**上 海 建 桥 学 院**

SJQU-QR-JW-013（A0）

计算机图形技术 课程教案

Computer Graphics Technology Teaching Plan

周次Week 1 第 1 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **第1部分 预备知识——第1章 数据 Part 1 Preliminary Knowledge——Chapter 1 Data** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过本章学习，对《计算机图形技术》课程进行概述，介绍课程主要教学内容、教学资源和考核方式，介绍各种不同的视觉数据（如二维图像、视频和三维几何数据）。**  Through the study of this chapter, we summarize the course of computer graphics technology, introduce the main teaching contents, teaching resources and assessment methods, includes various visual data (such as two-dimensional image, video and three-dimensional geometric data). | | |
| 教学设计思路 Teaching Design Rationale  **课程概述，了解课程地位和评价标准。通过引例引出研究内容及激发学习兴趣。** Course overview, understanding of the status and evaluation criteria of the course. We use examples to introduce the research content and stimulate learning interest. | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：课程的导入**introduction of courses  **教学难点：数据的采样、噪声的分类**data sampling, noise classification | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、课程概述Course overview（30'）**  **2、数据、可视化、噪声的讲解 Explanation of data, visualization and noise（50'）**  **3、学习通上完成课后作业题To complete the homework after class with Xuexitong APP（10'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **OpenCV 图像处理截图**  **image processing screenshot** | | |
| 课后反思 Reflection | 无  No | |

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Computer Graphics Technology Teaching Plan

周次Week 2 第 2 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **第1部分 预备知识——第2章 技术 Part 1 Preliminary Knowledge——Chapter 2 Techniques** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍计算机图形学、计算机视觉和图像处理领域所需的核心数学技术（如插值和向量乘法），基本的图像处理（打开、保存、边界、ROI等）**  We introduce the core mathematical technologies (such as interpolation and vector multiplication) and basic image operations (read, save, boundary, ROI, etc.) required in the fields of computer graphics, computer vision and image processing. | | |
| 教学设计思路 Teaching Design Rationale  **通过OpenCV的库学习基本的图像处理，通过SciPy库完成课后习题**  **Learn basic image processing with opencv library, complete exercises with SciPy library** | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：插值、相交等数学基础，基本的图像处理 Interpolation, intersection and other mathematical basis, basic image processing**  **教学难点：数学基础 mathematical basis** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计Teaching Methods |
| **1、线性插值、双线性插值  Linear interpolation, bilinear interpolation（20'）**  **2、求解线性方程组Solving linear equations（20'）**  **3、向量的点乘和叉乘的几何意义 Geometric meaning of point multiplication and cross multiplication of vectors（20'）**  **3、基本的图像处理（打开、保存、边界、ROI等） Basic image opereations (open, save, boundary, ROI, etc.)（30'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments    **可完成实验1的“计算机视觉入门”中第一小题**  Students can manage to complete the first question of "Introduction to computer vision" in Experiment 1 | | |
| 课后反思Reflection | 无  No | |

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周次Week 3 第 3 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **第2部分 基于图像的视觉计算——第3章 卷积**  **Part II Image Based Visual Computing —— Chapter 3 Convolution** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍处理二维图像的卷积，学会OpenCV库中线性和非线性滤波器的使用。**  We will introduce the convolution process of 2D images and the use of linear and nonlinear filters with OpenCV library. | | |
| 教学设计思路 Teaching Design Rationale  **通过一维信号的示例，理解卷积的概念；再扩展到二维图像中卷积的概念。**  **使用OpenCV的输出观察卷积运算，即低通滤波、高通滤波、中值滤波的工作原理。**  To understand convolution concept through 1D signal; Then manage to understand convolution in 2D images.  To perceive principle of convolution operation with OpenCV library, i.e. low-pass filter, high pass filter and median filter. | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：线性和非线性滤波器的使用** How to use linear and nonlinear filters  **教学难点：卷积的概念 Concept of convolution** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计Teaching Methods |
| 1. **复习OpenCV中图像的数组、双线性插值、图像边框等 Review the image array, bilinear interpolation, image border, etc. in OpenCV（20'）** 2. **通过一维信号的示例，理解卷积的概念 To understand the concept of convolution through the example of 1D signal（20'）** 3. **二维图像中卷积的概念 Concept of convolution in 2D image（20'）**   **4、低通滤波、高通滤波、中值滤波的工作原理 principles of low-pass filter, high pass filter and median filter（30'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **作业： 各种滤波的计算式，下周提问检查。**  Homework: review the calculation of various filters, check next week. | | |
| 课后反思Reflection | 无  No | |

