AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

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DEPARTMENT OF COMPUTER SCIENCE

COMPUTER GRAPHICS

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Section: L, Group: 07

Project Title: " A Journey Through City, Hill & Beach: Train Landscapes".

Supervised By

ANEEM AL AHSAN RUPAI

Individual Project Report by: Irtisam Faruqui Alavi **ID:** 22-48863-3

Group Member:

Name	ID
IRTISAM FARUQUI ALAVI	22-48863-3
MD. FAHIM SHAHRIYAR PRANTO	22-48848-3
DIGANTA BEPARI	22-49977-3

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Introduction

The title of our project is “A Journey Through City, Hill & Beach: Train Landscapes”. In this project, we have implemented a 2D animated view of three different natural and urban landscapes found in Bangladesh: a busy city, hilly countryside, and a scenic coastal beach. Our main focus is on visually representing these scenarios using OpenGL with dynamic elements like moving vehicles, flying planes, boats, and environmental objects to make each scene feel immersive and interactive.
There are three scenarios in the project, and each scenario is designed to represent a distinct region with its own natural and infrastructural characteristics.

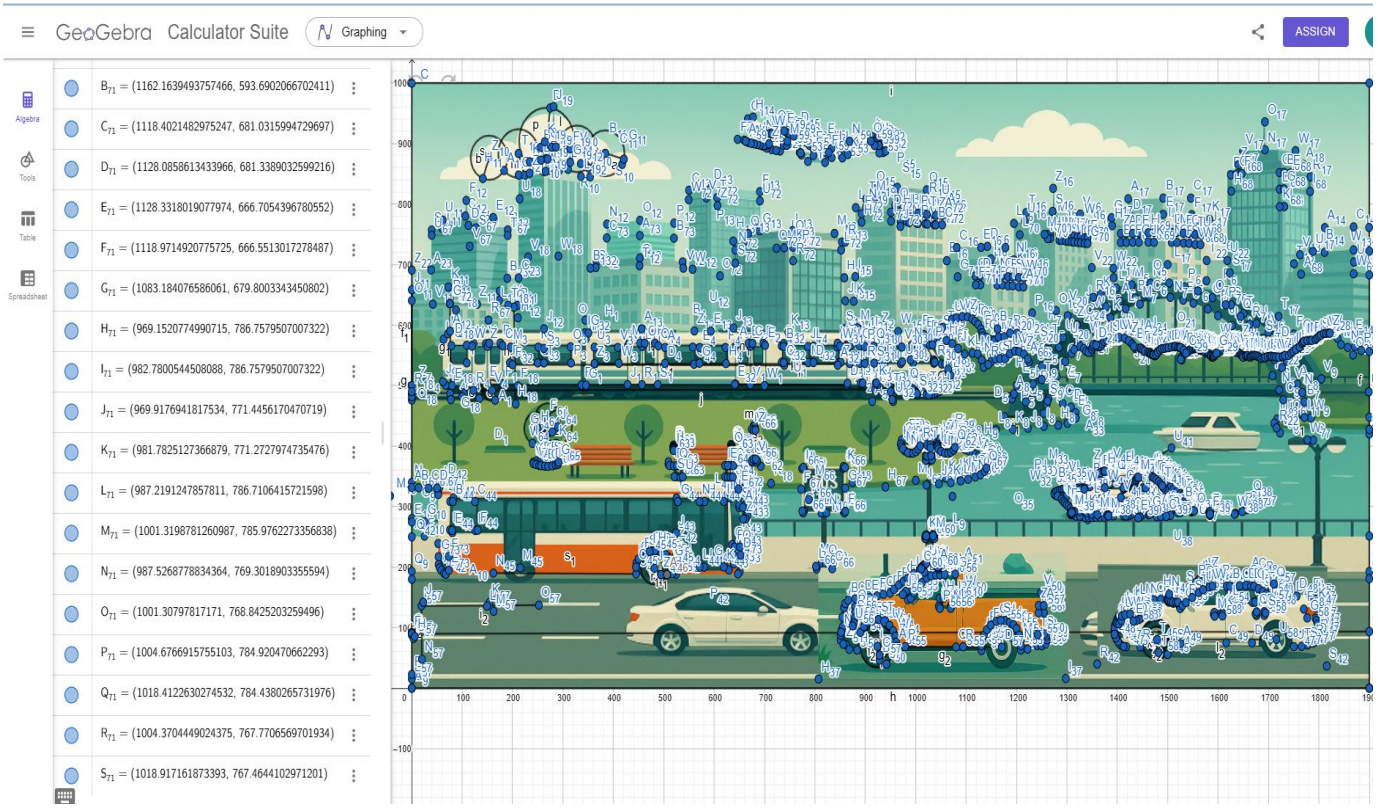
Scenario 1: Urban City Inspired by Dhaka

