Report

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**Descriptive title:** walking robot and moving robot arm

User's Guide

Goals: The HTML file should display two rotating 3D parts and two moving/rotating 3D assemblies.

Instructions:

- **Under the first canvas titled '3D parts', there are three sections for user interactions:**
  - **Keyboard Section:** You can press the right key(->) on the keyboard to spin up the rotation. You can press the left key(<-) on the keyboard to spin down rotation. Or you can click the buttons in this section to spin up/down and stop the rotation of the two 3D parts.
  - **Mouse Drag Section:** You can drag the mouse to rotate the 3d object on the top left of this canvas.
  - **Color Section:** There are three colours to draw the 3D parts. You can click the three boxes with white margins to select the colours. The colours below the three boxes are the original colour. You could compare them with your changed colours.
- **Under the third canvas titled '3D Assemblies:robot arm', there are two sections for user interactions:**
  - **Button Section:** You can click the buttons to stop or start the rotation of the three angles implemented in this robot arm. Angle 0 is the bottom angle controlling the base's rotation. Angle 1 is the middle angle controlling the arm's rotation. Angle 2 is the top angle controlling the fingers' rotation.

Results

There are three canvas on the screen:
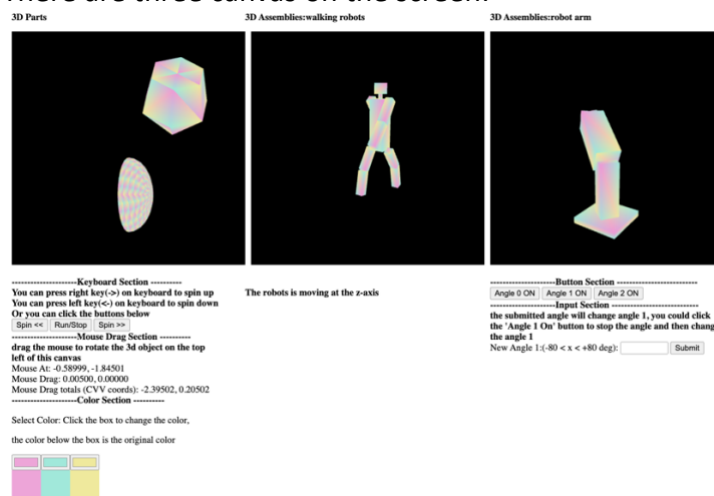
1. The first canvas titled **'3D Parts'** has two 3D objects. These two objects rotate automatically without user input. The object at the bottom translates right and left. You can change the colour of the two 3D parts.

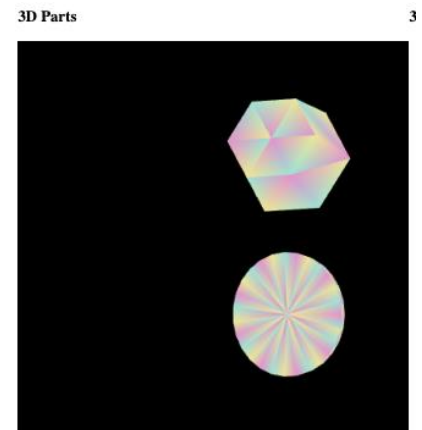*Figure1:One example of changing colour*   *Figure2: colour boxes*   *Figure3: The original colour*

2. The second canvas titled **'3D Assemblies: walking robots'** contains a robot walking along with the z-axis.

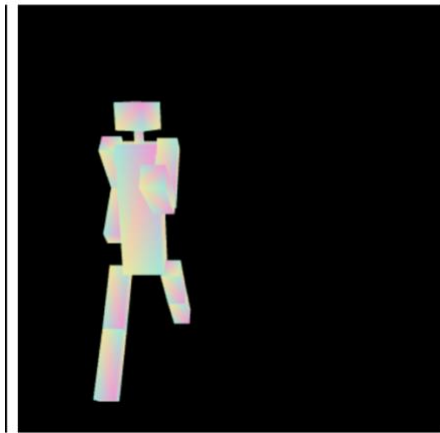*Figure 4: robot walks to the front*   *Figure 5: robot walks to the back*

