Assignments for Virtual Reality and Physically-based Simulation - Sheet 2


Exercise 1 (Autostereograms, 4 Punkte)
Describe how you can construct an autostereoscopic image (Magic Eye) from a depth map.

Exercise 2 (Disparity, 4 Punkte)
Please re-visit the slide about disparity from the lecture. Show that $\delta_2 - \delta_1 = \gamma - \alpha$.

Exercise 3 (Interaction and Scripting in VRML, 7+5 Punkte)

Figure 1: Pendulum

a) Figure 1 shows a classical pendulum. Your task is the animation of such a pendulum in VRML. You will find a template in the file Rollercoaster.wrl from line 3308. Use inline JavaScript-Code to define a function that computes the motion of the pendulum that is defined by:

$$\varphi = \varphi_{\text{max}} \cos(\sqrt{\frac{g}{l}} \cdot t)$$

With: $\varphi$ defines the current deflection of the pendulum, $\varphi_{\text{max}}$ is the maximum deflection (that should be 40° in this example). $g$ is the gravitational acceleration ($9.78033 \text{ m/sec}^2$) and $l$ is the length of the pendulum (0.24 in our example). You can derive the current time $t$ by querying the VRML time sensor TimerPendulum in Rollercoaster.wrl.

Actually, your task is the implementation of the rotationFunction in Rollercoaster.wrl following line 3362. Moreover, you have to define the appropriate routing using VRML ROUTE commands.
b) Until now, the pendulum swings for the whole time. Consequently, it is possible that it hits the carriage if it starts at the wrong time. Obviously, this behaviour is unwanted for the passengers. Therefore, you should activate the pendulum at the correct point in time in the second part of this assignment.

You can do this by manipulating the timer TimerPendulum by either using a script or changing a ROUTE. You will find a proximity sensor PSPendulum in line 3310. If a viewer enters the pre-defined region, the sensor delivers TRUE as outEvent for the field isActive. The field is set to FALSE if the viewer leaves it.