

A Flying Robot with A Tree Swaying in the Wind

COMP_SCI 351-1: Intro to Computer Graphics

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1. Goals and Project Description

1.1 Goals

The goal of project A contains 3 parts in general. First of all, make our own 3D 'parts' stored in VBO on the GPU. Second of all, make assemblies by using sequences of 3D transformations(e.g. modelmatrix). Last, create interactive animation: traveling without user input, mouse & keyboard and GUI controls.

1.2 Project Description

As shown in Fig 1, this project contains 2 kinds of assemblies: A flying robot and a swaying tree. The flying robot consists of 3 parts, a bamboo dragonfly, a robot body and a cloak that blows in the wind. The tree also consists of 3 parts, trunk, branches and leaves. Among them, the cloak and the trunk both have more than 2 sequential moving joint. Also, the bamboo dragonfly and leaves are designed by myself and vetices are stored in VBO.



Fig 1 Overall Design of Project A

In the canvas, the robot is flying randomly with the spinning bamboo dragonfly (no help of user input), the rotation can be adjusted by the mouse; The tree swings back and forth and can be repositioned via the keyboard.

2 User Guide

2.1 Keyboard Interactions

1. The "W""A""S""D"keys controls the tree to move up, left, down and right from user's view.
2. The arrows key "↑" and "↓" to speed up and down of the rotation speed of robot's bamboo dragonfly.

2.2 Mouse-Drag Interactions

Users can click and drag the mouse to rotate the robot.

2.3 GUI Controls

1. Controls menu

Open controls menu, there are 2 parameters to be controled.

`g_angle02Rate` for swing speed of the cloak.

`g_angle03Rate` for swing speed of the tree.

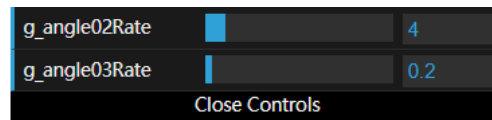


Fig 2 Control Menu

2. botton controls

"Spin<<" speeds down the spinning of the bamboo dragonfly.

"Spin>>" speeds down the spinning of the bamboo dragonfly.

"Stop" stops the spinning of the bamboo dragonfly.

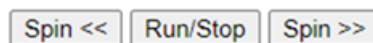


Fig 3 Button Controls

2.4 User Input

Fill in the blank, the angle of thetree at the users view will be changed.

New Current Angle (-180 < x < +180 deg):

You Typed: 20

Fig 4 User Input

3 Results

Here are some results of this project which can be shown with pictures.

3.1 Keyboard Interactions

As shown in Fig 5, Using "WASD" to control the translation of tree, we can move the tree from origin to lower right corner.

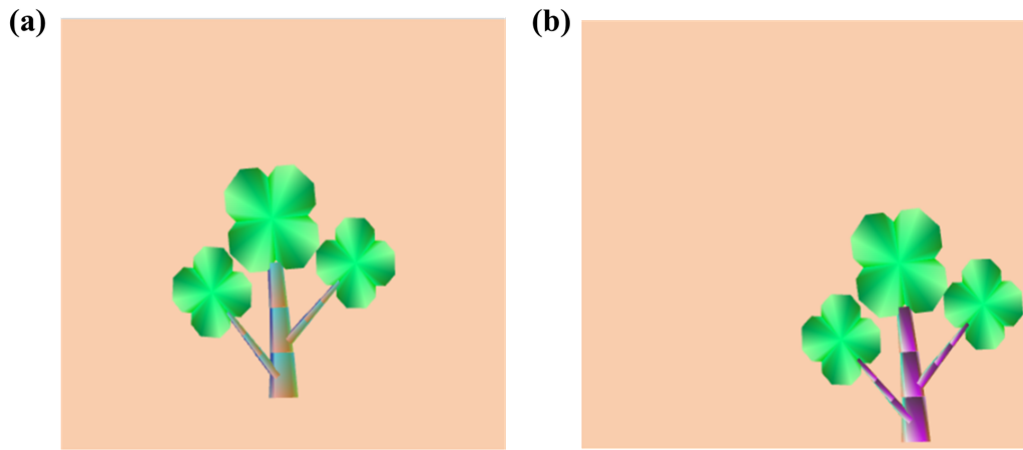


Fig 5 (a) Tree at origin; (b) Tree after translation by keyboard

3.2 Mouse-Drag Interactions

As shown in Fig 6, using the mouse to click and drag the robot, the rotation of it can be changed.

