A_DesertTrees4()
40	#Tree 5	A_DesertTrees5()
41	#Tree 6	A_DesertTrees6()
42	#Car	A_car()
43	#Road	A_road()
44	#Roaddivider 1	A_roadanddivider1()
45	#Roaddivider 2	A_roadanddivider2()
46	#Roaddivider 3	A_roadanddivider3()
47	#Roaddivider 4	A_roadanddivider4()
48	#Roaddivider 5	A_roadanddivider5()
49	#Roaddivider 6	A_roadanddivider6()
50	#Roaddivider 7	A_roadanddivider7()
51	#Roaddivider 8	A_roadanddivider8()
52	#Star1	Star1()
53	#Star2	Star2()
54	#Star3	Star3()
55	#Star4	Star4()
56	#Star5	Star5()

5. List of Animation Functions with ID:

SL#	Animation Function ID	Animation Function	Object/Scene
1	#Tree 1	void timer()	Tree
2	#Tree 2	void timer()	Tree
3	#Tree 3	void timer()	Tree
4	#Tree 4	void timer()	Tree
5	#Tree 5	void timer()	Tree
6	#Tree 6	void timer()	Tree
7	#Car	moveCar()	Car
8	#Clouds1	void timer()	Cloud
9	#Clouds1	void timer()	Cloud
10	#Clouds1	void timer()	Cloud
12	#for CAR	void mouseClicked()	car
13	#day night	void keyboard()	Day night

6. Contribution:

Member Name	Implemented Functions	Implemented Animation Functions	Percentage of Contribution
Swapnil Kuri	A_Stones1()	void moveCar()	25%
	A_Stones2()	void timer()	
	A_Stones3()	void keyboard()	
	A_Stones4()	void mouseClicked()	
	A_Stones5()		
	A_Stones6()		
	A_Stones7()		
	A_Stones8()		
	A_Stones9()		
	A_Stones10()		
	A_Stones11()		
	A_Stones12()		
	A_Stones13()		
	A_Stones14()		
	A_Stones15()		
	A_Stones16()		
	A_Stones17()		
	A_Stones18()		
	A_Stones19()		
	A_hills1();		
	A_hills2();		
	A_hills3();		
	A_hills4();		
	A_hills5();		
	A_hills6();		
	A_hills7();		
	A_hills8();		
	A_hills9();		
	A_Groud1()		
	A_Groud2()		
	A_Groud3()		
	A_DesertTrees1()		
	A_DesertTrees2()		
	A_DesertTrees3()		
	A_DesertTrees4()		
	A_DesertTrees5()		
	A_DesertTrees6()		
	A_road()		
	A_roadanddivider1()		
	A_roadanddivider2()		
	A_roadanddivider3()		
	A_roadanddivider4()		
	A_roadanddivider5()		

	A_roadanddivider6()		
	A_roadanddivider7()		
	A_roadanddivider8()		
	A_car()		
	Cloud1()		
	Cloud2()		
	Cloud3()		
	Star1()		
	Star2()		
	Star3()		
	Star4()		
	Star5()		

7.Conclusion:

The Desert Highway project is an excellent example of creative fusion of artistic vision and technical implementation using OpenGL and GLUT. Through its environmental details, smooth animations, and interactive features like the day-night cycle, the project offers an immersive visual experience. Not only does the project show what can be achieved with 2D graphics programming, but it also demonstrates thoughtful storytelling through scene staging and animation. Overall, Desert Highway is a demonstration of how far code can be pushed to develop engaging and good-looking simulations.