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周次Week 4 第 4 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **第2部分 基于图像的视觉计算——第5章 特征检测**  **Part II Image Based Visual Computing —— Chapter 5 Feature Detection** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍处理二维图像的边缘检测，边缘是图像分割、图像理解及图像识别的重要特征。**  Edge detection of 2D image processing. Edge is an important feature of image segmentation, image understanding and image recognition. | | |
| 教学设计思路 Teaching Design Rationale  **介绍边缘检测的常用方法。**  **使用OpenCV验证基于梯度、基于曲率等边缘检测方法及区别。**  We introduce the common methods of edge detection.  We use OpenCV to verify the edge detection methods and differences based on gradient and curvature. | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：sobel算子、拉普拉斯算子、canny边缘检测**  Sobel operator, Laplace operator, Canny edge detection  **教学难点：边缘的概念** Concept of edge | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计Teaching Methods |
| 1. **复习OpenCV中的卷积 Review convolution with OpenCV（10'）** 2. **基于梯度的边缘检测 Gradient based edge detection（20'）** 3. **基于曲率的边缘检测 Curvature based edge detection（20'）** 4. **canny边缘检测 Canny edge detection（30'）** 5. **课堂作业：边缘检测的截图 Assignments:** **Screenshot of edge detection（10'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **作业： 提醒同学们完成实验1中的边缘检测部分。**  Homework: remind students to complete edge detection part of Experiment 1 | | |
| 课后反思Reflection | 无  No | |

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周次Week 5 第 5 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **第2部分 基于图像的视觉计算——第5章 特征检测**  **Part II Image Based Visual Computing —— Chapter 5 Feature Detection** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍处理二维图像的角点检测，角点应用三维场景重建运动估计，目标跟踪、目标识别、图像配准与匹配等计算机视觉领域**  We introduce corner detection of 2D image. Used in target tracking, target recognition, image registration ,image matching and other computer vision fields. | | |
| 教学设计思路 Teaching Design Rationale  **介绍角点检测、轮廓检测的常用方法。**  **使用OpenCV验证基于Moravec算子进行模板匹配、Harris角点检测方法。**  We introduce common methods of corner detection and contour detection.  Template matching and Harris corner detection method based on Moravec operator in OpenCV. | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：模板匹配、Harris角点检测 Template matching, Harris corner detection**  **教学难点：角点的概念 Concept of corner** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、 复习边缘检测 Review edge detection（20'）**  **2、 模板匹配template matching（20'）**  **3、 Harris角点检测Harris corner detection（20'）**  **4、 轮廓检测Contour detection（20'）**  **5、 课堂作业Assignments（10'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **作业：卷积和滤波的测试Homework:Test of convolution and filtering** | | |
| 课后反思Reflection | 无  No | |

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周次Week 6 第 6 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第2部分 基于图像的视觉计算——第4章 谱分析 Part II Image Based Visual Computing —— Chapter 4 Spectral Analysis | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍将复杂的信号分解成一组正弦、余弦信号的方法，即离散傅里叶变换。**  We introduce the method of decomposing signals into a group of sine and cosine signals, namely discrete Fourier transform | | |
| 教学设计思路 Teaching Design Rationale  **使用OpenCV验证傅里叶变换和逆傅里叶变换，认识频谱图，知道陷波器的作用。**  Use OpenCV to verify Fourier transform and inverse Fourier transform, understand the spectrum diagram and the function of notch filter | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：离散傅里叶变换、频谱图、陷波器  Discrete Fourier transform, spectrum diagram, notch filter**  **教学难点：离散傅里叶变换、频谱图的分析  Discrete Fourier transform, analysis of spectrum** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、 复习特征检测Review corner detection（20'）**  **2、 理解傅里叶变换Fourier transform（20'）**  **3、 频域中的图像处理示例：低通、高通、陷波器Image processing in frequency domain: low pass, high pass, notch filter（20'）**  **4、 频谱图Spectrum diagram（20'）**  **5、 课堂作业:谱分析的测试**  **Assignments :Test of spectral analysis（10'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **作业： 提醒同学们完成实验1中的谱分析部分。**  Homework: remind students to complete spectral analysis part of Experiment 1 | | |
| 课后反思Reflection | 无  No | |

