COLLABORA

Game Development with OpenXR

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FOSDEM'20

Game Development with OpenXR

- OpenXR from a user/game developer view

- Getting Started with OpenXR

  - List of Examples

  - C simple example

  - Godot Engine Plugin

- TODOs

OpenXR from a user/game developer view

- VR Inputs
  - Headset, Controller position/rotation ("pose")
  - Buttons, touch, force, touchpad, thumbstick, …
- VR Output
  - Stereoscopic, tailored to hardware parameters
  - Lenses (distortion)
  - Extremely sensitive to latency/stutter
- Vendor VR runtime
  - Hardware drivers (USB data → pose, button events)
  - Presentation of Frames (distorted, async)
  - Provide API (vendor specific or OpenXR)
  - Think: libinput/X.org/Wayland
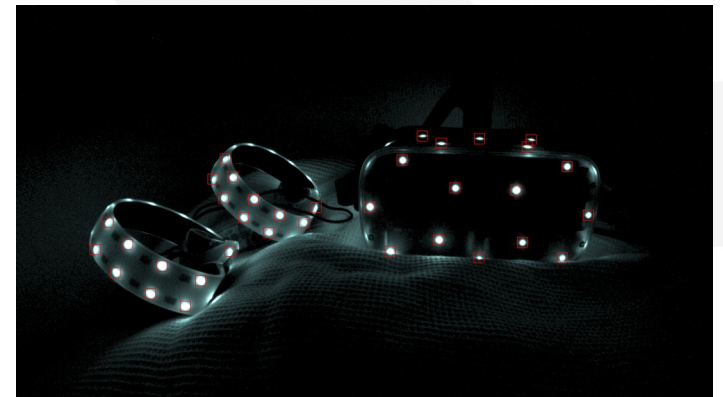
OpenXR Runtimes/Hardware today

- Windows

  - Oculus (beta) => Rift, Rift S, Quest

  - Windows MR [D3D only] => Windows MR

- Linux

  - Monado =>

    - OpenHMD, FLOSS, often reverse engineered & incomplete drivers

    - Native drivers in development (psmove, psvr, hydra, OSVR HDK)

    - libsurvive

FOSS Virtual & Augmented Reality
The Monado project & OpenXR

🅰 Track: Graphics devroom
🏠 Room: K.4.401
📅 Day: Saturday
▶ Start: 14:00
■ End: 14:55

OpenHMD Community meeting 2020
Open Source VR, XR, AR community meeting by the OpenHMD Community!

🅰 Track: BOFs (Track A - in J.1.106)
🏠 Room: J.1.106
📅 Day: Sunday
▶ Start: 14:00
■ End: 15:30

The year of the virtual Linux desktop

🅰 Track: Miscellaneous
🏠 Room: K.1.105 (La Fontaine)
📅 Day: Sunday
▶ Start: 15:00
■ End: 15:50

OpenXR from a user/game developer view

- Derived from Vulkan spec

  - Inherits some API concepts

  - Similar loader/header layout (provided by Khronos: OpenXR-SDK)

    - libopenxr_loader.so

    - openxr.h, openxr_platform.h

  - Extensions (KHR/EXT, 3D API support, unusual display configurations, input ...)

  - API Layers (validation, ...)

- No compile time references to specific runtime, only loader

- At runtime, loader finds & dispatches to any OpenXR compliant runtime

Code Examples

- https://github.com/KhronosGroup/OpenXR-SDK-Source/tree/master/src/tests/hello_xr
  - C++, abstracted, cross platform, OpenGL/Vulkan/D3D

- https://github.com/EpicGames/UnrealEngine/tree/release/Engine/Plugins/Runtime/OpenXR
  - C++, integrated/abstracted, windows only

- https://github.com/Microsoft/OpenXR-SDK-VisualStudio
  - C++, windows only, D3D

- https://github.com/jherico/OpenXR-Samples/
  - C++, abstracted, windows only, OpenGL

- https://gitlab.freedesktop.org/xrdesktop/gxr
  - C, glib, linux only, Vulkan with OpenGL memory object

- https://gitlab.freedesktop.org/monado/demos/xrgears
  - C++, mildly abstracted, linux only, Vulkan

- https://gitlab.freedesktop.org/monado/demos/openxr-simple-example
  - C, no abstraction, linux only, OpenGL

Simple example

- gcc app.c -o app `pkg-config --libs --cflags glx openxr`
- XR_RUNTIME_JSON=/path/openxr_monado-dev.json ./app
- Symlink: /etc/xdg/openxr/1/active_runtime.json
  - ./app

- Simple example: code & live demo

Godot Plugin

- live demo & code

TODOs

- Packaging OpenXR Loader/Headers in Distributions

  – Like Vulkan Loader/Headers

- Action binding UI for godot

  – Shared UI with OpenVR plugin?

  – https://github.com/GodotVR/godot_openvr/issues/71

TODOs

- ## Graphics Binding
  - ~~glXGetCurrentContext();~~
  - ~~glXGetCurrentDrawable()~~

```
typedef struct XrGraphicsBindingOpenGLXlibKHR {
    XrStructureType    type;
    const void*        next;
    Display*           xDisplay;
    uint32_t           visualid;
    GLXFBConfig        glxFBConfig;
    GLXDrawable        glxDrawable;
    GLXContext         glxContext;
} XrGraphicsBindingOpenGLXlibKHR;
```

- ## Windows Port
  - Some #defines
  - Graphics binding
  - Testing

```
typedef struct XrGraphicsBindingOpenGLWin32KHR {
    XrStructureType    type;
    const void*        next;
    HDC                hDC;
    HGLRC              hGLRC;
} XrGraphicsBindingOpenGLWin32KHR;
```

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Any questions?

FossXR Conference 2020
https://fossxr.dev/
https://twitter.com/FossXR/

Psst...
We're hiring!

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