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Development of a 3D Short Animated Film on Traffic Compliance Utilizing Offline Rendering Techniques

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Abstract

Traffic violations such as running red lights are one of the main causes of accidents in Indonesia. The lack of public awareness, especially among drivers, worsens this issue. This study aims to design a short 3D animated film using the offline render method as an educational medium to raise awareness about the importance of obeying traffic signals. This method was chosen for its ability to produce realistic visual quality and support strong message delivery. The design process includes problem identification, data collection through surveys and literature review, story idea development, storyboard creation, and animation production. The production stages involve modelling, texturing, rigging, lighting, animation, camera work, and rendering, while post-production includes visual editing, audio arrangement, and final video output. The software used in this research includes Blender and CapCut. The final product is a 1-minute-47-second MP4 video animation that visually depicts the consequences of traffic violations. This video is expected to raise public awareness of the importance of following traffic rules in an engaging and easily understandable way.

Keywords: *3D Animation, Traffic, Public Awareness, Offline Render*

1. Introduction

Traffic violations still frequently occur in the surrounding environment. Based on data from 2019, there were 2,410 violations committed by drivers, an increase compared to the previous year. The majority of these violations were committed by drivers who were not careful while driving. Meanwhile, the latest data shows that from January to July 2021, there were 113 recorded cases of traffic accidents [1]. A violation is a behavior in which a person disobeys or ignores norms or values that serve as rules in society. A person is said to commit a violation if they do not comply with a mutual agreement, such as traffic regulations. This action can take the form of a minor violation or a criminal act that has the potential to harm others or the public interest [2]. One effort that can be made by researchers to prevent traffic violations by drivers is by creating 3D animations as a medium for effectively conveying messages. The purpose of this step is to reduce the number of violations committed by road users [3]. In addition, 3D animation is also capable of capturing the audience's interest and helping to enhance their understanding of the material presented by the researcher [4]. The survey method is used to collect data through questionnaires, aiming to assess the level of public understanding and attitude toward traffic compliance, as well as to evaluate how effective 3D animation is as an educational medium. The use of the offline render method enables the rendering process to produce highly realistic visuals, especially in terms of lighting, textures, and detailed shadows. This technique is ideal for creating 3D animations that demand high visual quality. However, although it can produce high-quality output, this method requires a significant amount of time to complete the rendering process [5].Most traffic accidents in Indonesia occur due to violations committed by drivers. Therefore, educating the public about the importance of obeying traffic signs from an early age becomes crucial, one of which is through 3D animation media [6]. 3D animation technology is capable of presenting objects in a three-dimensional format, thereby providing a more realistic and immersive visual experience. This approach is expected to make the educational process more engaging and effective [7]. Based on the background of this issue, the author chose the title: "DESIGNING A 3D ANIMATED SHORT FILM ON TRAFFIC COMPLIANCE USING THE OFFLINE RENDER METHOD."

2. Literature review

2.1. 3D Animation

3D animation is the result of computer processing that creates a three-dimensional space to visually present objects. Unlike 2D animation, which only involves length and width dimensions, 3D animation adds the depth dimension, resulting in a more realistic and immersive appearance. Objects in 3D animation have volume and can move and rotate like real-world objects [7]. The creation of 3D animation

consists of several stages, starting from object modeling, applying animation through a sequence of frames, to the rendering stage to produce the final video. The rendering process uses a virtual camera that helps create the illusion of space and perspective within a digital environment. Thanks to these advantages, 3D animation is able to deliver more dynamic and lifelike visualizations [8].

2.2. Rigging

Rigging is a stage in 3D animation that involves adding a skeleton or bone structure to an object in order to facilitate movement control. With this system, parts such as hands, feet, or tails can move naturally and efficiently. The rigging process is typically applied to human characters, animals, or vehicles so they can be animated dynamically according to the needs of the animation [11].Creating an optimal rigging system allows animators to produce dynamic and natural movements, making characters appear more lifelike and less stiff. The level of rigging complexity in animated characters can vary, ranging from simple to highly complex, depending on the animation's motion requirements. More detailed rigging usually takes longer to complete and is used for characters that require smoother and more realistic movements [12].

2.3. Offline rendering

Offline rendering, also known as pre-rendering, is a rendering technique in which all production stages are completed beforehand, allowing the final result to be displayed without requiring real-time processing. This process begins with the creation of a 3D model using CGI (Computer-Generated Imagery), followed by the addition of various elements such as textures, lighting, and shadows to create a more realistic appearance. The output is then processed using a CPU or GPU and converted into a 2D format compatible with user devices, such as computer or mobile screens. The rendering time depends on the complexity of the project being worked on [13].

3. Research Method

3.1. Data Collection Method

To obtain the necessary data for designing the 3D animated short film, the author applied several methods, including:

1. Survey Method; The author will distribute a Google Form to university students to collect data related to the level of compliance with traffic regulations.
2. Literature Study Method; The author gathers data by accessing journals and various references available on the internet.

