What is REMO ES?

- Interactive 3D CG framework for embedded systems

- Originally developed as “REMO” for PC graphics on OpenGL, and then ported to OpenGL ES

- Developed by 3D Inc., since 2004
Concepts

- Rich Graphics
  - Automatic shader generation (See next slide)
- Simple Workflow
  - Reducing development cost and overhead
- High Performance
  - Fast rendering
  - light-weight
Features

- **Automatic shader generation (GLSL ES)**
  - by the scene settings of general CG tools such as 3ds Max
  - Special “shader editor” NOT required
  - GLSL ES/OpenGL ES coding NOT required

- **Portability / Scalability**
  - Platform Independent
  - based on standard OpenGL ES 1.1 / 2.0

- **Advanced memory management**
  - Choose Dynamic / static allocation
  - Configure how / where the data is allocated

- **Safe support for automotive system**
  - Verified by MISRA-C, QAC,…
Markets

- **Automotive application**
  - Instrument panel
  - Navigation system (3D Map, 3D GUI)

- **Other Electronics**
  - Advanced GUI of TV, mobile phone, etc.

- **Entertainment**
  - Consumer, Arcade, Mobile

- **Digital Signage**
  - Integration with Augmented Reality
Workflow

CG authoring tool (3ds Max,...) -> REMO ES Designer’s Toolkit

REMO Exporter plugin

Create CG scene

Export

Convert data for Embedded systems

REMO scene file (.xrm)

REMO ES Preprocessor

Scene data for Embedded systems

Application developer

Application

REMO ES Rendering Engine

OpenGL ES 1.1/2.0

OS

GPU

Develop user application
(OpenGL/Shader programming is not required)

Check the scene

Feedback

Rendering result

CG Designer

Check the scene

Application developer

REMO ES Previewer

Check the scene

Application developer

REMO ES Developer’s Toolkit
Software components

- **REMO Exporter**
  - A Plug-in for CG authoring tools such as 3dsmax and so on, to export the 3D scene data into REMO file format.

- **REMO ES Previewer**
  - A Windows PC application to check the rendering result of REMO ES output as an emulation of the embedded system.

- **REMO ES Preprocessor**
  - A Windows PC application to convert REMO scene file into the data for the target embedded system.

- **REMO ES Rendering Engine (Scene graph API)**
  - C-language library to render the output data of Preprocessor on the target embedded system.
Basic 3D specification

Scene
- Typical scene graph in a tree structure

Geometry (vertices)

Material
- Basic shading, lighting (blinn [OpenGL ES 2.0])
- Texture mapping (Including bump, reflection [OpenGL ES 2.0])
- Shadow (depth map, smooth, self) [OpenGL ES 2.0]

Animation
- Automatic animation from CG authoring tool
- Fully programmable animation
  - Geometry position, orientation
  - Material
  - Bone-skin [OpenGL ES 2.0]
  - Morphing [OpenGL ES 2.0]
REMO for PC ( On REMO ES )

- REMO ES is now also available on PC
  - PC is just one of the environments supported by REMO ES
  - Easy maintenance by sharing common core
  - Direct loading from REMO scene file without preprocessor
  - C++ wrapper and various utilities in “REMO SDK” for PC

Application

- REMO scene file (.xrm)
- REMO SDK (C++)
- REMO ES Rendering Engine
- OpenGL ES 1.1/2.0 wrapper
- OpenGL
- Win, Linux,…
- GPU

SIGGRAPH ASIA 2009

REMO demonstration available at SIGGRAPH Asia Exhibition

D25 (in 3D Consortium booth)
Thanks a lot!

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