

American International University Bangladesh



Computer Graphics **Course Code: CSC4118** **Spring Semester 2023-** **24**

**Project Report [Urban scenario of a day,
night, and rain]**
SECTION : F

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II. Table of Contents:

Topic name	Page number
1. Introduction	3
2. Background	3
3. Objective of the project	4
4. List of Objects	6
5. System Implementation method	6
6. Significance of the project	8
7. Conclusion	9
8. Screenshot of the system	10

▪ **Introduction:**

The project aims to explore and implement a scenario of an urban area with the change in day and night. There is also a scenario of raining at night. This report provides a comprehensive overview of the project, its objectives, and the methodologies employed.

▪ **Background:**

"Urban Scenario Day, Night, and Rain" serves as a captivating project in the realm of computer graphics, offering a multifaceted exploration of urban environments through digital artistry and advanced rendering techniques.

1. **Daytime Urban Landscape:** Utilizing sophisticated rendering algorithms and texture mapping, the project recreates the vibrant energy of a bustling city during daylight hours. High-fidelity models of skyscrapers, streets, and landmarks are meticulously crafted to capture the intricacies of urban architecture. Realistic lighting effects simulate the play of sunlight, casting dynamic shadows that shift as the virtual sun moves across the sky. Through intricate details and lifelike animations, viewers are immersed in the sights and sounds of urban life.
2. **Nighttime Cityscape:** Transitioning seamlessly from day to night, the project transforms the urban landscape into a nocturnal wonderland. Neon signs, street lamps, and car headlights illuminate the darkness, creating a mesmerizing interplay of light and shadow. Advanced shading techniques bring out the depth and atmosphere of the night, while ambient occlusion adds realism to the scene. Dynamic weather effects such as fog and mist enhance the mood, enveloping viewers in an immersive digital dreamscape.
3. **Rainy Urban Environment:** The pièce de résistance of the project is the simulation of rain-soaked city streets. Realistic particle systems generate cascading raindrops that interact with the virtual environment, creating ripples in puddles and streaks on surfaces. Wet shaders add a glistening sheen to buildings and pavements, enhancing the illusion of a downpour. Immersive sound design complements the visual spectacle, with audio effects simulating the patter of raindrops and distant thunder, further heightening the sense of immersion.
4. **Interactive Exploration:** Beyond passive observation, the project offers viewers the opportunity for interactive exploration. Using intuitive controls, users can navigate through the digital urban landscape, exploring every nook and cranny of the cityscape. Interactive elements such as clickable objects or

hidden easter eggs encourage engagement and discovery, fostering a sense of agency within the virtual environment.

"Urban Scenario Day, Night, and Rain" represents a convergence of artistic vision and technical innovation in the field of computer graphics, pushing the boundaries of what's possible in digital storytelling and immersive experiences. With its seamless blend of realism and imagination, it invites audiences to embark on a journey through the urban jungle like never before.

▪ **Objective of the project:**

The objective of "Urban Scenario Day, Night, and Rain" is multifaceted, aiming to achieve several key goals:

1. **Immersive Experience:** The primary objective is to create an immersive experience that transports viewers into the heart of urban environments. By leveraging advanced computer graphics techniques, the project seeks to blur the lines between reality and virtuality, allowing audiences to feel fully immersed in the sights and sounds of the city.
2. **Atmospheric Exploration:** Another goal is to explore the dynamic interplay of light, shadow, and weather in urban landscapes. By simulating different times of day and weather conditions, the project aims to evoke a range of emotions and moods, from the hustle and bustle of daytime activity to the tranquility of a rainy night.
3. **Technical Innovation:** "Urban Scenario Day, Night, and Rain" serves as a showcase for cutting-edge techniques in computer graphics and interactive media. The project pushes the boundaries of what's possible with rendering algorithms, texture mapping, particle systems, and dynamic lighting, demonstrating the latest advancements in digital artistry and technology.
4. **Artistic Expression:** Beyond technical prowess, the project is a creative endeavor aimed at expressing the beauty and complexity of urban life. Through meticulous attention to detail and artistic vision, it seeks to capture the essence of cityscapes in all their diversity, from towering skyscrapers to hidden alleyways.
5. **Engagement and Exploration:** The project encourages viewer engagement and exploration, inviting audiences to interact with the digital environment and uncover its hidden secrets. By offering a sense of agency within the virtual world, it fosters a deeper connection between viewers and the urban landscape, sparking curiosity and creativity.