4. Results

In this section, the author will present the final results of the 3D animation design process that has been completed:

Figure 1: Scene 1

Scene 1 shows the STMIK Time opening logo with a screen wipe transition effect.

Figure 2: Scene 2

Scene 2 shows two pedestrians having a casual conversation.

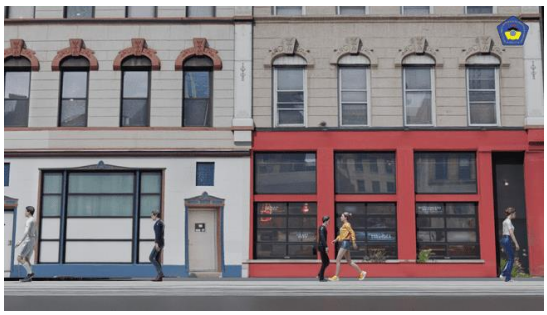

Figure 3: Scene 3

Scene 3 shows two pedestrians having a casual conversation.

Figure 4: Scene 4

Scene 4 shows a traffic light switching into a red light

Figure 5: Scene 5

Scene 5 shows a yellow car accelerating with a high speed

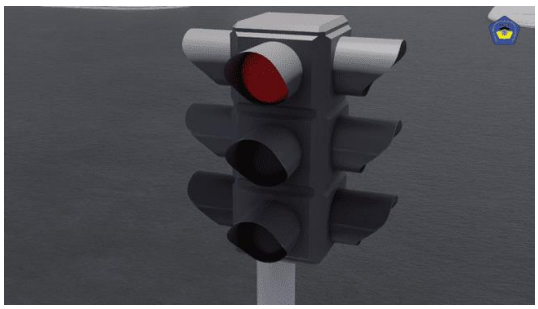

Figure 6: Scene 6

Scene 6 shows another traffic light switching into a red light on the other side of the intersection

Figure 7: Scene 7

Scene 7 shows a black car stopping at a red light

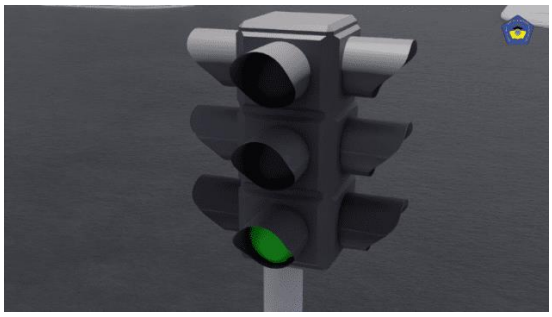

Figure 8: Scene 8

Scene 8 shows a traffic light switching into a green light

Figure 9: Scene 9

Scene 9 shows 2 cars collide due to the car who ran a red light

Figure 10: Scene 10

Scene 10 shows a black car experiencing a heavy dent

Figure 11: Scene 11

Scene 11 shows a yellow car also experiencing a heavy dent

Figure 12: Scene 12

Scene 12 shows two pedestrians is showing exclamations by the collisions

Figure 13: Scene 13

Scene 13 shows a driver is experiencing an injury from the collision

Figure 14: Scene 14

Scene 14 shows a pedestrian is giving the driver a warning to not run a red light

Figure 15: Scene 15

Scene 15 shows a pedestrian approaching the driver who is experiencing injuries

Figure 16: Scene 16

Scene 16 shows an ambulance has arrived to the accident site

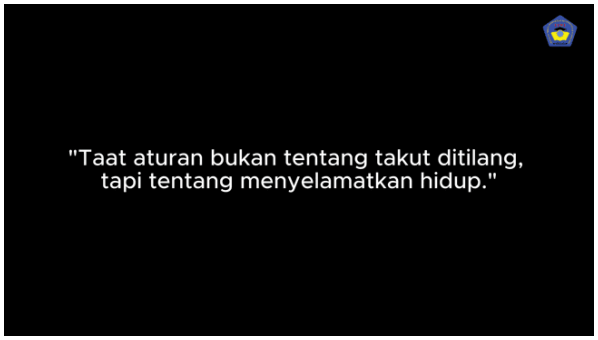

Figure 17: Scene 17

Scene 17 shows a quote as a reminder to obey traffic laws

Figure 18: Scene 18

Scene 18 shows the title of the short film in the post credit

Figure 19: Scene 19

Scene 19 shows the name of the author in the post credit

Figure 20: Scene 20

Scene 20 shows the closing int post credit of the short film

5. Conclusion

In the process of creating the 3D animated video, the author was able to draw several conclusions, including:

1. The 3D animated video on climate change, created with cinematic elements, can provide a deeper emotional experience for the audience.
2. The application of the Stop Motion method in the design of this 3D animated video adds an interesting extra dimension to the production and results in a unique piece of work.
3. This 3D animated video also includes a voice-over in English that explains the current climate conditions, accompanied by Indonesian subtitles to ensure the message is more easily understood by the audience.

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