The first and most detailed scenario of our project portrays a bustling urban environment inspired by Dhaka city, showcasing the dynamic and chaotic yet vibrant life of a metropolitan area. This scene combines multiple animated components to deliver a realistic feel of a busy day in the capital. A train continuously moves along its tracks, representing the city's active rail transport. Above, birds gracefully fly across the sky while commercial airplanes travel through defined flight paths, adding layers of realism and motion to the skyline. On the ground, wide roads are filled with moving vehicles including buses, cars, and pickups, all running on separate lanes to simulate organized city traffic. A serene lake placed strategically within the city adds a touch of nature, with boats gliding slowly across its surface, offering contrast to the fast-paced surroundings. Around the lake and on the sidewalks, static and decorative elements like chairs and lamp posts enrich the environment with details one would find in a modern city park. Fields and patches of greenery are also included to mimic urban landscaping efforts, creating balance between nature and infrastructure. All objects, whether static or moving, are designed with smooth animation transitions to ensure immersive realism. This scenario not only sets the tone of the entire project but also acts as the central highlight due to its complexity, richness in visual elements.

Technologies used

We used OpenGL to create the entire project. We used different features of OpenGL like lines, polygon, quads, circle drawing, translation, scaling, rotation, and moving animation. We also use free glut ,a special library which is mainly used in bird animations. We used GeoGebra online graphing tool to graph the entire project. We took help from some online websites like pine tools, google images to search for designs and colors. BMP pictures and textures and audio are also used in the project.

Project Graph-



List of Objects(Scenario – 01)

SL#	Object ID	Object Name
1	1	backgroundtexture
2	2	background1texture
3	3	greenfield
4	4	lake
5	5	road
6	6	roadlines
7	7	walkway
8	8	railing
9	9	trainwindowdoor
10	10	trainwindowdoor1
11	11	trainwindowdoor2
12	12	trainwindowdoor3
13	13	trainwindowdoor4
14	14	trainwheels
15	15	building1
16	16	b1windows
17	17	b1windows1
17	17	building2
19	19	b2windows
20	20	b2windows2
21	21	building3
22	22	b3windows
23	23	b3windows1
24	24	b3windows2
25	25	building4
26	26	b4windows

27	27	b4windows1
28	28	building5
29	29	b5windows
30	30	building6
31	31	b6windows
32	32	b6windows1
33	33	b6windows2
34	34	building7
35	35	b7windows
36	36	b7windows1
37	37	b7windows2
38	38	building8
39	39	b8windows
40	40	building9
41	41	b9windows
42	42	b9windows1
43	43	building10
44	44	b10windows
45	45	b10windows1
46	46	building11
47	47	b11windows
48	48	building12
49	49	b12windows
50	50	b12windows1
51	51	b12windows2
52	52	b12windows3
52	52	building13
54	54	b13windows
55	55	backbuildings

56	56	train
57	57	birds
58	58	bridge
59	59	bushes
60	60	waves
61	61	boat1
62	62	boat2
63	63	bus1
64	64	bus1allwindows
65	65	bus1wheels
66	66	bus2
67	67	car1
68	68	car1wheelsa
69	69	car2
70	70	pickup
71	71	pickupwheels
72	72	plane
73	73	planewindows
74	74	busstop
75	75	lightpost
76	76	callinglightpostss
77	77	trees
78	78	callingtrees
79	79	benches
80	80	callingbenches
81	81	smalllights
82	82	callsmalllights
83	83	renderText

List of Functions(Scenario – 01)

SL#	Object Name	FunctionName
1	backgroundtexture	background()
2	background1texture	background1()
3	greenfield	greenfield()
4	lake	lake()
5	road	road()
6	roadlines	roadlines()
7	walkway	walkway()
8	railing	railingv
9	trainwindowdoor	trainwindowdoor()
10	trainwindowdoor1	trainwindowdoor1()
11	trainwindowdoor2	trainwindowdoor2()
12	trainwindowdoor3	trainwindowdoor3()
13	trainwindowdoor4	trainwindowdoor4()
14	trainwheels	trainwheels()
15	building1	building1()
16	b1windows	b1windows()
17	b1windows1	b1windows1()
17	building2	building2()
19	b2windows	b2windows()
20	b2windows2	b2windows2()
21	building3	building3()
22	b3windows	b3windows()
23	b3windows1	b3windows1()
24	b3windows2	b3windows2()
25	building4	building4()
26	b4windows	b4windows()

27	b4windows1	b4windows1()
28	building5	building5()
29	b5windows	b5windows()
30	building6	building6()
31	b6windows	b6windows()
32	b6windows1	b6windows1()
33	b6windows2	b6windows2()
34	building7	building7()
35	b7windows	b7windows()
36	b7windows1	b7windows1()
37	b7windows2	b7windows2()
38	building8	building8()
39	b8windows	b8windows()
40	building9	building9()
41	b9windows	b9windows()
42	b9windows1	b9windows1()
43	building10	building10()
44	b10windows	b10windows()
45	b10windows1	b10windows1()
46	building11	building11()
47	b11windows	b11windows()
48	building12	building12()
49	b12windows	b12windows()
50	b12windows1	b12windows1()
51	b12windows2	b12windows2()
52	b12windows3	b12windows3()
52	building13	building13()
54	b13windows	b13windows()
55	backbuildings	backbuildings()