3. The third canvas titled **'3D Assemblies:robot arm'** contains a moving robot arm.

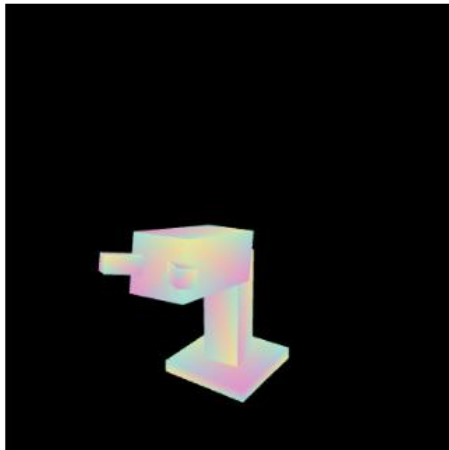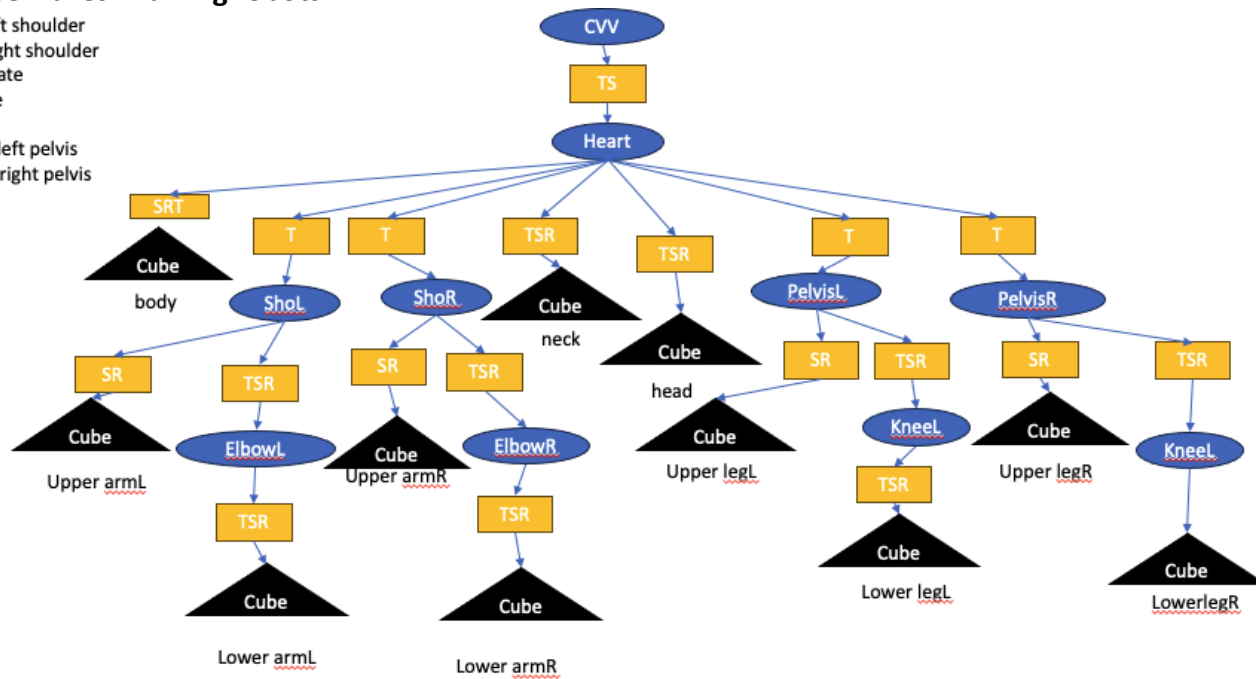*Figure 6: Moving robot arm example 1*

