



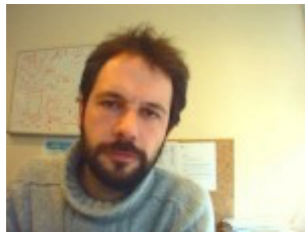
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Algorithms and techniques for virtual camera control

Session 1: Introduction

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Presenters



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Tutorial Outline

Basic Knowledge	10 mn	Christophe Lino
User-Controlled Cameras	30 mn	Roberto Ranon / Christophe Lino
Computer-controlled cameras part 1 - Viewpoint Computation	30 mn	Roberto Ranon
Computer-controlled cameras part 2 - Camera Motions	30 mn	Quentin Galvane
Automated Editing	30 mn	Christophe Lino
Applications, trends and issues	30 mn	all

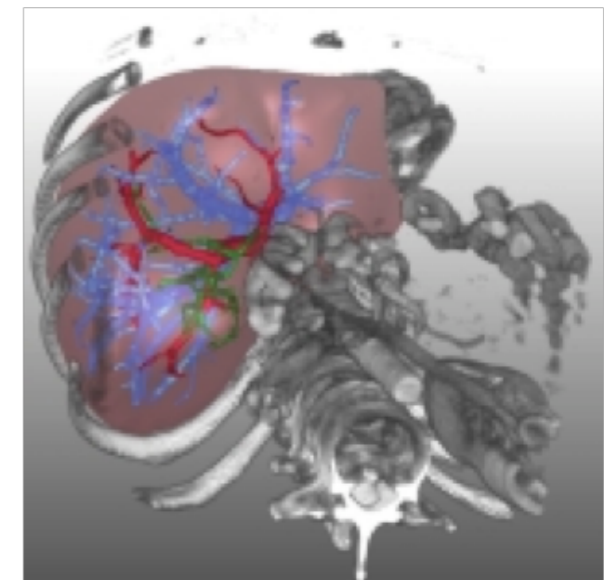
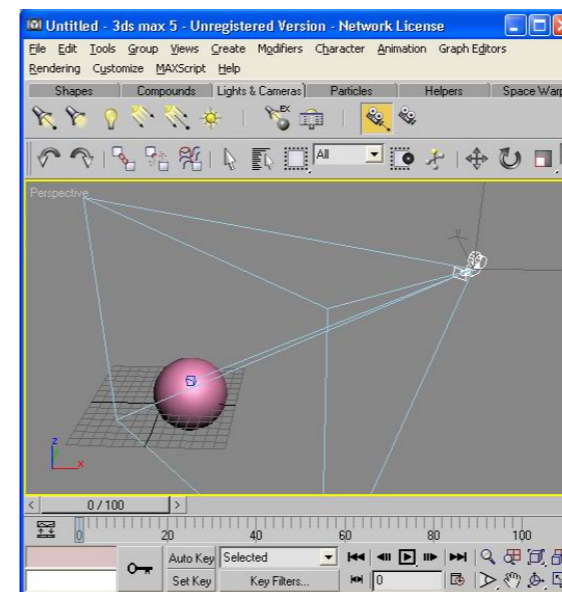
Tutorial Resources

- Unity Viewpoint Computation Library:
<https://github.com/robertoranon/Unity-ViewpointComputation>
- ToricCam library:
<https://sites.google.com/site/christophelino/libraries/toric-cam>
- “Back To The Future” data set,
<https://cinematography.inria.fr/resources/continuity-editing-for-3d-animation/>
- Updated slides, videos, links (available after the tutorial):
<http://dimi.uniud.it/ranon/EG2016-cameracontrolcourse/>

Introduction

What is virtual camera control?

- process by which the camera is interactively or automatically controlled in a 3D environment
 - e.g. games, virtual storytelling, modeling, data / scientific visualisation
- encompasses a collection of techniques to:
 - aid the user in controlling the camera
 - place the camera in a suitable position
 - maintain the visibility of targets
 - make well-composed shots
 - plan camera paths
 - perform cuts between shots



Application: Games

- require camera control
 - during game play (real-time)
 - between game play (cut scenes)
- available resources tightly constrained
- classes of viewpoint
 - first person
 - third person
 - bird's eye
 - cinematic
- key problems:
 - occlusion vs geometric complexity
 - gameplay vs cinematic qualities
 - visual consistency



