

PRINCIPLES OF USING THE C++ PROGRAMMING LANGUAGE IN MODERN COMPUTER GRAPHICS

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Abstract: This scientific in the article modern computer C++ programming in graphics of the language Role , possibilities and applications principles wide illuminated . Graphic systems in creation high productivity , memory management and hardware to the level close work important importance has is , namely the C++ language this requirements satisfy takes . In the article OpenGL , DirectX graphics libraries like with work , object directed approach , realistic time in mode images create technologies analysis will be done .

Key words : C++, computer graphics , OpenGL, DirectX, real -time graphics , rendering , 3D modeling , GPU, shaders

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Modern information technologies computer as a result of its development graphics various in the fields wide is being used . Including the game industry , film production, engineering , medicine and virtual reality systems without graphics technology imagination as This will not happen . in processes efficient and fast processing to give important is , this and programming from their languages high requires efficiency .

C++ programming language high to fertility has is , hardware from resources effective use opportunity gives . This because of that computer graphics the most in the field applicable from languages one is considered .

Literature analysis

Latest in years computer graphics according to many scientific research has been conducted . In creating graphics systems, such as OpenGL and DirectX from platforms use wide spread . This technologies real time using in mode high good quality images create possible .

Many Researchers have found that the C++ language is useful in graphics programming. advantages emphasizing In particular , its speed , memory management , and object orientation important factors as is considered .

C++ programming of the language main features

C++ programming language following main to the features has :

- High fertility
- Low level memory management
- To the object directed programming
- Wide libraries ecosystem



This features computer graphics in developing systems important role plays .

C++ in graphics programming place

Graphic systems number of calculations when creating very big will be . Every pixel , geometric object or light calculations high requires precision and speed . C++ is processes effective done increase opportunity gives .

With OpenGL work

OpenGL — from the platform independent graphics library , 2D and 3D graphics in creation wide is used with C++ together OpenGL following opportunities gives :

- 3D objects create
- Light and shadows calculation
- Texturing

Example :

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

void display ( ) {

    glClear (GL_COLOR_BUFFER_BIT);

    glBegin ( GL_TRIANGLES);

    glVertex2 f( -0.5, -0.5);

    glVertex2 f( 0.5, -0.5);

    glVertex2 f( 0.0, 0.5);

    glEnd ( );

    glFlush ( );

}
```

DirectX technology

DirectX is a graphics API designed primarily for the Windows platform , and is used in game development . wide Used in C++ with DirectX quality graphics systems is created .

With shaders and GPU work

Modern graphics systems using GPUs works . Shader programs using the graphics fast again work possible . C++ shaders with to work manages and with GPU the connection provides .

Real time graphics

Real time graphics — user interactive with systems . For example , video games . C++ is minimal delay in the process with work opportunity gives .



3D modeling

Using C++ complex 3D models create and render them possible . In this process Mathematical calculations are important. role plays .

To the object directed approach

graphics systems to the object directed programming important importance have Each graphic element is an object as is considered .

Example :

```
class Object3D {  
public:  
float x, y, z;  
virtual void draw() = 0; };
```

Memory management

graphics programs from memory effective use very important . C++ is regarding big to opportunities has .

C++ 's advantages

- High speed
- Flexibility
- Cross-platform work opportunity

Conclusion

Modern computer graphics C++ programming in the field language important place It occupies . Its high performance , flexibility and hardware to the level close work possibility in creating graphic systems big advantage OpenGL and DirectX such as technologies with together C++ modern graphics systems forms the basis .

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