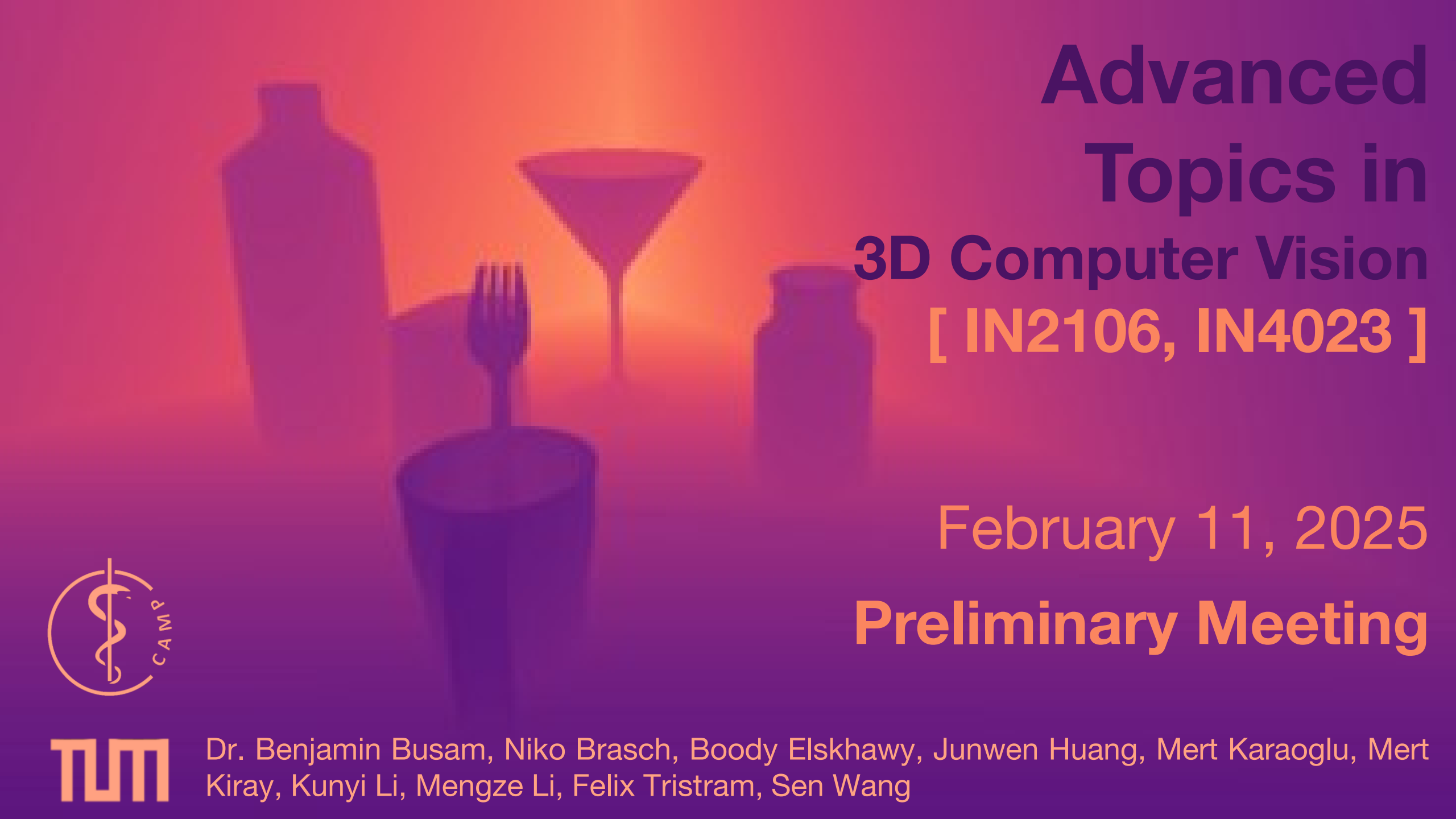


Advanced Topics in 3D Computer Vision

[IN2106, IN4023]

February 11, 2025

Preliminary Meeting

Dr. Benjamin Busam, Niko Brasch, Boody Elskhawy, Junwen Huang, Mert Karaoglu, Mert Kiray, Kunyi Li, Mengze Li, Felix Tristram, Sen Wang

Feedback from previous Students

"AT3DCV is the best course I have ever taken at TUM. I really love this concept because we Master Students can get very detailed, fruitful, and patient supervision from researchers specialized in that field. As a master student who is about to graduate, I really recommend AT3DCV if you are a young fellow and want to do research someday in the future because in this course, you will get a LOT of support from the organizers and this really helps you enjoy research. I believe that is how and why we start doing research. We are being motivated instead of being pushed!"

