

## ЛАБОРАТОРИЙН АЖИЛ

### 3-D TRANSFORMATIONS AND PROJECTIONS

Лабораторийн ажлын даалгавар:

Дурын 3D хэмжээст хоёр объектыг сонгон авч зураад өөрчлөлтүүдийг хийнэ үү?

- Translation
- Rotation

Объектууд нь ирмэгээр болон талаар будсан байхаар хоёр сонголттой байна. Доорх шоог улаан өнгийн ирмэгээр зурах жишээтэй танилцана уу.

Жишээ:

```
#include <GL\glut.h>
```

```
GLfloat xRotated, yRotated, zRotated;
```

```
void redisplayFunc(void)
```

```
{  
    // buffer tseverleh  
    glClear(GL_COLOR_BUFFER_BIT);  
  
    glLoadIdentity();  
    // translate the draw by z = -4.0  
    // z utgiig -8.0aas bagasgaval het jijig esvel hol bolno.  
    glTranslatef(0.0,0.0,-5.0);  
    // red  
    glColor3f(0.9, 0.0, 0.0);  
    // x huvid translation  
    glRotatef(xRotated,1.0,0.0,0.0);  
    // rotation Y  
    glRotatef(yRotated,0.0,1.0,0.0);  
    // rotation Z  
    glRotatef(zRotated,0.0,0.0,1.0);  
    // scaling  
    glScalef(1.0,1.0,1.0);  
    // built-in (glut library) function , cube zurah.  
    glutWireCube(1.0);  
    // Flush buffers to screen  
    glFlush();  
    // sawp buffers (double buffering ashigljaj bgaa) (zuraad hiih zuraad hiih hadgalah)  
    glutSwapBuffers();  
}
```

```
void reshapeFunc(int x, int y)
```

```
{  
    if (y == 0 || x == 0) return; //Nothing is visible uyd return hiigdene  
  
    glMatrixMode(GL_PROJECTION);  
    glLoadIdentity();  
    //harah ontsog:40  
    //clipping hiih oiriin zai: 0.5  
    // clipping holiin zai: 20.0  
    gluPerspective(40.0,(GLdouble)x/(GLdouble)y,0.5,20.0);  
    glMatrixMode(GL_MODELVIEW);
```

```

    glViewport(0,0,x,y);
}

void idleFunc(void)
{
    // rotation by x
    xRotated += 0.03;
    // yRotated += 0.01;
    // zRotated += 0.01;
    redisplayFunc();
}

int main (int argc, char **argv)
{
    //Initialize GLUT
    glutInit(&argc, argv);

    glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGB);
    // window size
    glutInitWindowSize(350,350);
    // create the window
    glutCreateWindow("Cube3d animation");
    glPolygonMode(GL_FRONT_AND_BACK, GL_LINE);
    xRotated = yRotated = zRotated = 0.0;

    glClearColor(0.0,0.0,0.0,0.0);

    glutDisplayFunc(redisplayFunc);
    glutReshapeFunc(reshapeFunc);
    glutIdleFunc(idleFunc);

    glutMainLoop();
    return 0;
}

```

#### Объектууд:

##### Cube

1. glutWireCube(double size);
2. glutSolidCube(double size);

##### Sphere

1. glutWireSphere(double radius, int slices, int stacks);
2. glutSolidSphere(double radius, int slices, int stacks);

##### Cone

1. glutWireCone(double radius, double height, int slices, int stacks);
2. glutSolidCone(double radius, double height, int slices, int stacks);

##### Torus

1. glutWireTorus(double inner\_radius, double outer\_radius, int sides, int rings);
2. glutSolidTorus(double inner\_radius, double outer\_radius, int sides, int rings);

##### Teapot

1. glutWireTeapot(double size);
2. glutSolidTeapot(double size);

Гүйцэтгэх хугацаа: 12-13 долоо хоногт