

Hands-on AI based 3D Vision Summer 26

Lecture 1_0 – Organization

Prof. Dr.-Ing Gerard Pons-Moll
University of Tübingen / MPI-Informatics

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN



Team

Lecturer



Prof. Dr.-Ing. Gerard Pons-Moll
Mvl 1, room A507

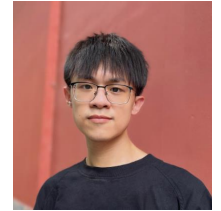
Teaching assistants



Niklas Berndt
MvL 1, room A514



Pradyumna YM
MvL 1, room A514



Yannan He
Mvl 1, room A516

Team

- I am a Professor in Computer Science at the University of Tübingen and the Tübingen AI center
- My group focuses on 3D computer vision and graphics
- Special focus on Virtual Humans – making machines human-like
- *I want to teach machines to see, perceive and act on the 3D world like humans do*

Lecturer



Prof. Dr.-Ing. Gerard Pons-Moll
5th floor Mvl 1

Team

- I am a first year PhD student supervised by Prof. Dr. Pons-Moll
- Studied computer science and mathematics at RWTH Aachen
- Interested in analysis and synthesis of realistic and plausible human-object interactions
- Working on physics-based character animation

Teaching assistant



Niklas Berndt
5th floor MvL 1, room A514

Team

- I am a first year PhD student @ RVH group.
- Studied machine learning @ Tübingen
- Currently interested in human-scene interaction.

Teaching assistant

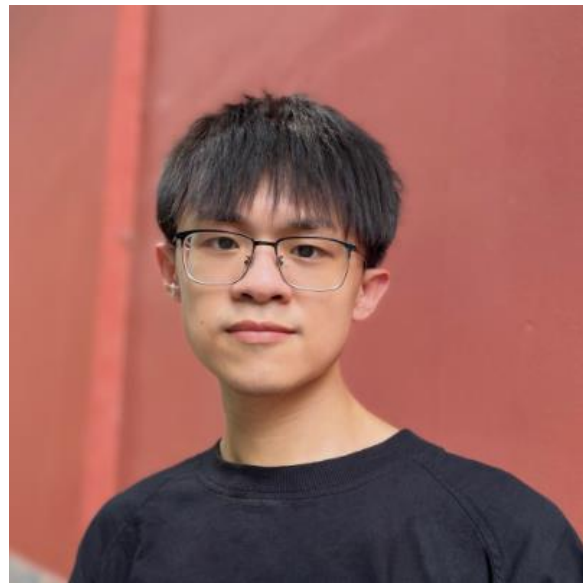


Pradyumna YM
5th floor MvL 1, room A514

Team

- I am a fourth year PhD student @ RVH group supervised by Prof. Dr. Pons-Moll.
- Currently interested in human motion generation and deep generative models.

Teaching assistant



Yannan He
5th floor MvL 1, room A516

Organization

- **Course webpage:**
 - <https://virtualhumans.mpi-inf.mpg.de/3DVision26/>
- **Lecture**
 - Wednesday 10-12, MVL1
 - Tutorials on Tuesday 14-16, MVL6
 - The course is 6 ECTS
- **Grade:**
 - 50% exam, 20% exercises, 30% project
- **ILIAS and Website**
 - Announcements, discussion forum on ILIAS
 - Exercises will be made available on ILIAS
 - Slides will be available from the course webpage
- **Work in teams**
 - Form teams up to 3 people
 - Add your team names on google docs ([link](#))
 - Deadline: **April 24th 23:59PM CET**.
 - Exercises: Only 1 report per team

About Lectures and Tutorials

- Lectures and Tutorials will be in presence.
- It is really important that you **participate in class**. Any question is welcome. For example, *“I didn’t understand slide XX”* or *“I’d like to know more about these type of models”* etc.
- Classes **will not** be recorded.

Tutorial / Exercises

- The exercises will consist of **theoretical questions** and also **programming exercises**
- The final exercise (project) will consist of a mini research project
- You can complete the exercises in teams of **2/3 people (depending on #of participants)**
 - Form a “**team**” until next week **Apr 24 23:59PM CET**.
 - Add your team names on this [google doc](#).
 - We will remove you from the course if your name is not there to leave slots for waiting list students.

Evaluation criteria

- Exam (Oral or written) 50 %:
 - Depending on the number of students exam will be oral or written
 - You need to pass the exam to pass the course
- Exercises (20%) + project (30%):
 - Exercises:
 - Evaluation of theoretical exercises is based on **correctness and clarity**
 - Project (mini-research project ~6 weeks) – we will evaluate
 - Completeness of the report, including **motivation, prior work, methodology, evaluation, and limitations/discussion**.
 - Whether the developed methods are substantial (not a small addition).
 - Robustness of the final result in the scale and scope it was developed.
 - We will have different TAs read the reports so that grading is unbiased.
 - Presentation will also be graded
- To pass the course, you need to pass the exercises, project and exam

Goal

After this course, students should be able to:

- **Understand research papers** related to 3D vision and be able to assess how they fit within the state of the art
- **Develop classical and modern algorithms**
 - camera parameters estimation, Structure-from-Motion, pointcloud processing, Neural Rendering techniques, Generative models

Requirements:

- Master course. Knowledge of linear algebra, probability theory and programming skills are required.

Lectures Schedule

Location:

- **Lectures:** MVL1, 10-12
- **Tutorials:** MVL6, 14-16

Lecture	Lecture Date & Time	Lecture Title
Lecture 01	April 15	Introduction to 3D Computer Vision
Lecture 02	April 22	Camera Models and Coordinate Systems + First exercise
Lecture 03	April 29	Classical 3D Reconstruction Techniques
Lecture 04	May 6	Stereo Vision and Depth Estimation + Second exercise
Lecture 05	May 13	Surface reconstruction and Procrustes alignment
Lecture 06	May 20	Neural Fields and Point Based Representations + Third exercise
Lecture 07	June 10	Neural Radiance Fields (NeRF)
Lecture 08	June 17	Gaussian Splatting and Point Clouds + project proposal
Lecture 09	June 24	Advanced Methods in Learning-Based 3D Reconstruction
Lecture 10	July 01	Generative models
Lecture 11	July 08	Generative models continued
Lecture 12	July 15	Recap of concepts
Lecture 13	July 22	Project DEADLINE July 22 00:00 CET