Abstract: Mobile phone handsets are fast becoming personal computing platforms and offer exciting new opportunities for graphics applications. They present the largest ever market opportunity for the graphics industry. Handset shipments are an order of magnitude larger than PC shipments. Not surprisingly they come with significant limitations compared to traditional desktop environments. This course presents two 3D graphics APIs that address the special needs and constraints of mobile platforms and have become dominant in that space: OpenGLES and M3G. OpenGLES 1.1 is a lightweight version of the well-known workstation standard, offering a subset of OpenGL 1.5 capability plus support for fixed point arithmetic. OpenGLES 2.0 brings programmable shaders into mobile devices. M3G, Mobile 3D Graphics API for Java Micro Edition augments the low-level rendering capabilities of OpenGLES with scene graph, animation, and file format support to facilitate content production with popular tools such as Max or Maya. The second generation M3G 2.0 (still being standardized) introduces shaders to mobile Java. These APIs provide powerful graphics capabilities in a form that fits well on today's devices, both with and without a hardware floating point unit and a graphics hardware accelerator. We begin the course with a discussion of the target environments and their limitations, and general techniques for coping with these (such as fixed-point arithmetic). We continue with detailed descriptions of the functionality of OpenGLES 1.1, 2.0, and M3G 1.1, comparing to related desktop standards as necessary and explaining what was left out and why. We will show how to use the APIs in practical examples and will provide advice on how to extract the best performance from each API and how to deal with the challenges inherent in deploying applications in the mobile space. We conclude with a description of the forthcoming M3G 2.0 standard.
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