Hanzhi Chen, MSc Robotics, Cognition, Intelligence
AT3DCV student in WS 2020/21

Core Organizers

Felix Tristram

Nikolas Brasch

Mengze Li

Boody Elskhawy

Junwen Huang

Mert Kiray

Mert Karaoglu

Sen Wang

Kunyi Li

Benjamin Busam

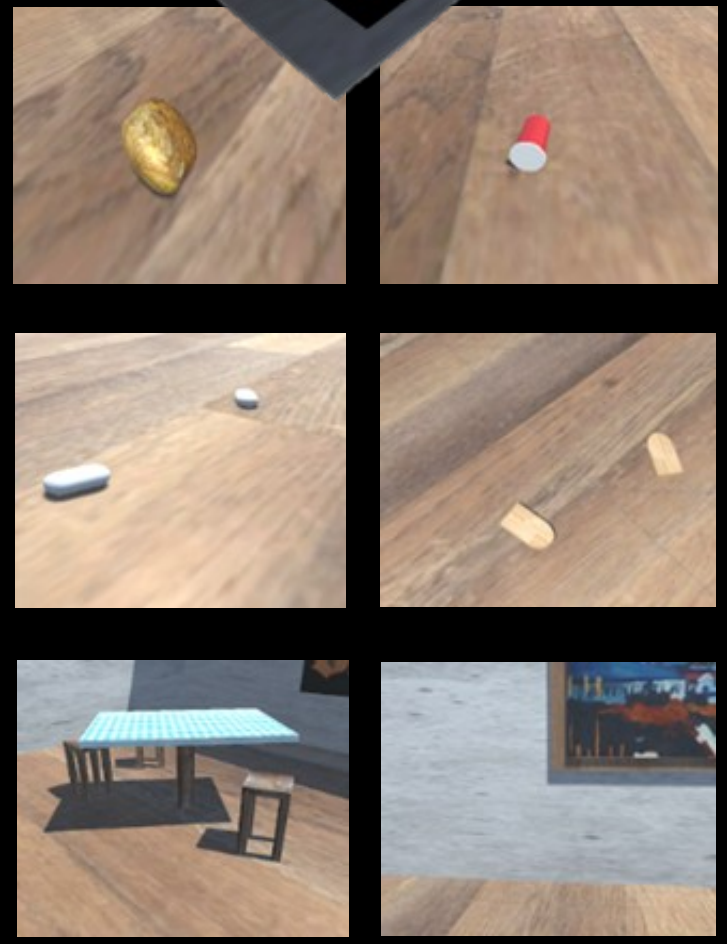
TEAM AWESOME!

