

TUM - CAMP

Summer Semester 2021

AT3DCV – Preliminary Meeting



Advanced Topics in 3D Computer Vision – Lab Course/Praktikum

Benjamin Busam, Mahdi Saleh, Patrick Ruhkamp, Hyunjun Jung

Prof. Dr. Nassir Navab

Feb 04, 2021

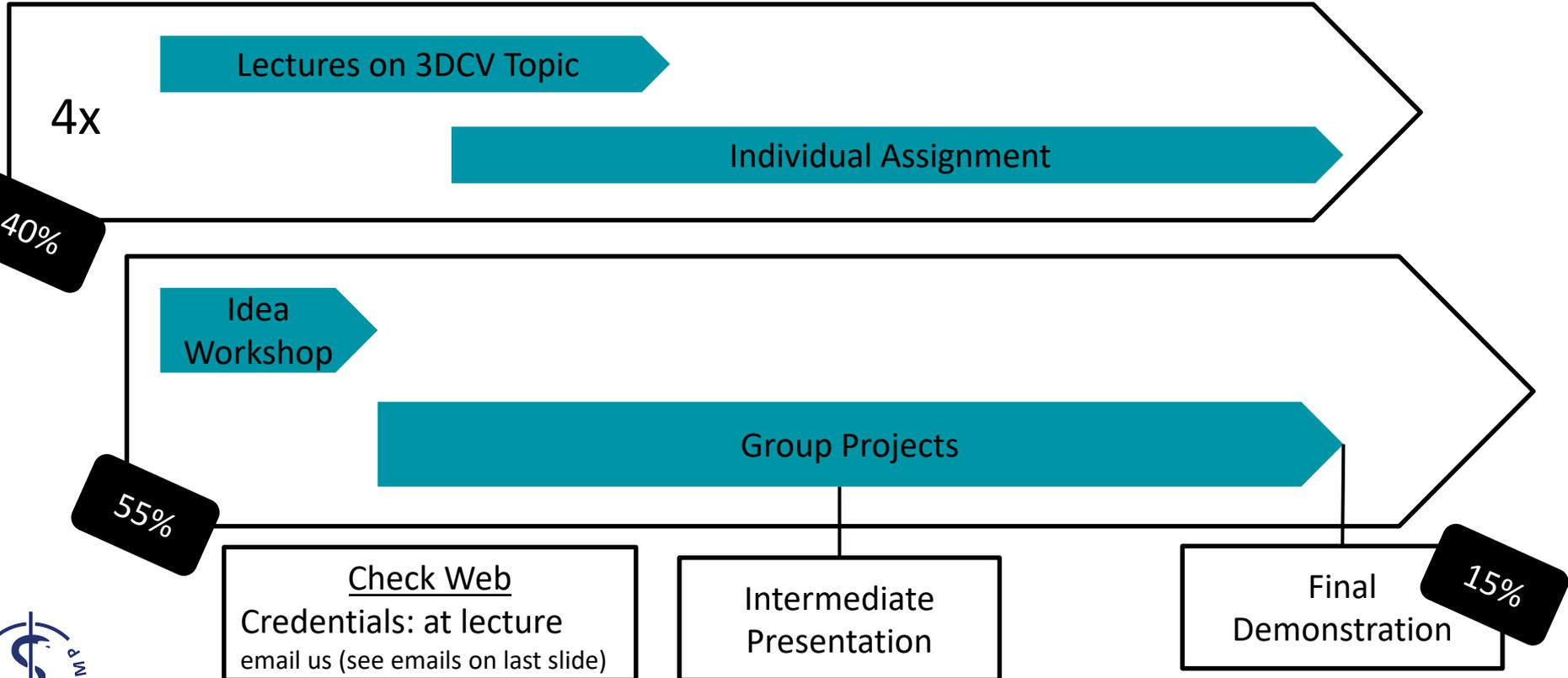


Application

- 2-Stage Application (refer to <http://campar.in.tum.de/Chair/TeachingSoSe21AT3DCV>):
 1. <https://wiki.tum.de/display/campforms/Application+for+Praktikum%3A+Advanced+Topics+in+3D+Computer+Vision>
 - Deadline 16.02.2021
 2. <https://matching.in.tum.de>
- We select appropriate candidates based on their background, interests, and motivation



Lecture Structure



Schedule from last Semester (for reference only)

Schedule

The schedule is preliminary and still subject to change. Please check the course website regularly!