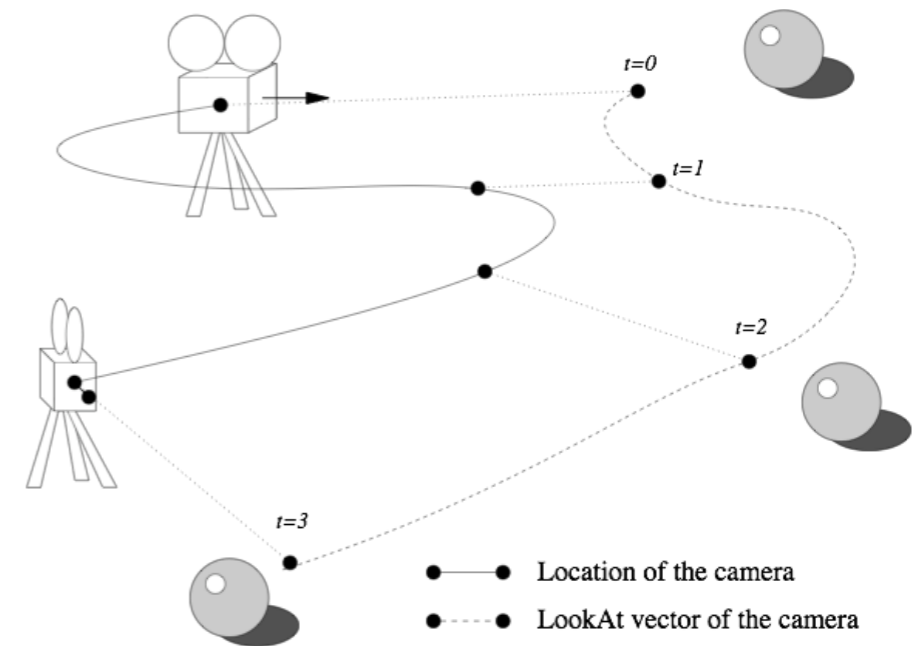
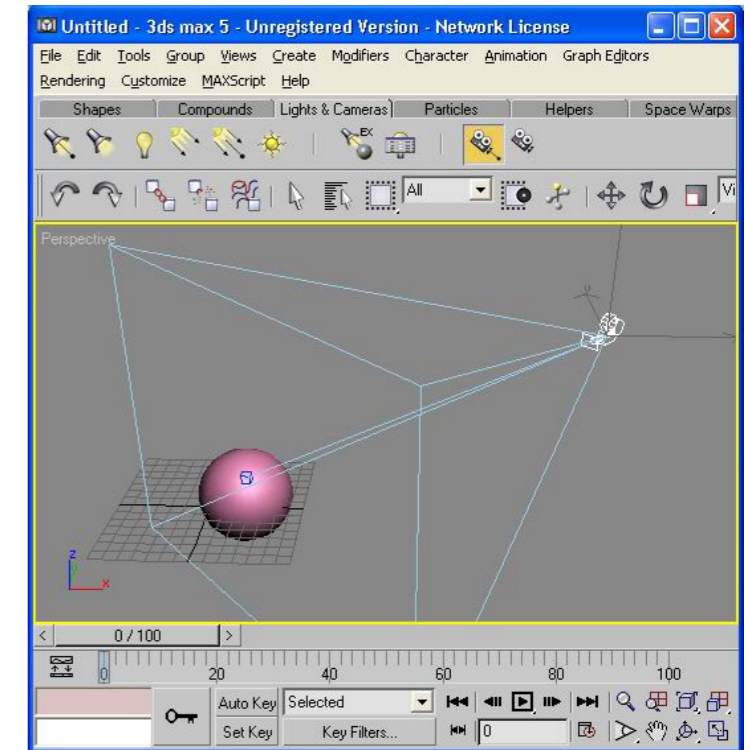
Example: Heavy Rain



Heavy Rain, © Quantic Dream, 2010: <https://www.youtube.com/watch?v=fMK6sTnMxBI>.

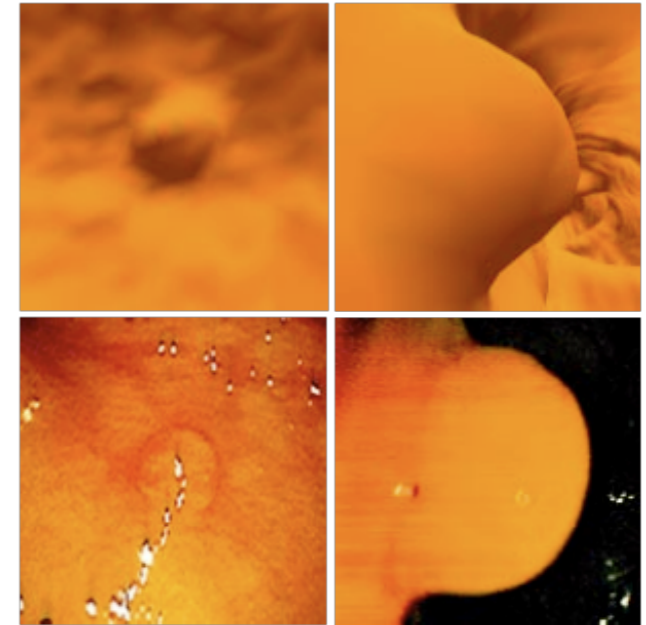
Application: Modelers

- 3D artists specify:
 - camera position
 - look-at / up vectors
- control provided:
 - classical interpolation methods (splines with key frames/control points)
 - fine control of the velocity curves supported
 - target constraints supported
- other basic notions from cinematic practice are not supported (e.g. framing)
- designer is the cameraman (not the director)