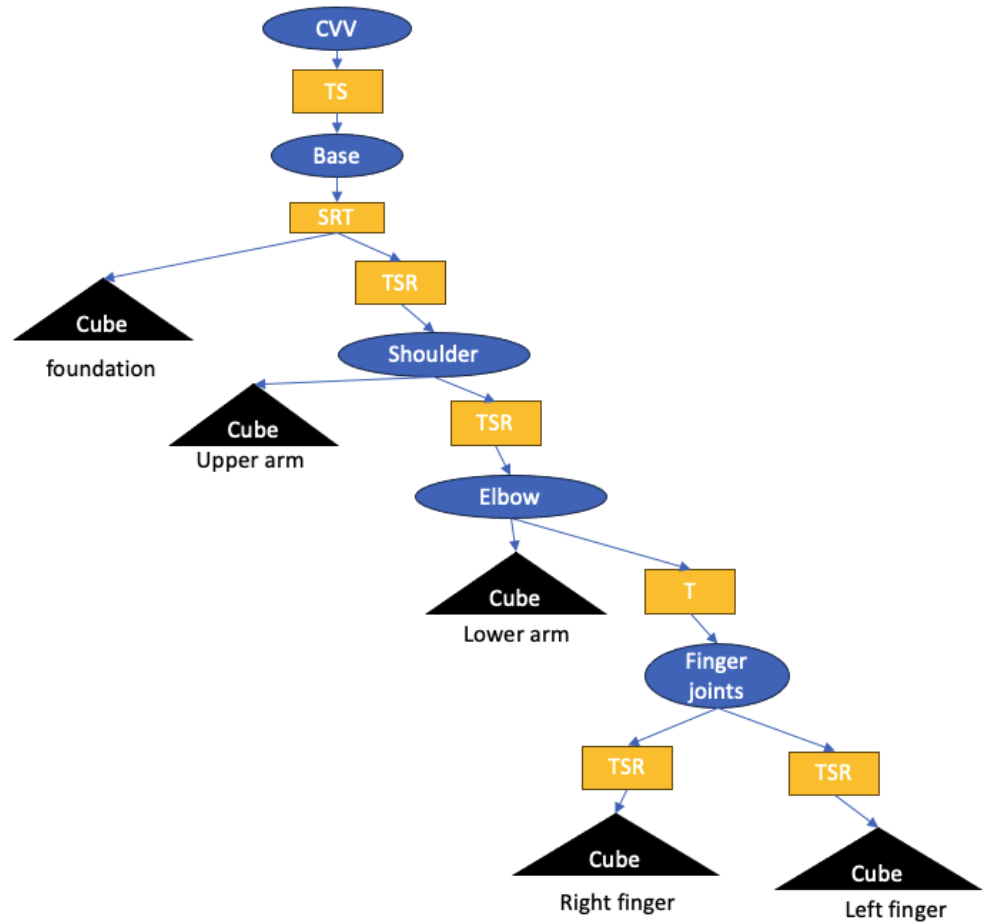*Figure 7: Moving robot arm example 2*

Scene Graph

1. **3D Assemblies: walking robots:**

shoL: left shoulder
shoR: right shoulder
T: translate
R: rotate
S: Scale
PelvisL: left pelvis
PelvisR: right pelvis

2. **3D Assemblies: robot arm:**

T: translate
R: rotate
S: Scale

```
                              CVV
                               │
                              TS
                               │
                             Base
                               │
                              SRT
                         ╱      │
                   Cube        TSR
                foundation      │
                            Shoulder
                          ╱      │
                      Cube      TSR
                    Upper arm    │
                               Elbow
                            ╱      ╲
                       Cube         T
                     Lower arm      │
                              Finger joints
                              ╱        ╲
                           TSR         TSR
                            │           │
                          Cube         Cube
                       Right finger  Left finger
```

3. **Scene graph for 3D parts:**

T: translate
R: rotate
S: Scale

```
              CVV
            ╱      ╲
          TSR      TSR
           │         │
         Verts     Verts
  3D part at the bottom  3D part at the top
```