

SSGMCE	SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGG.		LABORATORY MANUAL	
	PRACTICAL EXPERIMENT INSTRUCTION SHEET			
	EXPERIMENT TITLE : Write a program in Java3D to a bouncing ball.			
EXPERIMENT NO. : SSGMCE/WI/IT/01/8IT06/01		ISSUE NO. : 00	ISSUE DATE : 14.01.2023	
REV. DATE :		REV. NO. :	DEPTT. : INFORMATION TECHNOLOGY	
LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 1 OF 8

1.0) AIM:

Write a program in Java3D to a bouncing ball.

2.0) SCOPE:

The scope of the program is to provide a simple example of how to create and manipulate 3D objects using Java 3D.

3.0) FACILITIES/ APPARATUS:

i) **Software:** Java & Java3d

4.0) THEORY:**Program Detail**

The program is an implementation of a simple animation of a bouncing ball in a 3D environment. It is written in Java and uses the Java 3D API to create and manipulate the 3D objects.

The program starts by creating a scene graph that contains a sphere (the ball) and some light sources. The scene graph is then attached to a SimpleUniverse object, which manages the rendering and the user's interaction with the scene.

The ball is made to bounce up and down by repeatedly updating its position based on a timer. When the timer fires, the height of the ball is adjusted according to the sign variable, which indicates whether the ball is moving up or down. If the ball hits the ground (i.e., its height is less than -0.4), its scale is adjusted to give the impression that it is squashing.

The program also includes some user interaction. The ball can be moved horizontally using the 'a' and 's' keys, and the animation can be started and stopped using a button.

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 2 OF 8

Program

```

import java.applet.Applet;

import java.awt.*;

import java.awt.event.*;

import java.awt.event.WindowAdapter;

import com.sun.j3d.utils.applet.MainFrame;

import com.sun.j3d.utils.universe.*;

import javax.media.j3d.*;

import javax.vecmath.*;

import com.sun.j3d.utils.geometry.Sphere;

import javax.swing.Timer;

public class BouncingBall extends Applet implements ActionListener, KeyListener {

private Button go = new Button("Go");

private TransformGroup objTrans;

private Transform3D trans = new Transform3D();

private float height=0.0f;

private float sign = 1.0f; // going up or down

private Timer timer;

private float xloc=0.0f;

```

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 3 OF 8

```

public BranchGroup createSceneGraph() {

    // Create the root of the branch graph

    BranchGroup objRoot = new BranchGroup();

    objTrans = new TransformGroup();

    objTrans.setCapability(TransformGroup.ALLOW_TRANSFORM_WRITE);

    objRoot.addChild(objTrans);

    // Create a simple shape leaf node, add it to the scene graph.

    Sphere sphere = new Sphere(0.25f);

    objTrans = new TransformGroup();

    objTrans.setCapability(TransformGroup.ALLOW_TRANSFORM_WRITE);

    Transform3D pos1 = new Transform3D();

    pos1.setTranslation(new Vector3f(0.0f,0.0f,0.0f));

    objTrans.setTransform(pos1);

    objTrans.addChild(sphere);

    objRoot.addChild(objTrans);

    BoundingSphere bounds =

        new BoundingSphere(new Point3d(0.0,0.0,0.0), 100.0);

    Color3f light1Color = new Color3f(1.0f, 0.0f, 0.2f);

    Vector3f light1Direction = new Vector3f(4.0f, -7.0f, -12.0f);

```

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 4 OF 8

DirectionalLight light1

```
= new DirectionalLight(light1Color, light1Direction);
```

```
light1.setInfluencingBounds(bounds);
```

```
objRoot.addChild(light1);
```

```
// Set up the ambient light
```

```
Color3f ambientColor = new Color3f(1.0f, 1.0f, 1.0f);
```

```
AmbientLight ambientLightNode = new AmbientLight(ambientColor);
```

```
ambientLightNode.setInfluencingBounds(bounds);
```

```
objRoot.addChild(ambientLightNode);
```

```
return objRoot;
```

```
}
```

```
public BouncingBall() {
```

```
setLayout(new BorderLayout());
```

```
GraphicsConfiguration config =
```

```
SimpleUniverse.getPreferredConfiguration();
```

```
Canvas3D c = new Canvas3D(config);
```

```
add("Center", c);
```

```
c.addKeyListener(this);
```

```
timer = new Timer(100,this);
```

```
//timer.start();
```