3DV

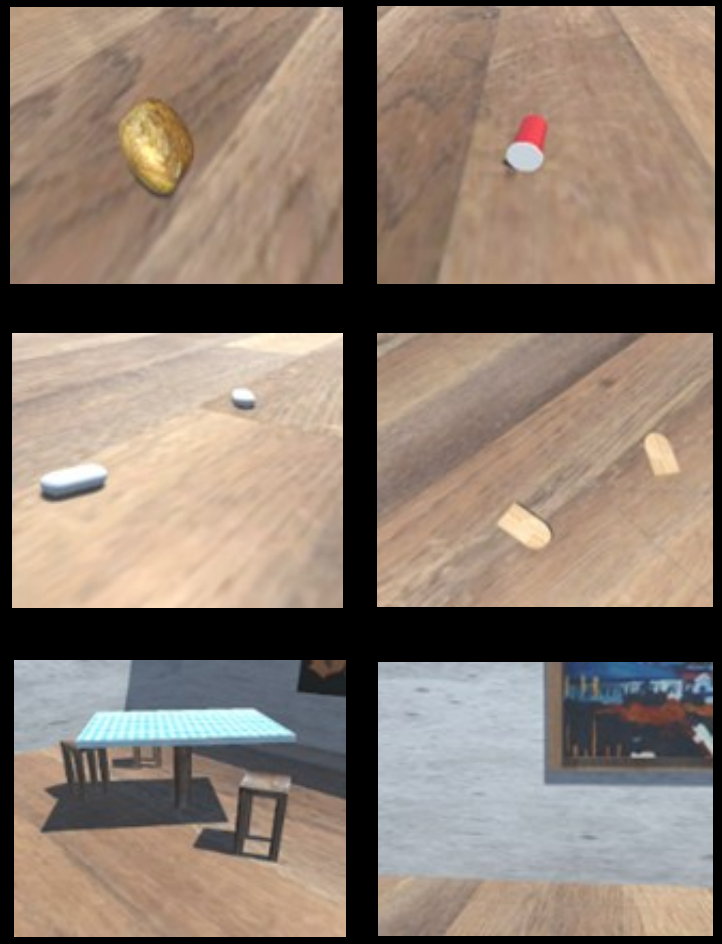
Illustration credit to Mahdi Saleh

Previous Projects

Garbage Evaporating Robot

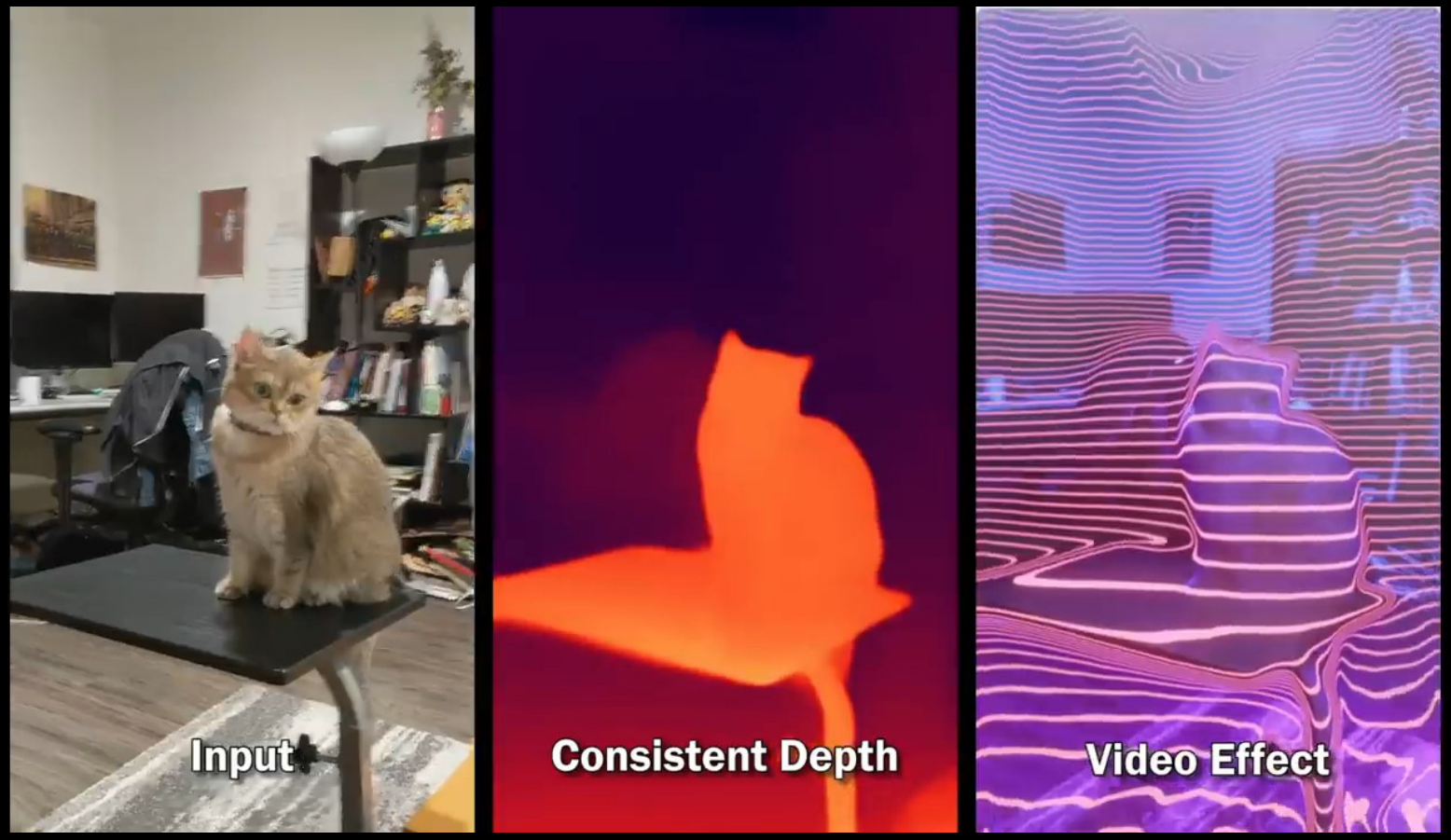


