Using Blender for Rapid Virtual Reality Prototyping

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Project context

- How to facilitate communication between product designers and end-users in the early stages of product development?
Prototyping
High-Fidelity Prototypes

- Augmented reality
- Holography
- Motion capturing
VR for designers

- Blender (BGE) is used for
  1. Creating demonstrators of various VR technologies
  2. Creating interactive prototypes of VR applications
  3. Identifying requirements for VR design tools

- Why Blender?
  - Flexible and open development platform
  - Prior experience with modelling, animation and game engine
Quick prototypes of various VR technologies

- Involving all industrial partners
- Customized VR demos for each design domain
Demo 1

- Client 1 // Allow design team to discuss various machine line configurations (i.e. factory layouts)

- Demonstrator: Augmented Reality Table
  - Easily move around big machines
  - Visualise additional layers of information
Demo 1

Marker

Camera

AR Toolkit: Marker Coordinates

Blender Objects

Composed Scene
Demo 2

- Client 2 // Design team wants to discuss hospital room layouts and configure lighting, sound, etc.

- Demonstrator: Hospital room with surface table input
  - Collaboratively determine room layout using table
  - Experience ambient settings (light, sound) in real-time
Demo 2

- Surface Table
- Remote GUI
- Tags on Objects
- SQL Server
- Virtual Room
Demo 3

- Client 3 // Printer designers would like end-users to try out new GUI concepts in a realistic context

- Demonstrator: Interactive virtual printshop
  - Regular first-person walkthrough environment
  - Real GUI connected to virtual printers
Demo 3

Virtual Office

Interactive Printer

User Controls

1st Person View

Printer GUI
Interactive Prototype

- Company specific case study results
- Validation of results within other companies

The approach starts with a company...
Interactive Prototype

Low level of realism

High level of realism

Fully virtual

Augmented reality
2 // Interactive Prototype

- Fully Virtual printshop
  - With and without textures
  - 3D sound vs. on/off sound
  - Avatars vs. icons

- Augmented Reality printshop
  - Same levels of realism
  - Re-implemented with ARToolkitPlus *

* http://handheldar.icg.tugraz.at/artoolkitplus.php
What kind of tools do designers need to create such VR applications themselves?

- Blender is part of a tool chain with in-house modelling tools, and SweetHome3D for creating virtual rooms
- Blender is used for 'behaviour modelling' (e.g. interactions, behaviour, events, etc.)
3 // Tool Requirements

○ User study
  • Designer with experience in scripting, modelling, GUI prototyping and game design
  • Three hour introduction workshop to Blender and subsequent self study
  • Three behaviour modelling tasks
3 // Tool Requirements

○ Results
  • “It can do the job, but the tool is too complex if you only need it 4 or 5 times a year”
    - Need for layered functionality
    - Need for support (e.g. auto-complete in Python editor)
  • Majority of complaints about Blender being non-intuitive
    - Overall concepts; objects, meshes, IPO's
    - GUI
Conclusions

- Benefits of Blender for VR prototyping
  - Speed
    - Two months to build 3 demonstrators
    - Focus on look and feel, not the implementation
  - Flexibility
    - Development on Linux, deployment on Windows machines
    - Works OK in a tool chain with other (modelling) tools
    - Use of external resources (e.g. ARToolkit, SQL databases) with limited skills
Limitations for 'Professional' Use

- Making runtime/executable VR applications is difficult because of external (Python) libraries
- Outdated documentation and/or incompatible external resources (also due to Blender 2.5+)
- Lack of building bricks for interactive (VR) applications
  - Basics; walk-through, object pick-up, etc.
  - 3D UI solutions (e.g. HUD's)
  - File/network IO
Future Work

- Blender Bricks for VR development/prototyping
  - Collection of 'bricks' for virtual environments
    - First-person walk around
    - Head-up display
    - Tracking cameras
    - Etc.
  - Currently available as a wiki

- Work in Progress
  - Interactive textures

Blender Bricks
http://blenderbricks.josthalen.nl
Thanks

- Videos available via slides on Blender Conference website
- Full documentation available a.s.a.p.

- Feel free to contact me for further details
  
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