Date	Time	Location	Topic	Conducted by	Materials
14.07.2020	13.00 - 14.00	03.13.010 + Zoom	Preliminary Meeting via Zoom	Patrick Ruhkamp Benjamin Busam Hyun Jun Jung	Preliminary Meeting Slides
03.11.2020	14.00 - 15.30	03.13.010 + Zoom	Lecture 1: Basic Tips and Knowledge for Deep 3D Vision	Hyun Jun Jung	Course Organization Lecture Slides Lecture Video Challenge 01
09.11.2020	23:59 CET	Upload	Solutions to Challenge 1	Students	
10.11.2020	14.00 - 15.30	Zoom	Lecture 2: Sensing Depth with 3D Computer Vision	Benjamin Busam	Lecture Slides Lecture Video Challenge 02 Example Solution
16.11.2020	23:59 CET	Upload	Solutions to Challenge 2	Students	
17.11.2020	14.00 - 15.30	Zoom	Lecture 3: Visual Self-Localization - Classical Methods and Learning-based Approaches	Patrick Ruhkamp	Lecture Slides Lecture Video Challenge 03 Challenge 03 PGO
23.11.2020	23:59 CET	Upload	Solutions to Challenge 3	Students	
24.11.2020	14.00 - 15.30	Zoom	Lecture 4: 3D Deep Learning	Mahdi Saleh	Lecture Slides Lecture Video Challenge 04 Workshop Info
30.11.2020	23:59 CET	Upload	Solutions to Challenge 4	Students	
05.12.2020	10.00 - 14.00	Zoom	Project Brainstorming Workshop (attendance mandatory)	Benjamin Busam Mahdi Saleh Patrick Ruhkamp Hyun Jun Jung	Workshop Intro Presentation Template
12.01.2021	14.00 - 15.30	Zoom	Project Update Presentations (attendance mandatory)	Benjamin Busam Mahdi Saleh Patrick Ruhkamp Hyun Jun Jung	
11.02.2021	18.00 - ca. 20.30	Zoom	Final Workshop (attendance mandatory)	Benjamin Busam Mahdi Saleh Patrick Ruhkamp Hyun Jun Jung	



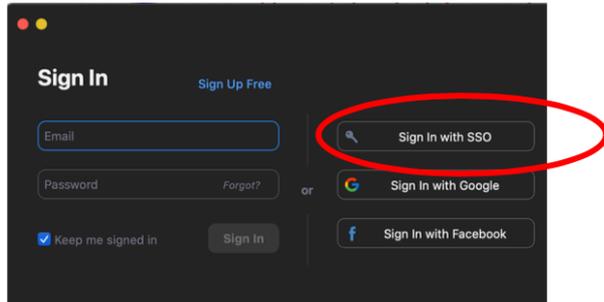
Communication – Virtual/On-sight Lectures

- Depending on government regulations/ TUM regulations
- Communication via Zoom (for virtual lectures and Chat)
- See website for updates (<http://campar.in.tum.de/Chair/TeachingSoSe21AT3DCV>)

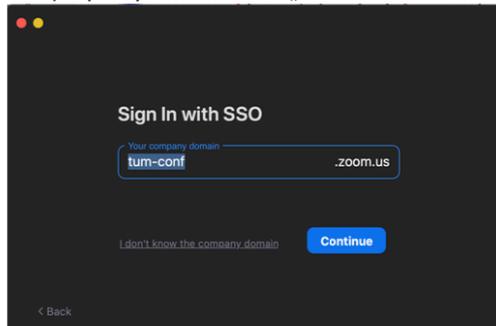


How-To TUM-Zoom

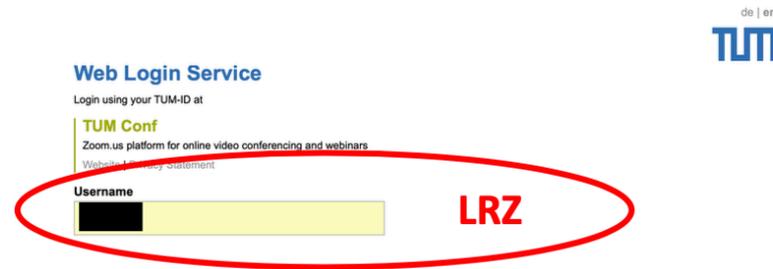
- 1) Download the Zoom App and install.
- 2) Sign in with the SSO