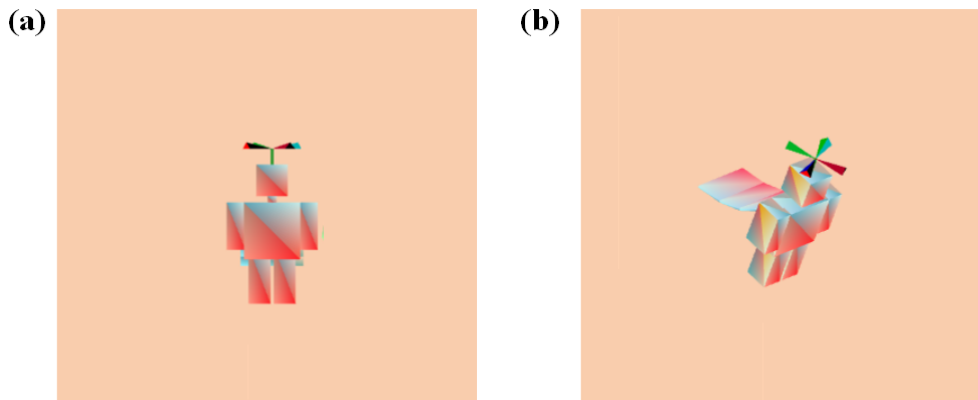


Fig 6 (a) Robot before rotation; (b) Robot after rotation by mouse interaction

3.3 User Input

As shown in Fig 7, after entering an new current angle: 45, the tree rotated 45 degrees along the + z-axis.

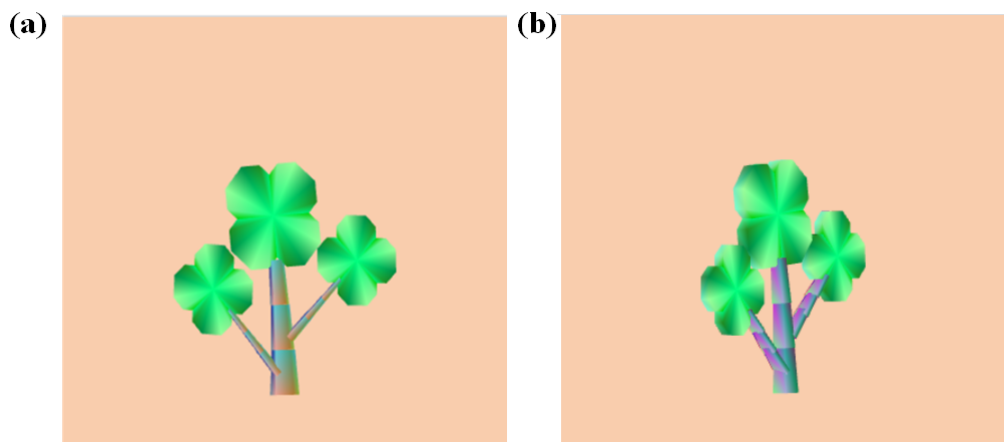


Fig 7 (a) Tree before rotation; (b) Tree after rotation by user input

4 Scene Graphs

4.1 Scene graph for robot

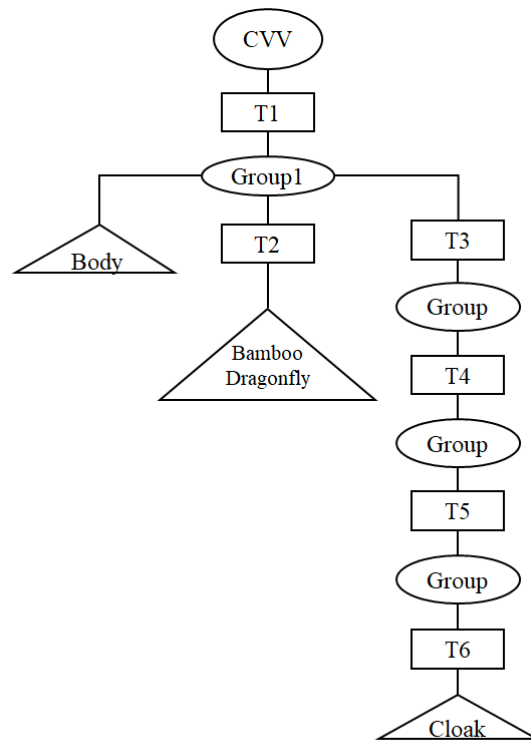


Fig 8 Scene Graph for Robot

4.2 Scene graph for tree

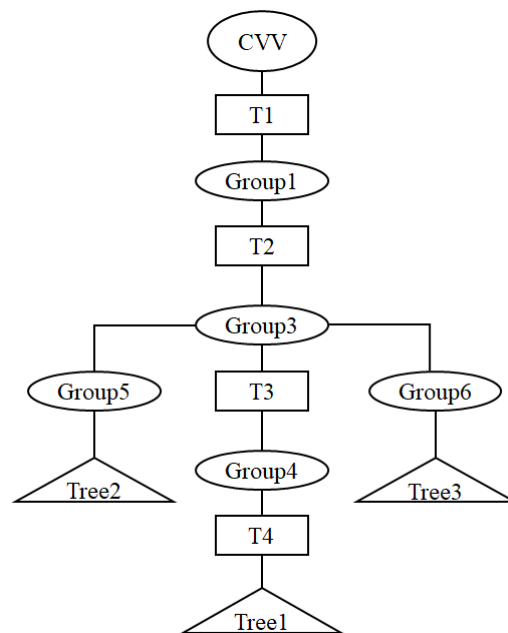


Fig 9 Scene Graph for Tree