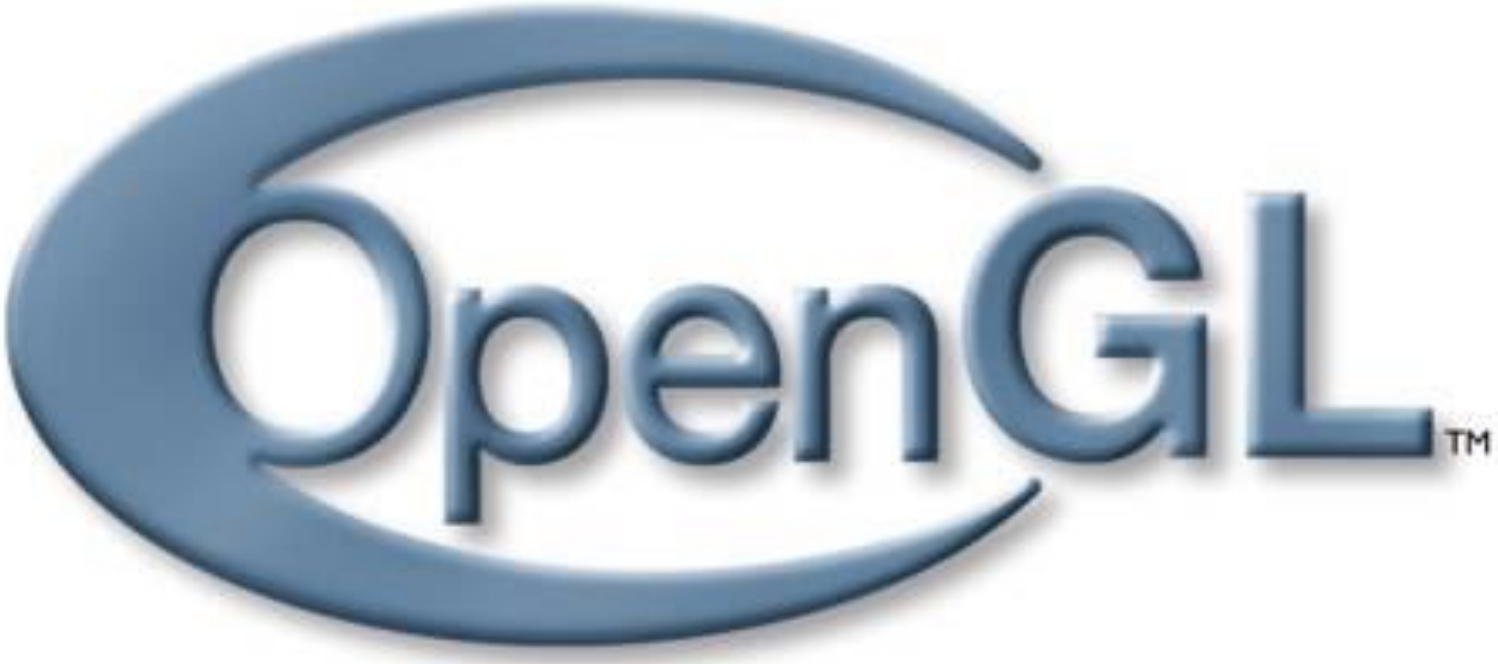

part 12

Martin Samuelčík
http://www.sccg.sk/~samuelcik
Room I4

OpenGL ES

- OpenGL for ES (Embedded Systems)
- Lightweight version of OpenGL
- For smartphones, computer tablets, video game consoles and PDA
- http://www.khronos.org/opengles/

OpenGL ES 1.x

- OpenGL ES 1.0 is drawn up against OpenGL 1.3
- OpenGL ES 1.1 is defined relative to OpenGL 1.5
- Removed
  - glBegin, glEnd rendering, Display lists
  - Line, polygon stipple and antialiasing
  - Quad and polygon rendering primitives
  - Bitmaps and bitmap operations, 3D textures
  - Selection and feedback
  - Backface material
- OpenGL ES 1.1 added
  - Multitexture, VBO, automatic mipmaps, point parameters

OpenGL ES 2.0

- Based roughly on OpenGL 2.0
- Eliminates most of fixed-function pipeline similar to OpenGL 3.1
- Shaders must be used
- No built-in uniforms and attributes
- OpenGL ES 2.0 is not backward compatible with OpenGL ES 1.1

OpenGL ES 3.0

- Backwards compatible with OpenGL ES 2.0
- Added occlusion queries, transform feedback, multiple rendering targets
- Added ETC2 / EAC texture compression
- Better textures support - floating point textures, 3D textures, depth textures, vertex textures, NPOT textures, …
- Newer version of GLSL ES
- Supported in iPhone 5S, Samsung Galaxy S4, HTC One, Sony Xperia Z, LG G2, …

Android examle

- Using EGL, support library for connecting OpenGL ES and underlying windowing system (like WGL)
- http://android-dls.com/wiki/index.php?title=EGL_notes
- Using prepared class GLSurfaceView on top of EGL (like GLUT)
- Tutorial from android page using
- http://developer.android.com/training/graphics/opengl/index.html

WebGL

- JavaScript API for rendering 3D graphics within browser without plugins
- http://www.khronos.org/webgl/
- GPU accelerated
- Based on OpenGL ES 2.0
- Uses the HTML5 canvas element
- Automatic memory management
- Supported in Mozilla Firefox, Google Chrome, Safari, Opera, partially in Internet Explorer

WebGL engines

- Libraries written in JavaScript build on top of WebGL providing advanced functionality
- http://jster.net/blog/webgl-3d-engines-and-tools#.UqbrNiecuJk
- three.js, CopperLicht, CubicVR.js, C3DL, Curve3D, SpiderGL, SceneJS, WebGLU, GLOW GL, GLGE, csg.js, KickJS, Construct 2, Turbulenz, …

WebGL tutorial

- Defining canvas for rendering
- Creating context from canvas
- Define shaders as special type of script
- Call WebGL functions as member functions of context
- Use timer to update and render animation
- http://learningwebgl.com
- https://developer.mozilla.org/en-US/docs/Web/WebGL/Getting_started_with_WebGL

The End!

Questions?