Overall, the objective of "Urban Scenario Day, Night, and Rain" is to create a captivating and memorable experience that inspires wonder, curiosity, and appreciation for the rich tapestry of urban life. Through a fusion of artistry, technology, and storytelling, it seeks to transport audiences on a journey through the sights, sounds, and sensations of the modern metropolis.

List of objects:

Satellites: Orbiting communication hubs equipped with transmitters and receivers.

Cars: There are three distinct types of cars in the scenario. A private car, a taxi and a bus.

Trees: Trees are added to make the scenario more beautiful.

Bench: There are 2 benches added to the scenario.

Lamp post: To make the scenario more beautiful we have added two British lamppost.

Signals: Electromagnetic waves carrying data transmitted between satellites and ground stations. Which has been shown in red dotted line.

Sun: The sun shown in our project is moving left to right maintaining a time constant. When the sun goes to the age of the window the scenario automatic to night.

Moon: The moon shown in our project is moving left to right maintaining a time constant. When the sun goes to the age of the window the scenario is automatic today.

Stars: the stars can only be seen at night.

Clouds: Clouds are added in the day scenario only and it is moving in a time constant. And we have avoided the clouds in the night scenario to make the night view clear.

Grass Function: Represents a grassy area with a light green color.

Day, Night, and Rainy mode:

- **System Implementation methods:**

1. Main

Use: Implement all the functions.

2. Circle

Use: Draw sun,moon, cloud, tree.

3.Bench

Use: Draw 2 bench in day and night scenario.

4. Satellite

Use: Draw a satellite in night scenario.

5. Lamppost

Use: draw 2 lamppost in day and night scenario.

6. Update 1, Update 2, Update 3

Use: Automatically day night shifting by the movement of sun and moon.

7.Update cloud 1, update cloud 2

Use: Move 2 clouds in day
scenario.

8. Update_Fixed_Human

Use: Move 2 humans in day scenario.

9. Moon_Update

Use: Movement of moon.

10. Update_sun in night scenario.

Use: Movement of sun in day scenario.

11. Fixed_Human1, Fixed_Human2, Fixed_Human3, Fixed_Human4

Use: Draw 4 human object in day and night scenario.

12. Line1, line2

Use: Draw the wave line in night scenario.

13.Human-comb-Night, Human comb

Use;

14. Moon

Use: draw moon in night scenario.

15. Sun

Use: Draw sun in day scenario

16. Cloud

Use: Draw cloud in day scenario.

17. Car 1,Car2, Car3

Use: Draw 3 car.

18. Init

Use: Initialize background color.

19. Tree

Use: Draw 2 tree.

20.Mibile tower

Use: Draw 2 towers in night scenario.

21. Last 7 buildings.

22.Display.

23. Keyboard.

24. We have used gluOrtho2D () function to utilize the code points with the grid plotted points.

25. Rain view.

Significance of the project:

The significance of "Urban Scenario Day, Night, and Rain" extends far beyond its innovative use of technology and captivating visual aesthetics. At its core, the project serves as a powerful tool for fostering empathy, understanding, and appreciation for the diverse and dynamic nature of urban environments.

By providing viewers with immersive experiences that simulate the sights, sounds, and sensations of city life, the project offers a unique opportunity to explore and connect with urban landscapes in ways that may not be possible in the physical world. This has profound implications for education, urban planning, and cultural preservation, as it allows individuals to gain insights into different cities, cultures,

and lifestyles from the comfort of their own homes.