56	train	train()
57	birds	AnimatedBirda()
58	bridge	bridge()
59	bushes	bushes()
60	waves	waves()
61	boat1	boat1()
62	boat2	boat2()
63	bus1	bus1()
64	bus1allwindows	bus1allwindows()
65	bus1wheels	bus1wheels()
66	bus2	bus2()
67	car1	car1()
68	car1wheelsa	car1wheelsa()
69	car2	car2()
70	pickup	pickup()
71	pickupwheels	pickupwheels()
72	plane	plane()
73	planewindows	planewindows()
74	busstop	busstop()
75	lightpost	lightpost()
76	callinglightpostss	callinglightpostss()
77	trees	trees()
78	callingtrees	callingtrees()
79	benches	benches()
80	callingbenches	callingbenches()
81	smalllights	smalllights()
82	callsmalllights	callsmalllights()
83	renderText	renderText()

List of Animation Functions(Scenario – 03)

SL#	Animation Function ID	Animation Function	Object/Scene
1	a1	updateBirda()	Birds flying
2	a2	update()	Waves moving
3	a3	update1()	Train moving
4	a4	update2()	Boat1 moving
5	a5	update3()	Boat2 moving
6	a6	update4()	Plane moving
7	a7	update5()	Bus1 moving
8	a8	update6()	Car2 moving
9	a9	update7()	Bus2 moving
10	a10	update8()	Pickup moving
11	a11	update9()	Car1 moving
12	a12	toggleColor()	Colors toggle in the text “BUS STOP”
13	a13	handleKeypressa()	Keyboard Interactions
14	a14	handleSpecialKey()	Special key Interactions
15	a15	unifiedMouseHandler()	Mouse Interaction

Contribution

Member Name	Implemented Functions	Implemented Animation Functions	Percentage of Contribution
IRTISAM FARUQUI ALAVI	83	15	33.33%

Conclusion

In conclusion, our project "A Journey Through City, Hill & Beach: Train Landscapes" successfully captures the dynamic spirit of urban life through its first scenario, which is the central focus of the project. This scenario offers a detailed and realistic depiction of a cityscape inspired by Dhaka, reflecting the energy, motion, and complexity of a modern metropolitan environment. With animated trains symbolizing the city's vital transportation network, birds and airplanes adding life to the sky, and roads filled with moving cars, buses, and pickups, this scenario brings together all essential components of a lively urban ecosystem. The inclusion of elements like boats in a lake, cityside chairs, lamp posts, and patches of fields adds depth and variety to the landscape, illustrating how nature and infrastructure coexist in a busy city. Every object is designed with fluid motion and precise placement, ensuring a highly immersive experience. Utilizing OpenGL for graphics and animation, and tools like GeoGebra for layout design, we maintained technical accuracy and aesthetic harmony. The addition of BMP textures and wav sound effects further enhanced the environment, making the city feel alive and responsive.

Overall, this scenario not only reflects the essence of everyday life in a vibrant city like Dhaka but also demonstrates the capability of modern graphics programming to recreate complex real-world environments. We believe this project sets a foundation for future work in virtual city modeling and inspires further innovations in 3D urban visualization.

KEYBOARD AND MOUSE INSTRUCTIONS FOR SCENARIO 1

KEY '1': SCENARIO 1 (DAY)
KEY '2': SCENARIO 1 (NIGHT)

KEY '3': SCENARIO 2 (DAY)
KEY '4': SCENARIO 2 (RAIN)

KEY '5': SCENARIO 3

KEY 'esc' : EXIT
KEY 'L/l' : Toggle light on/off in night mode

KEY 'H/h' : Horn of train

KEY 'S/s' : Stop bus1 and freeze signboard
KEY 'M/m' : Resume Bus1 and signboard

KEY 'Q/q' : Manual car control of car2
KEY 'd' : Move forward car 2
KEY 'A/a' : Move Backward car2
KEY 'W/w': Move upward car 2
KEY 'X/x' : Move downward car2

KEY 'f' : Pause both car1 and pickup
KEY 'g' : Resume both car1 and pickup
KEY 'j' : Slow down both car1 and pickup
KEY 'k' : Speed up both car1 and pickup

KEY 't' : Speed up bus 2
KEY 'y' : Slow down bus 2

KEY 'UP' : Plane goes upward
KEY 'DOWN' : Plane goes downward
KEY 'RIGHT' : Plane speed increases
KEY 'LEFT' : Plane speed decreases

MOUSE HANDLER-

LEFT CLICK- Increase Speed of train
RIGHT CLICK- Decrease Speed of train
MIDDLE CLICK- Default Speed of train

SCROLL UP- Increase Speed of boat1
SCROLL DOWN- Decrease Speed of boat1