- 3) Specify the domain as „tum-conf“



- 4) Log in with your LRZ credential on the web interface



- 5) Go back to Zoom app
- 6) Go to "Chat" -> Top right "Search" for "Patrick Ruhkamp" and text "AT3DCV"
- 7) You will be manually added to the group

Comment: If you have problems logging in for the first time, try to sign in first by directly opening <https://tum-conf.zoom.us> in your browser. Then follow the instructions from 2) again



Lectures

- Basic Tips and Knowledge for Deep 3D Vision
- Sensing Depth with 3D Computer Vision
- Visual Self-Localization - Classical Methods and Learning-based Approaches
- 3D Deep Learning



Group Projects

- Students will be matched by taking their preferences into account
- Potential project ideas will be suggested during lectures
- Final project proposals of the group will be discussed in workshop session
- We are open to suggestions and ideas!!!
- Projects can either be applied on real world problems OR try to solve open research questions



What to expect

- Gain detailed knowledge in modern computer vision problems
- Study relevant Deep Learning methods
- Understand to see the world in 3D
- Lectures provide starting point for your projects
- Solve 3D Computer Vision tasks
- Apply your acquired knowledge in real scenarios and/or push the boundaries of research in Computer Vision



What we expect

- Interest in Computer Vision
- Independent and pro-active participation
- Actively asking for help (team members and tutors)
- Coding knowledge
- Working dedicated in your team towards achieving the goals of your group project



Evaluation Criteria

- Challenges
- Group Project
 - Interaction within the course / active participation in e.g. Q&As
 - Novelty and originality of your approach
 - Performance of approach: e.g. Robustness / Accuracy (or Functionality)
- Presentation
 - Live Demo during Final presentation

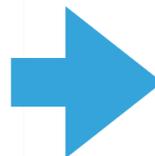
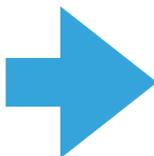
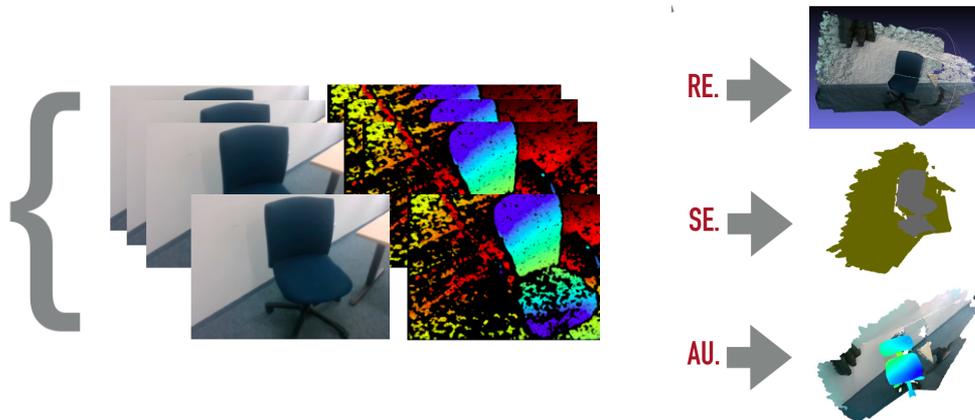
Previous Projects

