I Wish I Knew How To …

Program OpenGL Core

32-bit with Xojo

November 2016 Edition (2.0)

By Eugene Dakin

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About the Author

Eugene Dakin is an author, Professional Chemist, oilfield consultant and programmer in Canada. When he is in-between courses and oilfield projects, he and his wife spend valuable time raising their wonderful children. He has been hobby programming on computer's for over 25 years. He has created over 170 technical and industrial simulation programs for Windows in Xojo.

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Dedication

This writing is dedicated to my wife and children. Without their support this would not have been written.

Special Thanks

This book has been written with the helpful tips and tricks of fellow programmers in the Xojo community. Special thanks go to Alwyn Bester, Will Shank, Jim McKay. Additional thanks go to Jeff Quan for writing the many OpenGL library declares for Xojo.

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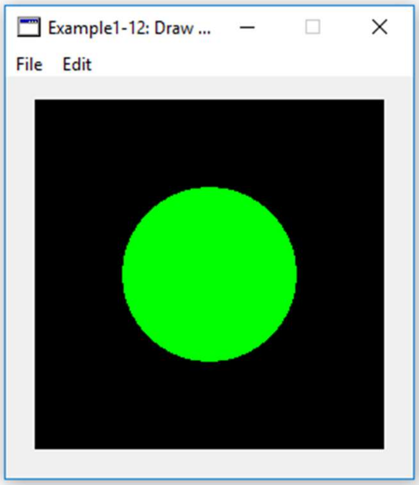
Draw a Sphere

This example draws a sphere, which is a circle in 3-dimensions. Although the example looks like a circle, it is a true sphere. This example will be used in a later example where the scene will be viewed in 3-dimensions. Below is a screen grab of the running program.

Figure 14. Example 1-12: Sphere Screen Grab



A method has been created to help make the sphere which accepts two parameters, which is the radius of the sphere and the graduations (number of subsets) to make the sphere appear smooth. A higher graduation value (20) makes a smoother sphere than a sphere with 5 graduations.

To create this project, start Xojo and make a desktop and save the project as Example 1-12. Add the following control to the project.

Table 5. Added Controls

Control	Name	Settings
OpenGLSurface	OpenGLSurface 1	Width: 240, Height: 240

Add a new method to Window1 called DrawASphere and add the following code:

Code 20. Example 1-12: DrawCircleOutline

```
OpenGL.glColor3d(0, 1, 0)  //Green Colour
//Draw a green sphere
Dim x1, y1, z1, alpha, beta as Double
Const Pi = 3.1415926535
```

```
For alpha = 0 to Pi step (Pi/Graduations)
  OpenGL.glBegin(OpenGL.GL_TRIANGLE_STRIP)
  For beta = 0 to 2.01*Pi Step (Pi/Graduations)
    x1 = Radius*cos(beta)*sin(alpha)
    y1 = Radius*sin(beta)*sin(alpha)
    z1 = Radius*cos(alpha)
    Opengl.glVertex3f(x1, y1, z1)
    x1 = Radius*cos(beta)*sin(alpha + PI/Graduations)
    y1 = Radius*sin(beta)*sin(alpha + PI/Graduations)
    z1 = Radius*cos(alpha + PI/Graduations)
    Opengl.glVertex3f(x1, y1, z1)
  Next beta
  OpenGL.glEnd
Next alpha
```

Some variables are created and the Pi constant is defined. Two For-Next loops are created and x, y, and z vertices (corner coordinates) are calculated with the various math calculations, and the second set of vertices are calculated with the beta values.

A drawing colour was chosen to be green with the glColor3d, and the primitive type to be drawn for the sphere is a triangle strip.

To call the method, add the Render event handler and add the following code.

Code 21. Example 1-12: OpenGLSurface1 Render

```
//Draw a sphere with radius of 0.5
//Make 20 graduations to smooth the sphere
DrawASphere(0.5, 20)
```

Here is the call to the method which does the hard work of drawing the sphere. This example draws a filled sphere by drawing many triangle strips.

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The ‘I Wish I Knew’ series contains technical data and advice that makes sense and contains practical and numerous examples with explanations to allow you to ease into the steep programming curve. You can create Xojo programs today!

The book “I Wish I Knew How to … Program OpenGL with Xojo” builds a strong foundation of programming graphics. This is an advanced graphics book and it is highly recommended to understand OpenGL and Xojo first. An intermediate book called “I Wish I Knew How to… Program the Canvas Control with Xojo Desktop” is a good book to study before learning OpenGL. The examples have been created and tested on Windows 10 and OSX El Capitan 32-bit Xojo settings, as some of the examples do not work when compiled as a 64-bit program.

Creating static data such as graphs can use most of the common numerical types in Xojo. If you wish to create motion and games, then this requires the knowledge of MemoryBlocks and OpenGl. The Timer control limitation for drawing on Windows OS has been enhanced by implementing a timer thread, which allows high Frames-Per-Second rates!! A partial OBJ model loader has been created to render and animate more complicated Blender models.

There are 23 chapters, more than 550 pages, and over 80 example programs. Source code is included with this book and is not heavily optimized because it was built for educational purposes. OpenGL animation speed is very impressive.

This is one of many books by Eugene with others available at XojoLibrary. Other books can be purchased at http://XojoLibrary.com where many great Xojo resources are available.

Happy programming!

Eugene

Eugene Dakin MBA, Ph.D., P.Chem., is an author of Xojo reference materials and has many years of experience in the programming industry. More great reference books are “*I Wish I Knew How To … Program Raspberry Pi 2B and 3B with Xojo”, “I Wish I Knew How to … Program the Canvas with Xojo in Windows”*.

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