Moreover, "Urban Scenario Day, Night, and Rain" has the potential to spark conversations and inspire action around pressing urban issues, such as sustainability, equity, and resilience. By simulating scenarios that reflect real-world challenges and opportunities, the project can serve as a catalyst for community engagement and collective problem-solving, empowering individuals to envision and create more vibrant, inclusive, and sustainable cities for future generations.

Ultimately, the significance of "Urban Scenario Day, Night, and Rain" lies in its ability to transcend boundaries and bridge divides, fostering a deeper sense of connection and understanding between people and the cities they inhabit. In an increasingly urbanized world, where most of the population resides in cities, projects like this play a vital role in shaping our collective perceptions and experiences of urban life, and in shaping the cities of the future.

Conclusion:

"Urban Scenario Day, Night, and Rain" is like a cool adventure that mixes art with computer magic. It takes you on a journey through different parts of a city, showing you what it's like during the day, at night, and when it's raining.

Using super fancy computer tricks, the project creates amazing scenes that make you feel like you're really there. You can almost hear the sounds of cars honking and people chatting as you walk down the digital streets.

But it's not just about looking cool—it's also about telling stories. Each scene has its own tale to tell, drawing you into the hustle and bustle of city life.

Overall, "Urban Scenario Day, Night, and Rain" is a fun way to explore cities and learn more about how computer graphics can make things look and feel real. So, get ready to be amazed and enjoy the ride!

▪ **Future Work:**

Looking ahead, future work on "Urban Scenario Day, Night, and Rain" could explore several exciting avenues to enhance the project's immersive experience and broaden its impact.

One potential direction is the integration of emerging technologies such as virtual reality (VR) and augmented reality (AR). By leveraging VR headsets or AR glasses, viewers could step directly into the digital urban landscapes, experiencing them in full 360-degree immersion. This would not only deepen the sense of presence but also offer new opportunities for interactive exploration and storytelling.

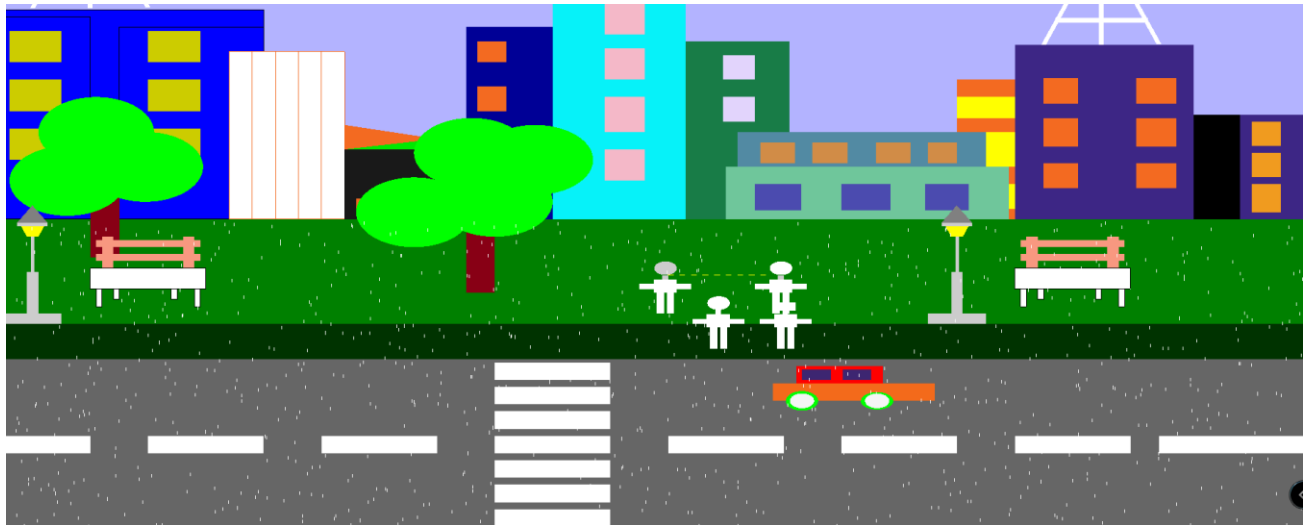
Additionally, advancements in procedural generation and machine learning algorithms could be harnessed to create even more dynamic and realistic cityscapes. By automating the generation of urban environments based on real-world data or artistic parameters, the project could scale up to include a wider variety of cities and architectural styles, further enriching the diversity of experiences available to viewers.