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周次Week 7 第 7 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第3部分 基于几何的视觉计算——第6章 几何变换  **Part III Geometric Visual Computing——chapter 6 Geometric Transformations** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **理解并掌握计算机图形学中的模型变换（平移、旋转、缩放、剪切），理解局部坐标系和世界坐标系，知道齐次坐标。**  Learn the model transformation (translate, rotate, scale and shear) in computer graphics, understand the local coordinate system and world coordinate system, and know the homogeneous coordinates. | | |
| 教学设计思路 Teaching Design Rationale  **使用OpenCV验证模型变换**  Model transformations in OpenCV | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：模型变换 model transformation**  **教学难点：变换的串联 Concatenation of Transformations** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、 欧氏变换、仿射变换 Euclidean transformation, affine transformation（40'）**  **2、 齐次坐标 Homogeneous Coordinates（20'）**  **3、 变换的串联 Concatenation of Transformations（20'）**  **4、 局部坐标系和世界坐标系 local coordinate system and world coordinate system（10'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **作业： 提醒同学们完成实验1中的几何变换部分。**  Homework: remind students to complete geometric transformation part of Experiment 1 | | |
| 课后反思Reflection | 无  No | |

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周次Week 8 第 8 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **实验1：计算机视觉入门 Experiment 1: introduction to computer vision** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过实验，帮助学生更好地掌握计算机视觉相关概念和技术，使学生对图像滤波、边缘检测、谱分析、几何变换等有比较深入的认识。** Master the concepts and technologies related to computer vision, and have a more in-depth understanding of image filtering, edge detection, spectral analysis, geometric transformation etc. | | |
| 教学设计思路 Teaching Design Rationale  **完成实验1**  Complete Experiment 1 | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：**  **难点：** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| 1. **图像金字塔（20'）** 2. **实验1**  * 简单图像处理：加载图片 -> 图像处理（如调整色彩亮度） -> 保存图片（20分） * 图像滤波：用不同图像源尝试方框滤波、高斯滤波、中值滤波等，并解释适用于什么噪声的图像（20分） * 边缘检测：图像源分别用sobel算子、canny边缘检测、形态学算子做边缘检测（20分） * 谱分析：完成幅值响应和图像的配对，并说明原因，P69课后习题5、6两题（20分） * 几何变换：分别对图像源施加线性变换和透视变换，并用实验结果解释变换串联的顺序至关重要（20分） | | **1、教学方法：**  **学生实践** |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **学习通布置实验1**  **要求：以附件形式上传实验报告的docx文档，并在文本框里粘贴“四、实验调试过程及实验结果截图”这部分的完整文本，以备查重。 Requirements: upload the docx document of the experimental report as attachment, and paste the complete text in the text box.** | | |
| 课后反思Reflection | 无  No | |

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周次Week 9 第 9 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第3部分 基于几何的视觉计算——第7章 针孔相机  **Part III Geometric Visual Computing——chapter 7 The Pinhole Camera** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **理解并掌握计算机图形学中的透视投影变换，了解针孔相机模型**  Perspective projection transformation in computer graphics, and understand the pinhole camera model | | |
| 教学设计思路 Teaching Design Rationale  **使用OpenCV验证透视投影变换，了解全景图像拼接**  Perspective projection transformation in OpenCV and know about panoramic image stitching  Model transformation and perspective transformation in Tutors | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：透视投影变换 Perspective projection transformation**  **教学难点：** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、实验1问题讲解，使用tutors复习模型变换，并注意复合变换的顺序 Explain the problems in Experiment 1, , use tutors to review model transformation, and pay attention to the order of compound transformation（30'）**  **2、针孔相机模型，透视投影变换 Pinhole camera, perspective projection transformation（30'）**  **3、全景图像拼接 Panoramic image mosaic（20'）**  **4、相机参数介绍camera parameters（10’）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  投影变换 Projection transformation | | |
| 课后反思Reflection | 无  No | |

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周次Week 10 第 10 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **Sports Meeting** | |
| 本次授课目的与要求 Teaching Objectives and Requirements | | |
| 教学设计思路 Teaching Design Rationale | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：**  **难点：** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **教学内容纲要：** | |  |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments | | |
| 课后反思Reflection | 无  No | |