Garbage Evaporating Robot



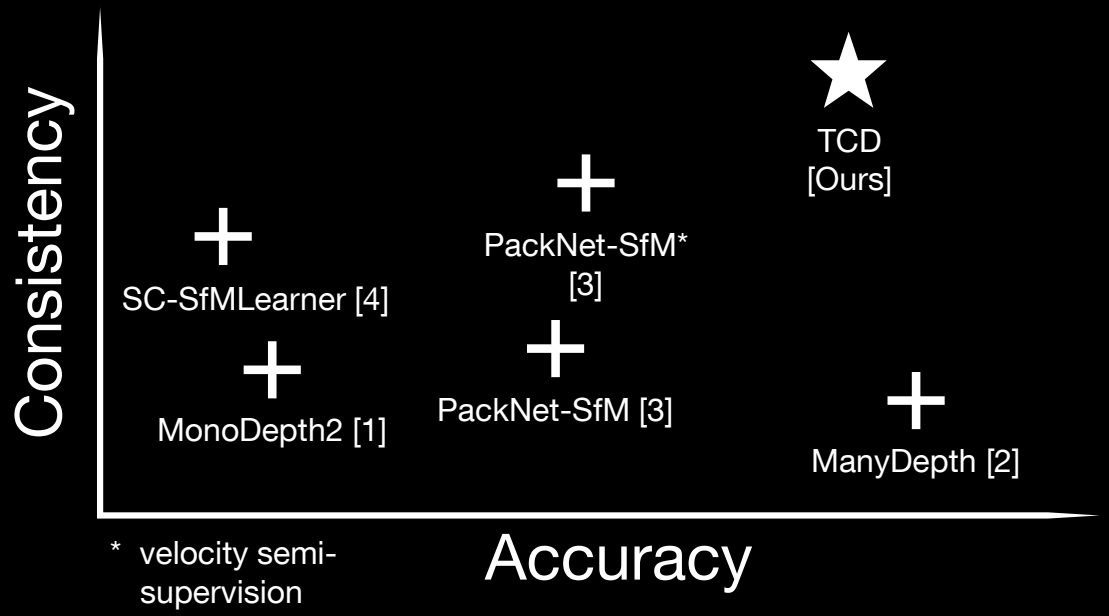
Garbage Evaporating Robot

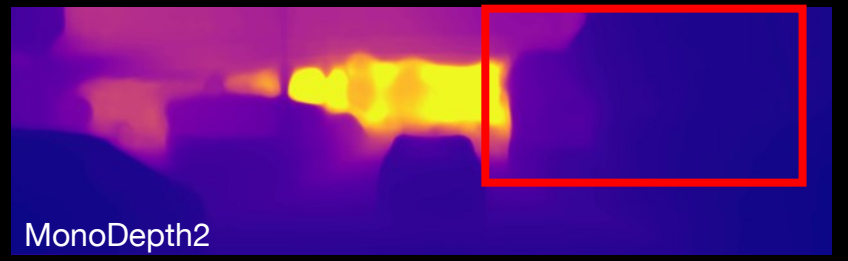
Temporally Consistent Depth [TCD]

