



**Politechnika
Śląska**

SILESIA UNIVERSITY OF TECHNOLOGY

Faculty of Automatic control, Electronics and Informatics

Computer programming **(110) 3D Graphic - specification**

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Year: 2021 (II sem)

Project topic:

3D graphics - write a library for drawing object defined as 3D shapes. Shapes should be stored separately as a collection of lines or arcs; have to be drawn on request.

Brief description:

This library should contain object with simple 3D shapes which should include collection of edges that are made of 3D point oriented vertices. All of objects should have somewhat of transformation functions which will move, scale, rotate in 3 dimensions.

Usage:

As this is a library there is no strict usage of any program, just a documentation of made objects for users to understand the inner functions and others. Documentation will contain all the necessary informations to use this library but also it should provide some template projects, usage of objects and functions in demo program. For example:

```
class edge;
    variables:
        vertex *v1 -reference to the first point of the edge
        vertex *v2 -reference to the second point of the edge
    functions:
        void reposition(double x, double y, double z) - changes the position of vertices
        edge(vertex *v1, vertex *v2) - initialization function with vertices as parameters
        delete() - removes this edge (obj) and vertices in it.
    ...

class vertex;
    variables:
        double x - verticle position
        double y - horizontal position
        double z - depth position
    functions:
        delete() - removes this object
    operand functions:
        vertex operator = (vertex &org) - copy data to other vertex object
        vertex operator[] (unsigned i) - returns [0] = x, [1] = y, [2] = z.
```

Important notes:

In included basic shapes should be edge, cube, cuboid, orb and cone. For orb and cone there should be additional parameter quality/number of faces for optimization as theoretically, for example to make cone that is visible as cone not a pyramid there should be one edge for every pixel on circle at the base of figure.

Of course this should not be a problem with a proper 3D shading but this is not what this problem is about.

Also there should be class called "canvas" for setting up properties of world and camera like size, depth, world transformations and camera transformations. For optimizing code and classes, all objects (cube, orb etc.) will inherit basic functions and variables from "3D_obj" class.