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周次Week 11 第 11 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第4部分 基于辐射度的视觉计算——第9章 光照，第11章 光度处理 Part IV Radiometric Visual Computing——9 Light, 11 Photometric Processing | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **介绍为处理光线与我们周围物体交互过程中产生的信息所需的基本技术，涉及人类视觉系统中与光照相关的反射率、光强和色彩等属性，知道常用的颜色模型。** The basic technology needed to process the information generated by the interaction between light and objects around us, involving the reflectivity, light intensity and color related to lighting.  Commonly used color model. | | |
| 教学设计思路 Teaching Design Rationale  **了解辐射度学的基本概念**  **了解CIE XYZ色彩空间及常用的颜色模型**  **了解直方图处理**  Basic concepts of radiometry, CIE XYZ color space and others, histogram processing | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **教学重点：CIE XYZ色彩空间** CIE XYZ color space  **教学难点：辐射度学的基本概念** concepts of radiometry | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、复习针孔相机模型和透视变换 Review pinhole camera model and perspective transformation（20'）**  **2、辐射度学的基本概念：辐射强度、irradiance、radiance、brdf、渲染方程 Basic concepts of radiometry: radiation intensity, irradiance, radiance, BRDF, rendering equation（20'）**  **3、CIE XYZ色彩空间 CIE XYZ color space（30'）**  **4、直方图均衡化Histogram equalization（20'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  作业：辐射度学、直方图处理  Assignment: Radiometry, histogram processing | | |
| 课后反思Reflection | 无  No | |

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周次Week 12 第 12 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第5部分 视觉内容合成——第12章 多样化域  **Part V Visual Content Synthesis——Chapter 12 The Diverse Domain** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过本章介绍创建计算机虚拟世界的基本技术，即计算机图形学的概述。**  We introduce the basic technology of creating computer virtual world, that is, the overview of computer graphics. | | |
| 教学设计思路 Teaching Design Rationale  **通过丰富的示例直观展示计算机图形学的研究内容和应用场景。**  The research contents and application scenarios of computer graphics are intuitively displayed through rich examples | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：研究内容、应用场景 Research content and application scenario**  **难点：** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **教学内容纲要：**  **1、研究内容之建模 Modeling（30'）**  **2、研究内容之处理 Processing（10'）**  **3、研究内容之渲染 Rendering（20'）**  **4、应用 Application（30'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments | | |
| 课后反思Reflection | 无  No | |

**上 海 建 桥 学 院**

计算机图形技术 课程教案

Computer Graphics Technology Teaching Plan

周次Week 13 第 13 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第5部分 视觉内容合成——第13章 交互式图形技术 Part V Visual Content Synthesis——Chapter 13 Interactive Graphics Pipeline | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过本章介绍交互式图形流程：模型变换、视图变换、投影变换、视口变换、光栅化。**  We introduce interactive graphics process: model transformation, view transformation, projection transformation, viewport transformation and rasterization | | |
| 教学设计思路 Teaching Design Rationale  **通过tutors参数直观了解计算机图形学的各种变换。**  Intuitively understand transformations of computer graphics through tutors | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：模型变换、视图变换、投影变换、视口变换、光栅化** model transformation, view transformation, projection transformation, viewport transformation and rasterization  **难点：变换公式推导 Derivation of transformation formula** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、模型变换 model transformation（20'）**  **2、视图变换view transformation（20'）**  **3、投影变换projection transformation（20'）**  **4、视口变换viewport transformation（10'）**  **4、光栅化rasterization（20'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  作业：Tutor/projection 截图 Assignment:sreenshot of Tutor/projection | | |
| 课后反思Reflection | 无  No | |

**上 海 建 桥 学 院**

计算机图形技术 课程教案

Computer Graphics Technology Teaching Plan

周次Week 14 第 14 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第5部分 视觉内容合成——第14章 真实感与性能  **Part V Visual Content Synthesis——Chapter 14 Realism and Performance** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过本章介绍创建计算机虚拟世界的基本技术，理解图形流水线；理解Blinn-Phong光照明模型、着色处理模型；理解z-buffer**  We introduce the basic technology of creating computer virtual world and understands graphics pipeline; Blinn Phong lighting model and shading model; z-buffer | | |
| 教学设计思路 Teaching Design Rationale  **通过tutors参数直观了解计算机图形学的环境光、漫反射光和镜面高光。**  Learn the ambient light, diffuse light and specular highlight of computer graphics through tutors. | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：z-buffer，Blinn-Phong光照明模型，着色处理模型** Z-buffer, Blinn Phong lighting model, shading model  **难点：z-buffer** | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、遮挡和z-buffer Occlusion and z-buffer（20'）**  **2、Blinn-Phong光照明模型 Blinn Phong lighting model（40'）**  **3、着色处理模型 Shading model（30'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  作业：Tutor/light 截图  Assignments : Screenshot of Tutor/light | | |
| 课后反思Reflection | 无  No | |

