30.7.2020

MARCH 2014

M	T	W	T	F	S	S
31	4	5	6	7	1	2
3	11	12	13	14	8	9
10	18	19	20	21	15	16
17	25	26	27	28	22	23
24					29	30

1 FEBRUARY

Monday 24

WK 09 • 055-310

ADVANCED GRAPHICS, GEOMETRY PROCESSING & AR/VR TECHNOLOGIES

prerequisite: DIP & computer vision

1. computer graphics module (5-6 lectures)

- revision to basics of computer graphics (plan to cover primarily using tutorials / flipped classroom sessions): primitives, geometric transformations,
- hierarchical modelling, and viewing transforms, clipping points and lines, polygon filling, visibility, intro to WebGL.

- advanced concepts in computer graphics: view frustum culling, depth buffering, light shading & shadows mapping, texture mapping, BRDF, ray tracing.

2. geometry processing module (6-8 lectures)

- representations of 3D objects; point clouds, implicit surfaces & meshes.

- point cloud registration (ICP)

- mesh reconstruction from points, poisson surface reconstruction

- polygonization of implicit surfaces

2014

30.7.2020

FEBRUARY

25 Tuesday

056-309 • WK 09

JANUARY 2014

S	M	T	W	T	F	S
5	6	7	1	2	3	4
12	13	14	8	9	10	11
19	20	21	15	16	17	18
26	27	28	22	23	24	25
			29	30	31	

- mesh simplification, laplacian smoothing
- introduction to differential geometry of curves & surfaces.

3. AR / VR module

- introduction to augmented reality & virtual reality.
- hardware, software interfaces
- light, optics (properties of light & lenses)
- human vision system (depth & motion perception)
- revision of camera models & multi-view geometry ~~optics~~ concepts.
- generating 360 degree ~~sphere~~ photosphere / protogrammetry
- 6 DoF optical tracking : outside-in tracking and inside-out tracking
- navigation in virtual reality world.
- rendering virtual objects in augmented reality
- interaction with virtual objects in augmented reality.

2014

4. invited expert talks (1-2 lectures)

PREFERRED TEXT BOOKS

1. computer graphics with OpenGL by heam & baker.

2. multiview geometry in computer vision by hartley & zisserman

3. augmented reality (1/e), deiter schmalstieg & tobias hollerer, addison wesley.

4. virtual reality, steven lavelle, cambridge university press (free online version)

other reference content:

- NPTEL shoort course on VR by prof lavelle

- NPTEL course lectores on computer graphics