AT3DCV

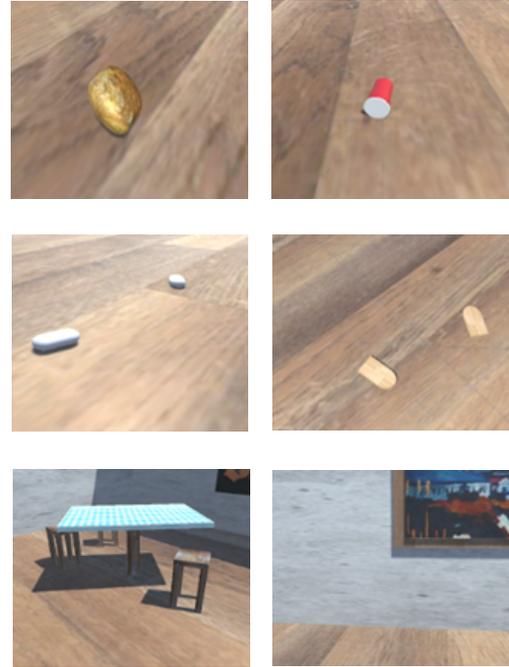


1. Furniture Replacement

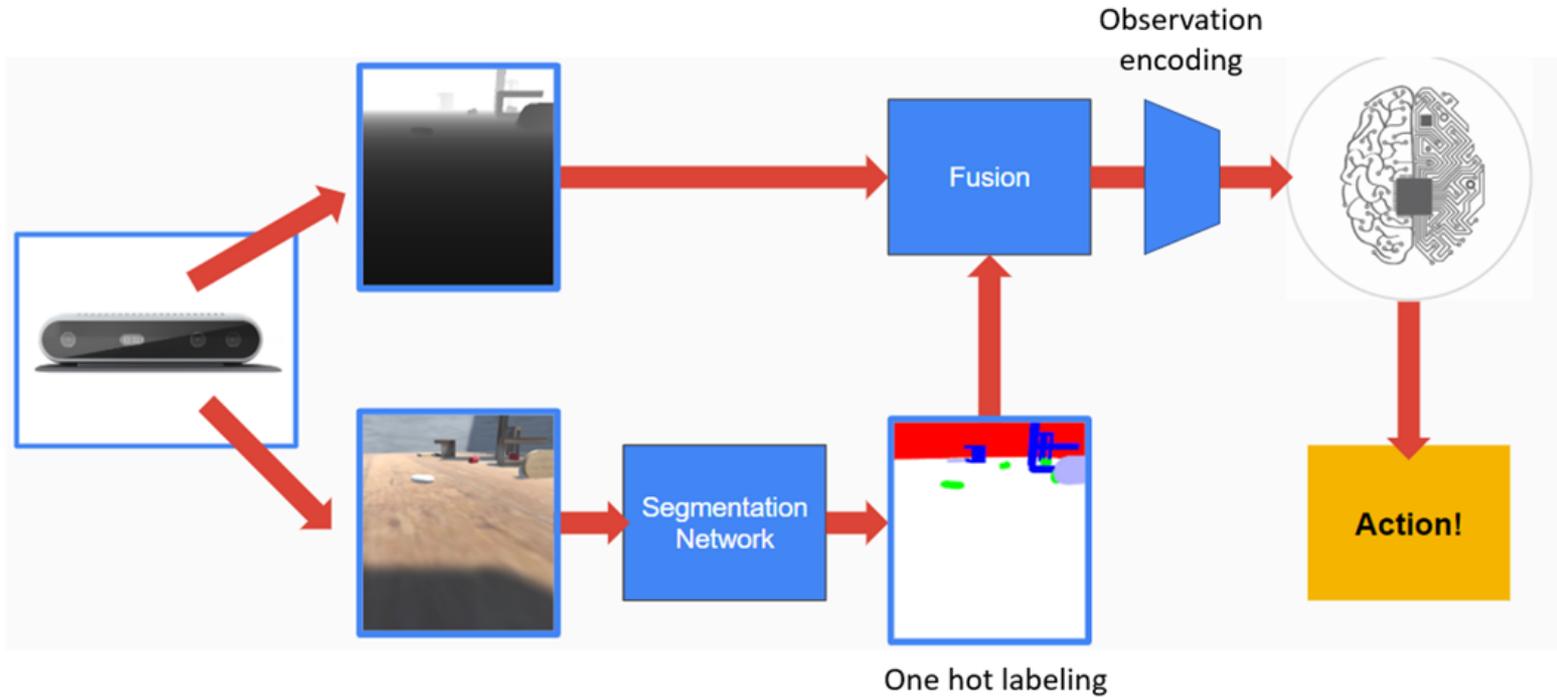
RE. CONSTRUCTION
SE. GMENTATION
AU. GMENTATION



2. Garbage Evaporating Autonomous Robot (a.k.a. Trash Hugger)



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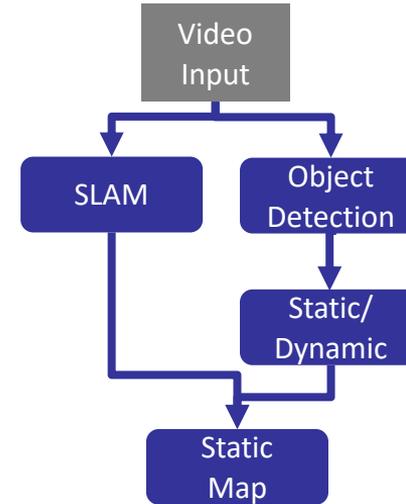


