# Seminar Wissenschaftliches Arbeiten 180.765, SS 2017, 2.0h (3 ECTS)

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There is a common first part – this is second part

Register to course in TISS: to get news & updates

These slides will on the website after this meeting

Official registration: by submitting the literature list

Topics are presented and assigned here today





Practice selecting, reading and understanding

- Search and select papers relevant to your topic
- Summarize them as a state-of-the-art report
- Prepare a talk about your topic in the seminar

This permits in-depth familiarization with the topic







- Submit a literature list (chosen with supervisor)
- Attendance of 3 lectures
- Meetings with supervisor: paper selection, discussion of papers, preparing talk slides
- Alternative: evaluate and compare algorithms
- Final talk in seminar





- Analyze recent papers (select with supervisor)
- Study secondary literature to understand topic
- How to find relevant papers:
- SIGGRAPH Proceedings
- Google Scholar: find the right key words
- Survey papers, often-referenced papers
- Submits a list of 10+ papers per email to supervisor & me  $\rightarrow$  official registration



## State-of-the-Art Report (STAR)

- 8 pages per student, preferably in english
- Format in the style of a scientific paper
- Use LaTeX template on course website
- LaTeX tools and guides also on the website
- Submit the draft in PDF format, per email to supervisor+organizer





- You will get a draft of another student to review
- Typical conference review form (Eurographics)
- This helps author to improve the manuscript
- Guides on review writing on course website
- You will receive 2 reviews (student, supervisor)
- Improve final report according to reviews





- Prepare slides in advance, using template
- Each student talks for 15 minutes, pref. English
- 5 minutes discussion after each talk
- Focus is on overview/comparison of methods
- Present so that other students will understand it
- Active discussion is mandatory and is graded
- Submitted slides are presented on seminar PC







- First part: 17%, second part: 83%, thereof:
- Lecture attendance 5%
- Review: 20%
- Seminar slides+talk: 30%, discussion 5%
- Final report: 40%

• Late submission: 15% off per day, max. 1 week

- 27.03. 23:59 Submit literature list (per email)
- 05.04. 11:00 13:00 Lecture Prof. Wimmer
- 26.04. 15:15 16:45 Lecture Prof. Gröller
- 08.05. 23:59 Submit report draft
- 16.05. 15:15 16:45 Lecture Prof. Purgathofer
- 27.06. 23:59 Submit slides (per email)
- 28.06. 10:00 18:00 Seminar talks (in groups)
- 28.06. 23:59 Submit final report (per email)





- Now 18 topics will be presented
- After the presentation, please mark down at least 3 in order of preference (1, 2, 3, ...)
- I will try to make a fair assignment of topics





## Grammar-based modeling = programming.

12

How to change it?

- Handles
- Node editors
- VPLs



Martin Ilĉik

Input --> Split01 Split01 --> split(x,adjust) { 0.5 : All | ~1.0 : Case01 | 0.5 : All }  $Case01 \rightarrow case \ scope.sx > 1$ : Split02 translate(rel,scope,0.0,0.0,1) Split01 else: Split02 Split02 --> split(x,adjust) { 1.0 : load("assets/woodLoa.obi") }\* Your code goes here epeat until 👍 number) > 4 check element (item 2 - of (next empty space) item 3 - of next empty space) of sudoku (sudoku) with value (number clear element item 2 - of next empty space item (3 - of (next empty space)) of sudoku hange number by 🕕 report false report (true)



## 2 Layouts Generation for Cities

- Multi-scale
- Constraints
- Optimization



Martin Ilĉik



## **3 Fractal Image Compression**



- Fractal Geometry
- State-of-the-art methods to improve speed
- Comparison with other image compression techniques











# **4 Offshoots of KinectFusion**



- Initially developed by Microsoft for surface reconstruction with Kinect
- There have recently been many efforts to build on this functionality

15

 Evaluate pros and cons of different approaches



KinectFusion reconstruction of my desk!

Jeremy Forsythe

# **5 Reinforcement Learning in Graphics**





**Reinforcement learning** is an amazing tool for optimizing the behavior of an agent in an enviroment. It is capable of playing computer games at a high level and also has applications in computer graphics. <u>Check this out</u>.

Károly Zsolnai-Fehér 16



## **6 Neural Networks in Graphics**





**Neural networks** are universal function approximators that are used to solve difficult problems in image and speech recognition, image synthesis, and many more. Check this out and see for yourself!

### Károly Zsolnai-Fehér 17





# Conduct a survey of convex decomposition methods.





Pocket cuts [Lien et al 2007]



Lines of sight [Kaick et al 2014]



Concavity aware fields [Au et al 2012]

#### Mohamed Radwan

18



## 8 Interactive Mesh Segmentation



Review the different techniques for segmenting meshes, aided by user input.



Intelligent scissors find the optimal cut



Stroke along boundary





Stroke across boundary

Select similar components

Mohamed Radwan

19



# 9 Light Painting for Lighting Design



- Solve the Inverse Lighting Problem for 3D Scenes
- Light Painting
- Sketch Based Lighting



Lin, Wen-Chieh, et al. "Interactive lighting design with hierarchical light representation." *Computer Graphics Forum*. Vol. 32. No. 4. Blackwell Publishing Ltd, 2013.



Schoeneman, Chris, et al. "Painting with light." Proceedings of the 20th annual conference on Computer graphics and interactive techniques. ACM, 1993.

#### Katharina Krösl





# **10 Foveated Rendering**



- Perceptually-Based
- Gaze-Based
- Eye Tracking
- Virtual Reality









#### Katharina Krösl



# 11 Hardware Algorithms for Rendering



- Investigate how GPUs perform rasterization
  - Tile-Based Rasterization
  - Efficient Memory Patterns







**Bernhard Steiner** 



# **12 Bending Active Structures**



#### Survey about Bending Active Structures

- Design Methods
- Form Finding





#### Bernhard Steiner





# 13 Global Illumination in Real Time



#### Conduct a survey of recent advances in real-time global illumination







#### **Christian Freude**

24



# 14 Character Animation: Motion Synthesis

Conduct a survey of recent advances in real-time motion synthesis for character animation







#### Christian Freude



## 15 3D Model compression



- Detailed 3D models require a lot of space
- Investigate 3D model compression techniques and their advantages (disk usage, load times, ...)









- Some models are too large to be loaded and rendered as a whole
- LOD structures allow you to load and render only the essential parts of a model (or map)



#### Markus Schütz









# 17 Adaptive Importance Sampling for PBR

 investigate physically based rendering techniques that consider the global importance in the sampling domain







## 18 Path-Space Filtering for PBR



 investigate physically based rendering techniques that combine samples in path space





#### Hiroyuki Sakai







 Please mark at least 3 topics in order of preference (1, 2, 3, ...), with:

Name, student number and email

- Hand in the sheet
- Then I will assign the topics on the spot







- Get in contact with your supervisor ASAP
- Discuss literature list with your supervisor
- Submit the list (to supervisor and me) by 27.3.