Screenshot of the system:

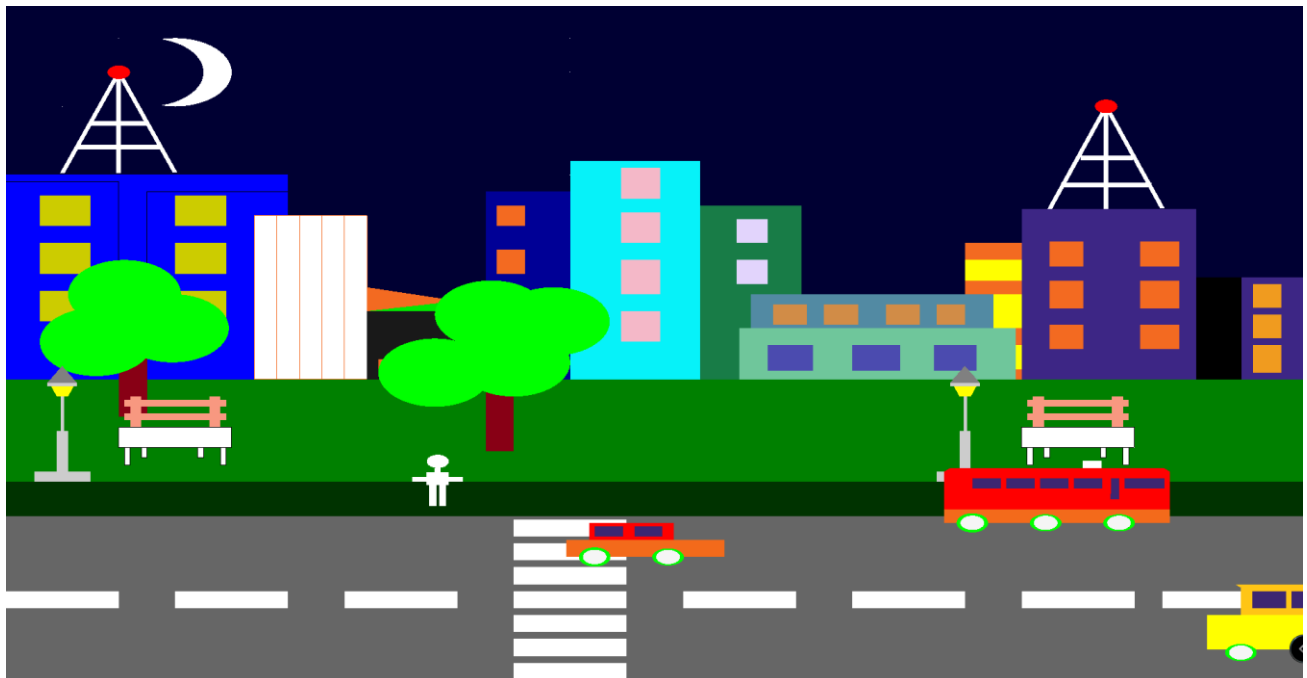
Day View:



Day view with raining:



Night View:



Night view with rain:



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Work Details

Video recording, satellite, creating buildings

Creating buildings, human, sun and cloud

Creating mobile tower, trees, moving humans

Combining Function, video editing, adding sound effects.

Moving and creating cars, rain effects, report writing