Robot in action!



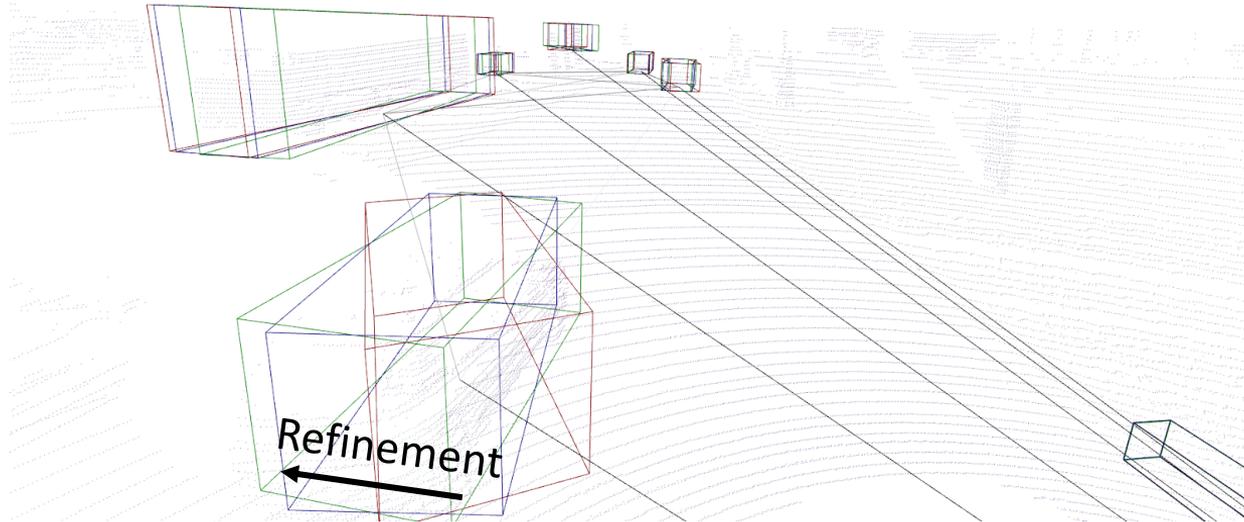
Project Object-SLAM

- Develop **SLAM** pipeline which **detect objects** in the scene, distinguishes between **moving and static objects**, and includes them accordingly in the **3D map reconstruction**

