

Bremen



Virtual Reality & Physically-Based Simulation Organization



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Helpful Knowledge (no Formal Prerequisites)

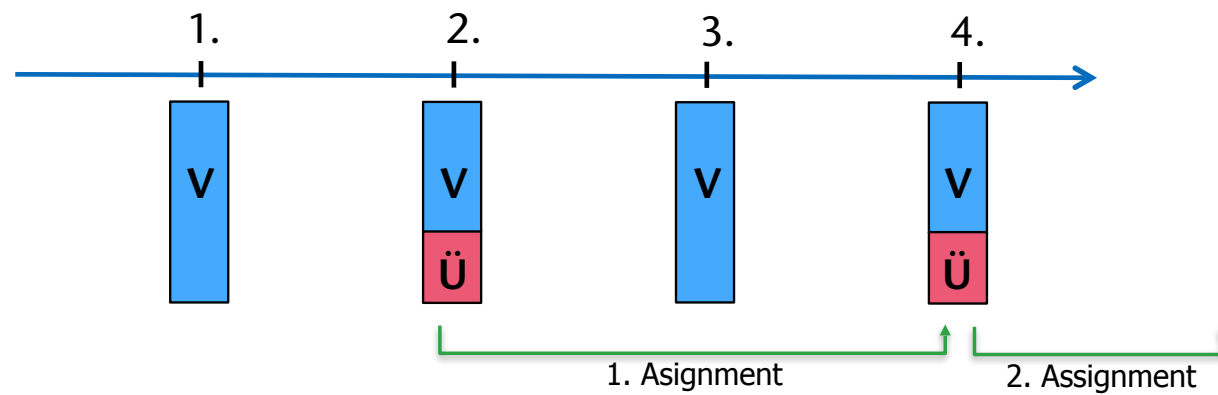
- A little bit of math (just first year)
 - After a few weeks: a little bit of linear algebra
 - At the end: easy differential equations 😊
- A little bit of programming (C/C++)

Where to Find Information on This Course

- The course's homepage:
<http://cgvr.cs.uni-bremen.de/>
→ "Teaching" → "Virtual Reality"
- Slides (a.k.a. Script) & Assignments
- Suggestions for text books, online documentation
- Announcements (rarely)
- Please register in StudIP!

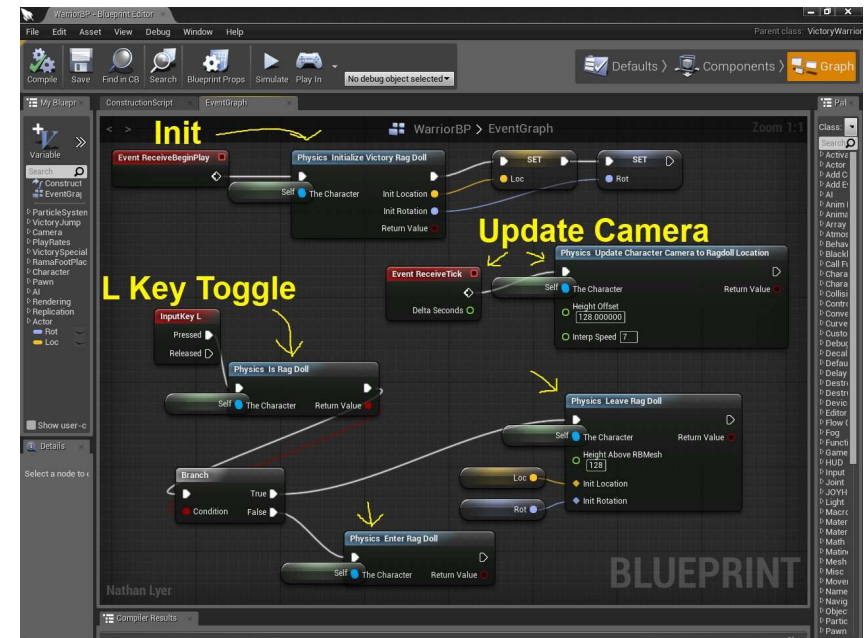
Time of the Class

- Tuesday: lecture
- Wednesdays: alternating



Exercises

- Mix of theoretical (a few) and practical (mostly) exercises
- Theoretical = pencil & paper
- Practical = Unreal engine
 - Using "blueprints" first
 - Later some C programming
- Unreal engine: version **4.9**
 - Download: www.unrealengine.com
 - Tutorials at <https://wiki.unrealengine.com/Videos>
 - See also the links on the course homepage!
- Recommendation: work in groups of **3-4**



The Exam

1. Either: long exam (= ½ hour per student)

2. Or: points from the assignments + short exam

- Assignments → grade A , short exam → grade B
 - 95% of the points from all assignments → grade A = 1.0
 - 40% of the points from all assignments → grade A = 4.0
- Total = $\min\left\{\frac{1}{2}\cdot A + \frac{1}{2}\cdot B, B\right\}$
 - Precondition: grade A ≥ 4.0 && grade B ≥ 4.0 !

(Allgemeiner Teil der Bachelorprüfungsordnungen der Universität Bremen, 2010)

- Note: in *all* variants, *all* of the course material could be topics in the exam!

- Criteria for grading the practical assignments:
 1. Good (= labelling) variable and function names
 2. Sufficient in-line comments
 3. Documentation of the function and its parameters (in/out, pre-/post-condition, what does the function do, ...)
 4. Functionality (solves assignments? no bugs? ...)

Tentative Overview

1. Introduction, immersion/presence/fidelity
2. Scenegraphs, game engines, VR frameworks
3. Devices
4. Stereo rendering
5. Techniques for real-time rendering
6. Simple 3D interaction: navigation, selection, object manipulation, ...
7. Complex 3D interaction: WIM, action-at-a-distance, RDW, ..
8. Collision detection
9. Force feedback
10. Sound rendering
11. Particle systems
12. Spring-mass systems

Text Books

- No single one will do
- Check out some of text books given on the course web page
- Use the online documents given on course web page!