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 5 OF 8

```

Panel p =new Panel();

p.add(go);

add("North",p);

go.addActionListener(this);

go.addKeyListener(this);

// Create a simple scene and attach it to the virtual universe

BranchGroup scene = createSceneGraph();

SimpleUniverse u = new SimpleUniverse(c);

u.getViewingPlatform().setNominalViewingTransform();

u.addBranchGraph(scene);

}

public void keyPressed(KeyEvent e) {

    //Invoked when a key has been pressed.

    if (e.getKeyChar()=='s') {xloc = xloc + .1f;}

    if (e.getKeyChar()=='a') {xloc = xloc - .1f;}

}

public void keyReleased(KeyEvent e){

    // Invoked when a key has been released.

}

```

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 6 OF 8

```

public void keyTyped(KeyEvent e){

    //Invoked when a key has been typed.

}

public void actionPerformed(ActionEvent e ) {

    // start timer when button is pressed

    if (e.getSource()==go){

        if (!timer.isRunning()) {

            timer.start();

        }

    }

    else {

        height += .1 * sign;

        if (Math.abs(height *2) >= 1 ) sign = -1.0f * sign;

        if (height<-0.4f) {

            trans.setScale(new Vector3d(1.0, .8, 1.0));

        }

        else {

            trans.setScale(new Vector3d(1.0, 1.0, 1.0));

        }

        trans.setTranslation(new Vector3f(xloc,height,0.0f));

```

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```

objTrans.setTransform(trans);

}

}

public static void main(String[] args) {

    System.out.println("Program Started");

    System.setProperty("sun.awt.noerasebackground", "true");

    BouncingBall bb = new BouncingBall();

    bb.addKeyListener(bb);

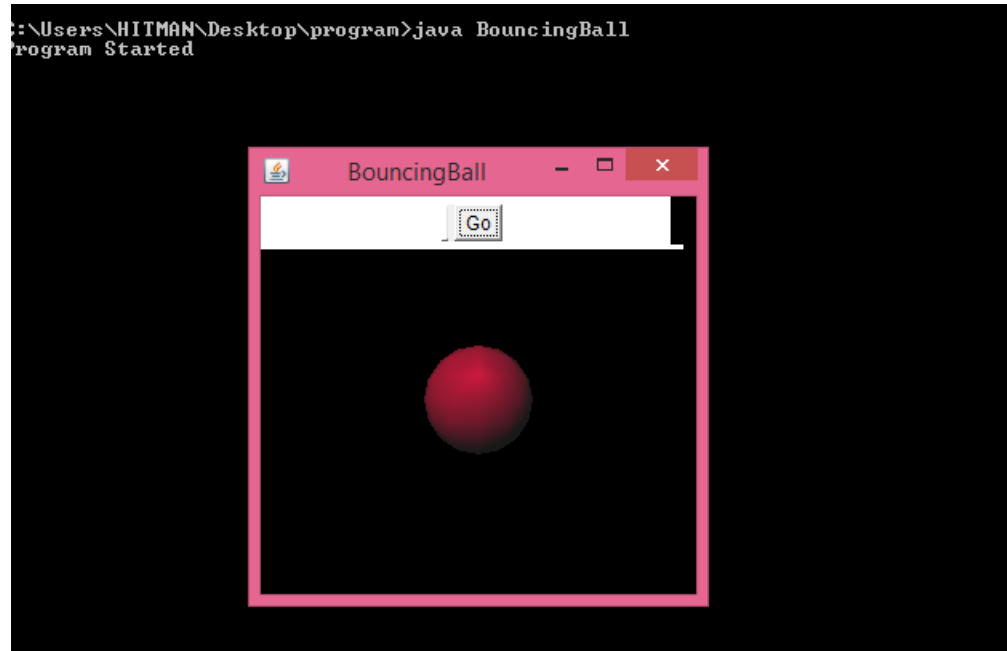
    MainFrame mf = new MainFrame(bb, 256, 256);

}

}

```

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LABORATORY : Virtual and Augmented Reality (8IT06)			SEMESTER : VIII	PAGE: 8 OF 8



5.0) Conclusion:

Demonstrated bouncing ball using Java3D.