**上 海 建 桥 学 院**

计算机图形技术 课程教案

Computer Graphics Technology Teaching Plan

周次Week 15 第 15 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | 第5部分 视觉内容合成——第14章 真实感与性能 Part V Visual Content Synthesis——Chapter 14 Realism and Performance | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **通过本章介绍创建计算机虚拟世界的基本技术，介绍如何使用纹理增强真实感；阴影图生成阴影；引入光线跟踪算法** We introduce the basic technology of creating computer virtual world, use texture to enhance realism; Shadow map; introduction to ray tracing algorithm | | |
| 教学设计思路 Teaching Design Rationale  **通过tutors参数直观了解计算机图形学的纹理设置**  Texture setting in tutors | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points  **重点：纹理设置，阴影图** Texture settings, shadow map  **难点：纹理设置** Texture settings | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| **1、复习光照明模型和着色处理模型 Review the lighting model and shading model（10'）**  **2、纹理映射：纹理坐标、Texture mapping: texture coordinates, magfilter、minfilter、mipmap（30'）**  **3、环境纹理、凹凸纹理、位移纹理等应用Environment texture, bump texture, displacement texture and other applications（30'）**  **4、阴影图生成阴影及光线跟踪的引入 Shadow map generation and introduction of ray tracing（20'）** | | ■课堂讲授  ■讨论  ■案例教学  ■ Lecture  ■ Discussion  ■ Case teaching |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  计算机图形学的测试  Test of computer graphics | | |
| 课后反思Reflection | 无  No | |

**上 海 建 桥 学 院**

计算机图形技术 课程教案

Computer Graphics Technology Teaching Plan

周次Week 16 第 16 次课 2 Hours学时 教案撰写人Designer 余莉

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| 课程单元名称Unit | **实验2：计算机图形学入门 Experiment 2: introduction to computer graphics** | |
| 本次授课目的与要求 Teaching Objectives and Requirements  **在tutors软件中通过调整参数，完成三维图形的变换、投影、纹理等效果，理解计算机图形学渲染管线。**  In tutors, complete the transformation, projection, texture and other effects of 3D graphics, understand the rendering pipeline of computer graphics. | | |
| 教学设计思路 Teaching Design Rationale  **完成实验2**  Complete Experiment 2 | | |
| 本次教学重点与难点 Teaching Keys & Difficult Points | | |
| 教学内容提要及时间分配  Teaching Plan and Time Allocation | | 教学方法与手段设计 Teaching Methods |
| 1、 transformation.exe 中①至少3种变换代码及效果截图，②其中至少有translate和rotate交换顺序的对比，截图效果的解释（20分）  2、 projection.exe中①3种视点设置代码及效果截图（正视图、侧视图、俯视图），②设置代码及效果截图展示正交投影和透视投影的不同，对截图效果的解释（20分）  3、 lightmaterial.exe中只有环境光、环境光+漫反射光、环境光+漫反射+镜面高光三种情况的参数设置及效果截图并进行解释（20分）  4、 texture.exe中至少3种纹理参数设置代码及效果截图，其中至少涉及magfilter，minfilter和纹理坐标，对截图效果的解释（20分）  5、 报告内容详实、完整、页面整洁、小结部分有独立的个人见解。（20分） | | **1、教学方法：**  学生实践 |
| 课外复习、预习要求及作业布置 NON-Guided Learning、Requirements and Assignments  **学习通布置实验2**  **要求：以附件形式上传实验报告的docx文档，并在文本框里粘贴“四、实验调试过程及实验结果截图”这部分的完整文本，以备查重。 Requirements: upload the docx document of the experimental report as attachment, and paste the complete text in the text box.** | | |
| 课后反思Reflection | 无  No | |