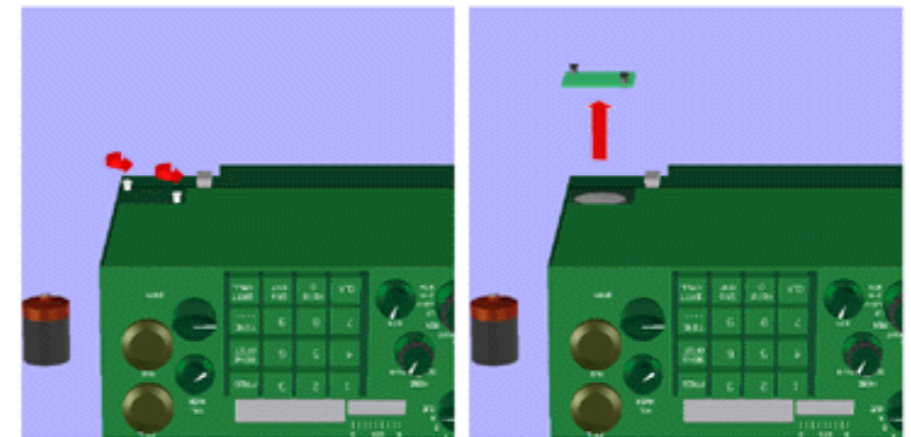


Application: Visualisation - Multimodal Systems

- support user understanding of presented data or procedures
 - or any task the user is performing
- coordination of language and graphics



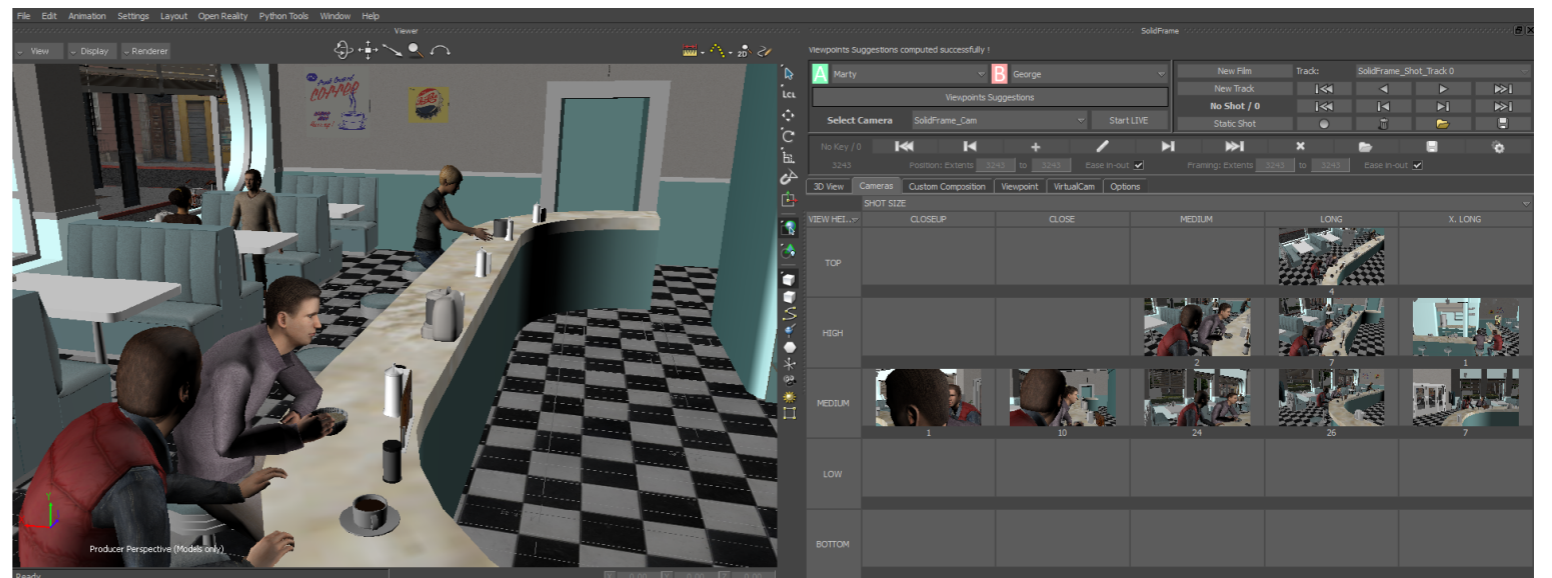
Remove the old holding battery. Step 1 of 2



Step1:
Remove the holding battery cover plate, highlighted in the right picture:
Loosen the captive screws and pull the holding battery cover plate off the radio.

Application: Movies

- CG movies
- digital previz
 - tools to aid the prototyping of camera angles and movements



ENJOY!