



Advanced Computer Systems Engineering Laboratory – ENCS5150

TODO 3: Car Traveling Around the Globe

Objective:

Develop an Android application that demonstrates a “car traveling around the globe” animation using Android Studio.

Assets Required: (All of them are in PNG format with a transparent background)

1. Sun image.
2. Cloud image.
3. Planet Earth image.
4. Car image.
5. Rock image.
6. 3 Traffic light images (3 states, one image for each state) (red, orange, green)

Animation Logic:

1. Sun Animation:
 - The sun rotates in and out of the screen.
 - The rotation center for the sun is Earth’s center.
 - Starts rotating immediately upon opening the application and keeps rotating infinitely.
2. Cloud Movement:
 - Have two cloud images moving in translation across the screen (on the x-axis).
 - One cloud should be above the sun and one behind it, so if the sun happens to be in the same position as the first cloud, the sun will be behind. And if the sun and the second cloud were in the same position, the cloud would be behind.
 - One of the clouds' translation duration should be 8 seconds, the other cloud 16 seconds.
 - Starts moving immediately upon opening the application and keeps moving infinitely.
3. Earth:
 - Planet Earth itself is stationary.
 - The traffic light is positioned at the top center of the globe (as shown in Figure 1).

- The rock is positioned at the bottom center of the globe (as shown in Figure 1) and is flipped 180 degrees to accommodate for it being at the bottom.
- Initially, the car should be before a red traffic light, then after 3 seconds it should turn to orange, then after 2 seconds, it will turn green.
- The car begins rotating around the globe (clockwise) right after the traffic light turns green, let's assume its current speed is x .
- When the car touches the rock while rotating, two things will happen at the same time:
 1. The car changes its speed to become $0.5x$.
 2. The rock falls diagonally to the left bottom corner of the screen, and at the same time it will rotate around itself so it lands standing (180-degree rotation with respect to its shape while it is on the earth), after that, the rock will stay forever there.
- After that, the car keeps its $0.5x$ forever and keeps rotating until it reaches the traffic light again (it should be red when the car arrives) after 3 seconds it should turn orange, and then after 2 seconds, it will turn green.
- The car will stay in an infinite loop rotating and waiting for the traffic light.

The following figure depicts the whole scene:

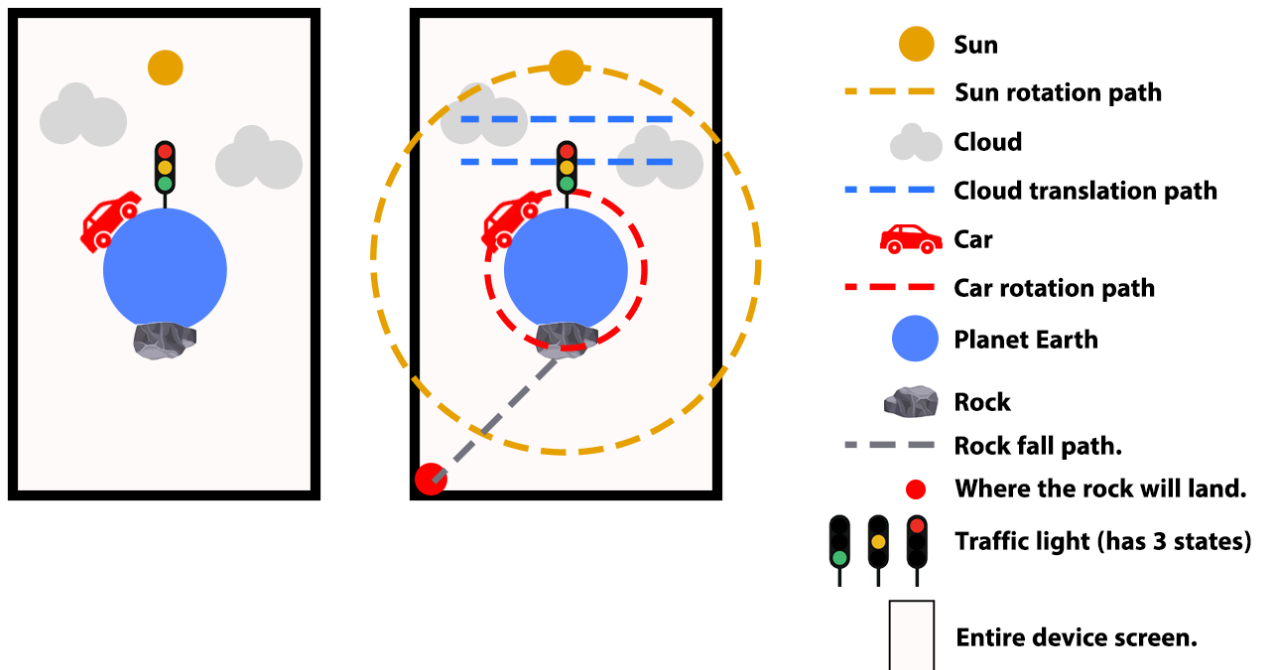
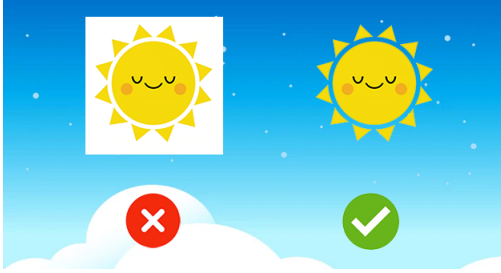


Figure 1: Abstract view of the scene

Notes:

- Utilize PNG images for all objects to achieve a transparent background.



- Don't use abstracted objects (circles/squares ...) to represent the objects in this simulation, instead use clipart/emojis/real-life images.
- The transition between the traffic light states should not happen instantaneously, there should be a fade-in and fade-out to gradually switch between them.
- Use both tween and frame animation, you should know which one to use for each animation.
- The size of the objects should be relatively close to the objects in Figure 1, avoid very large and very small sizes (e.g. a sun that fills the whole screen or a car that is very small and barely visible).
- The name of the application must be "ID_FirstName_LastName".
- Use Pixel 3a XL device with API Level 26 (Graphic=Software).
- ToDo is individual work and cheating will result in a **0 mark**.
- What to submit:
 1. Project.zip file (Size in KB)
From Android Studio: File → Export → Export to Zip File
 2. APK file
From Android Studio: Build → Build Bundle(s) / APK(s) → Build APK(s)
You will find the APK file under "app\build\outputs\apk\debug\app-debug.apk"

Send both the APK file and the ZIP file as a reply to my message.

- Deadline: **26/04/2024 Midnight**