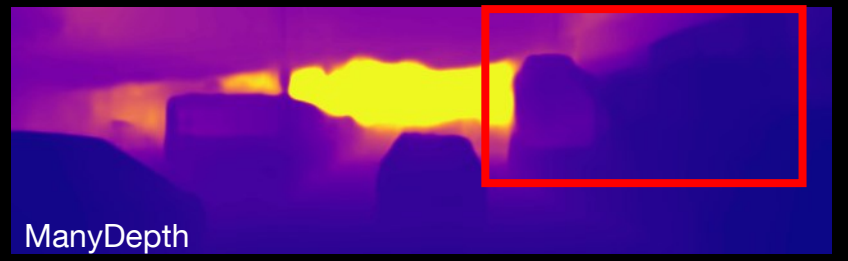


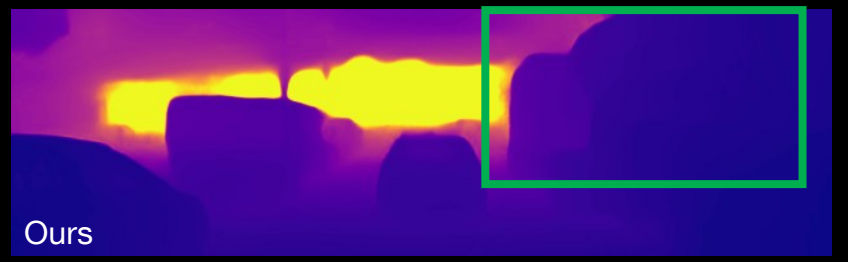
Luo, Huang, Szeliski, Matzen, Kopf. Consistent video depth estimation. SIGGRAPH 2020
Kopf, Rong, Huang. Robust Consistent Video Depth Estimation. CVPR 2021