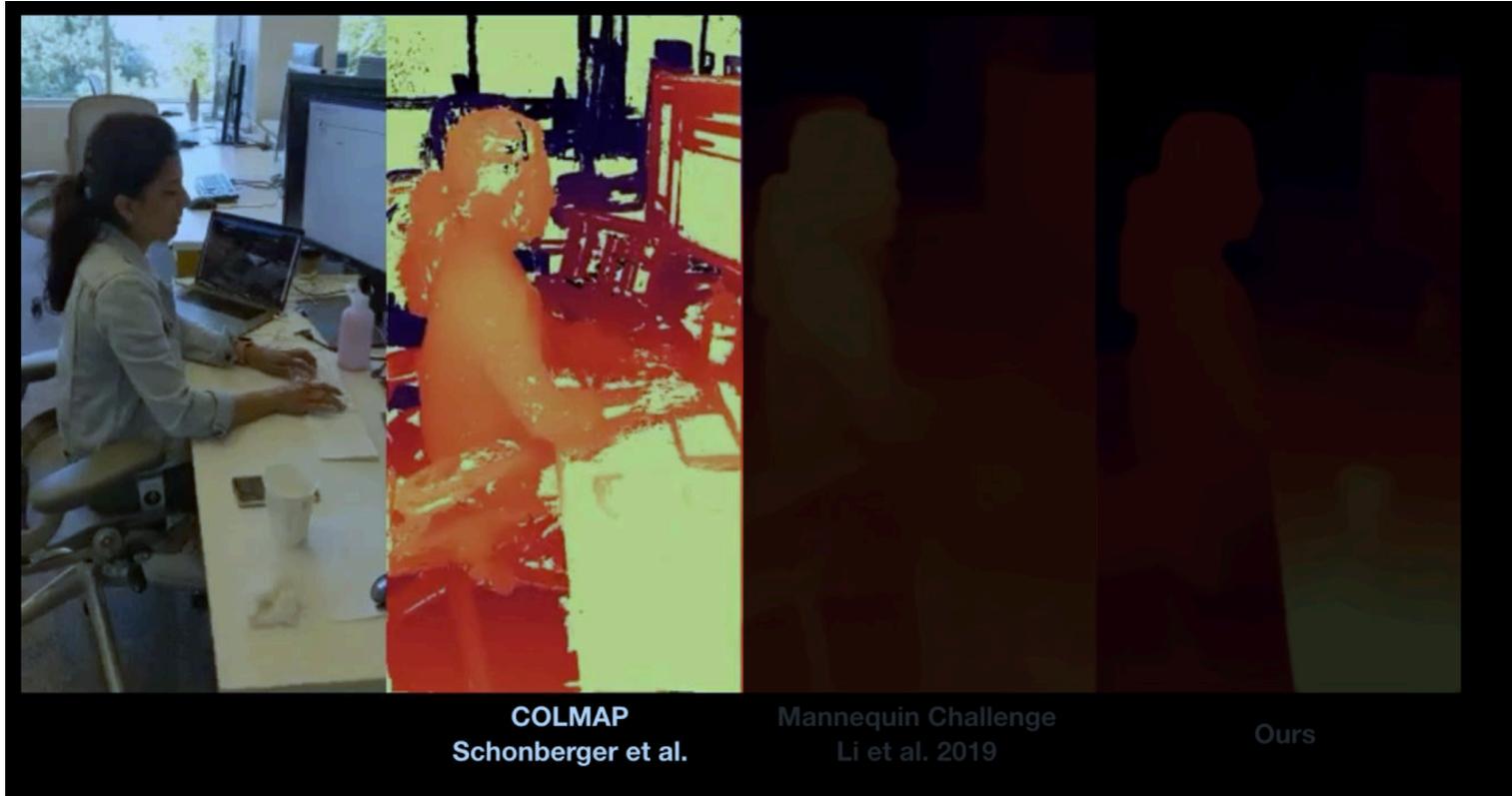


3D Bounding box Refinement

- 3D Bounding box Refinement for Point Cloud-based Object Detection



Unsupervised Temporally Consistent Depth



Questions

- Benjamin Busam: b.busam@tum.de
- Mahdi Saleh: m.saleh@tum.de
- Patrick Ruhkamp: p.ruhkamp@tum.de
- Hyunjun Jung: hyunjun.jung@tum.de

- <http://campar.in.tum.de/Chair/TeachingSoSe21AT3DCV>

- Previous:
<http://campar.in.tum.de/Chair/TeachingWs18AT3DCV>
<http://campar.in.tum.de/Chair/TeachingWs20AT3DCV>