TCD



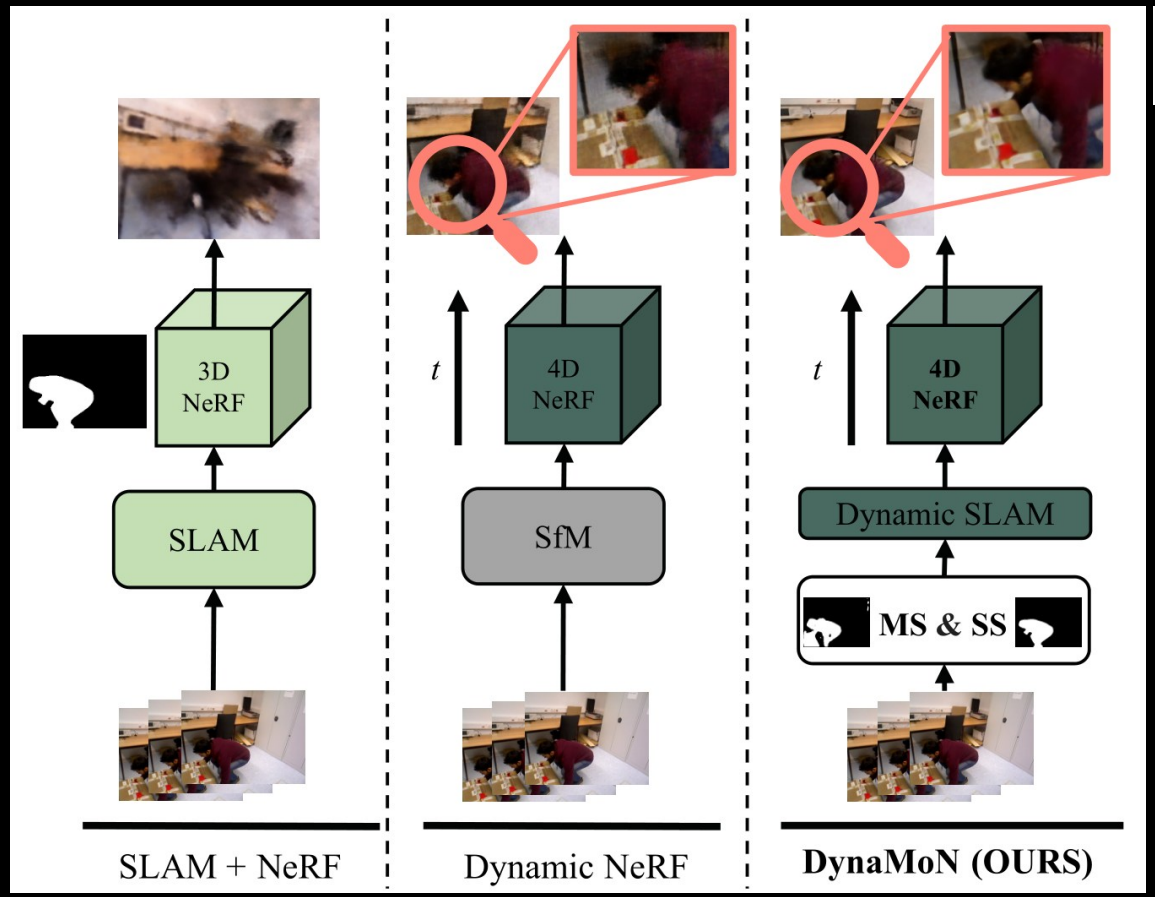


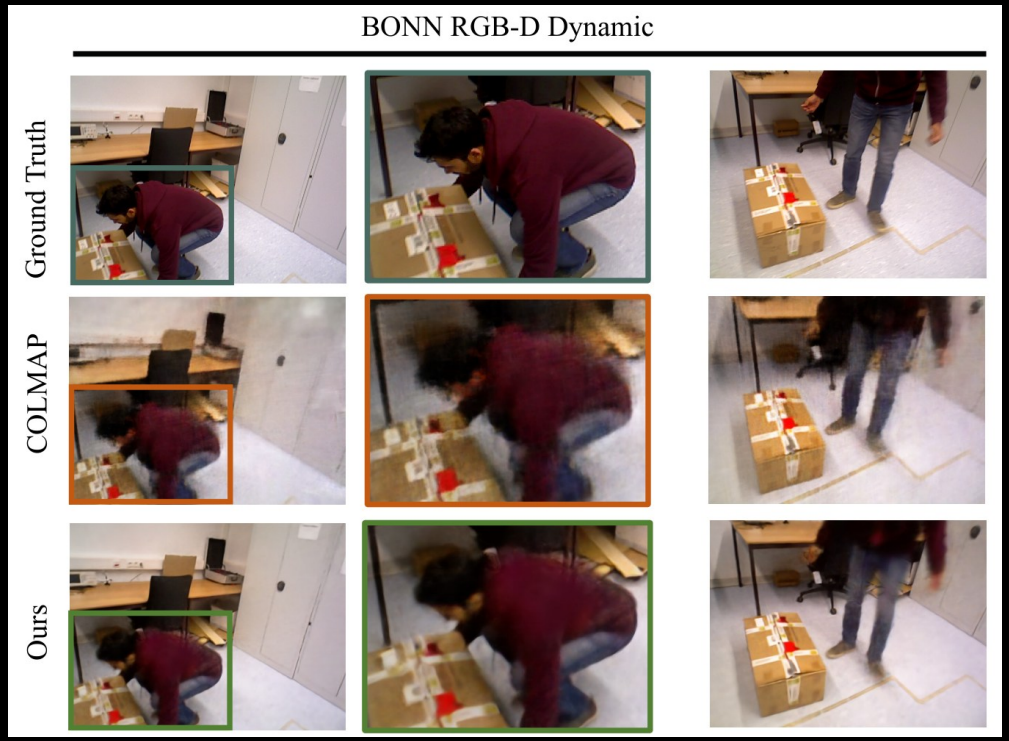




[1] Digging into Self-Supervised Monocular Depth Prediction. Godard et al., ICCV 2020
[2] The Temporal Opportunist, Watson et al., CVPR 2021
[3] 3D Packing for Self-Supervised Monocular Depth Estimation, Guizilini et al., CVPR 2020
[4] Unsupervised Scale-consistent Depth and Ego-motion, Bian et al., NeurIPS 2019

DynaMoN:
Motion-Aware Cam. Poses & Reconstruction





Karaoglu, Schieber, Schischka, Görgülü, Grötzner, Ladikos, Roth, Navab, Busam.
DynaMoN: Motion-Aware Fast And Robust Camera Localization for Dynamic NeRF. RAL 2025.

DynaMoN:
Motion-Aware Cam. Poses & Reconstruction

DynaMoN

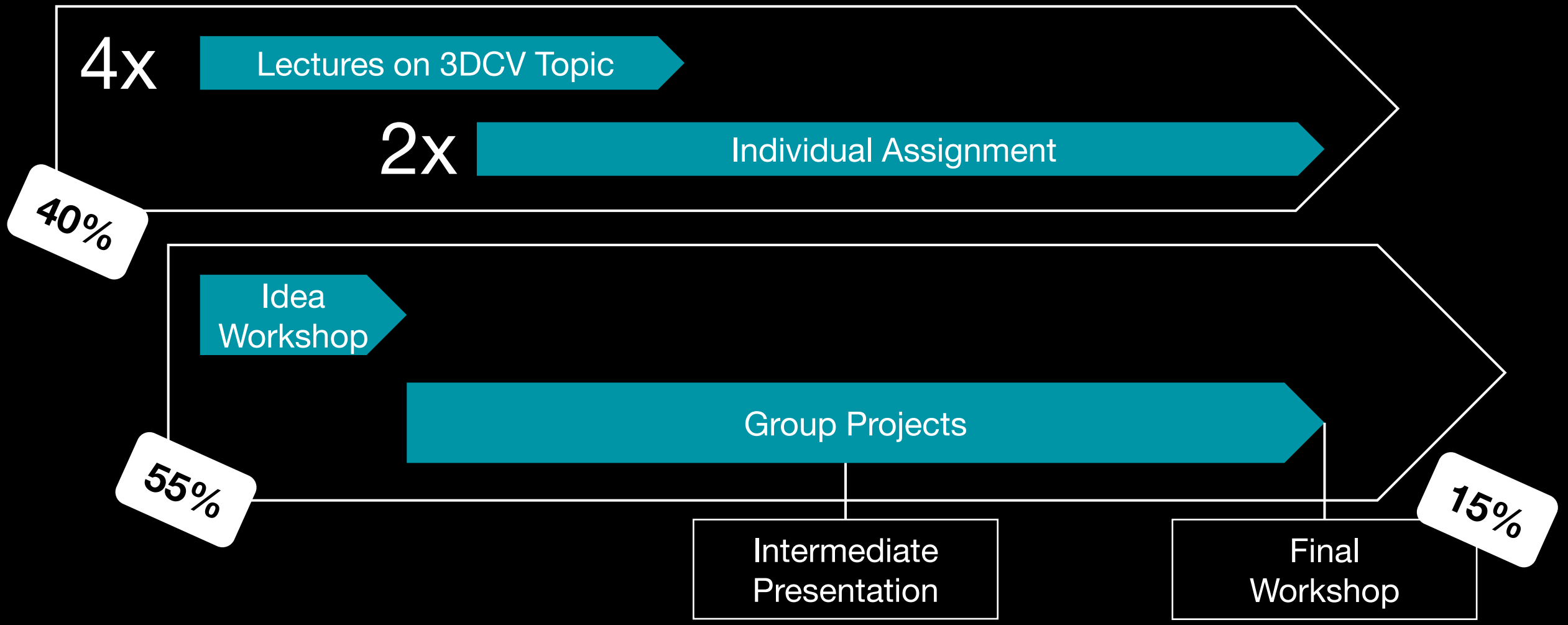
Motion-Aware Fast And Robust Camera Localization for Dynamic NeRF

Mert Asim Karaoglu*, Hannah Schieber*, Nicolas Schischka*, Melih Gorgulu*, Florian Grötzner,
Alexander Ladikos, Daniel Roth, Nassir Navab, and Benjamin Busam

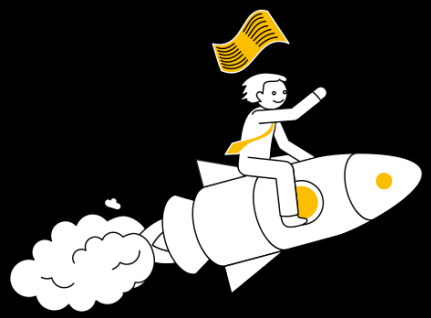
AT3DCV

Summer 2025

Course Structure



AT3DCV – Concept



1. Theoretical + Practical Foundation

- “Flipped Class-room”
  - Pre-recorded lectures: to study on your own pace
  - Interactive Tutor sessions: your chance for discussion and questions (on lectures and assignments)
  - Pass 2 (out of 4) assignments (mostly practical and some theoretical parts)

1. Group projects

Apply your 3DV and DL knowledge

- Very close tutoring
- “Researchy” projects
  - Projects are purposely not strictly defined
  - Be innovative and creative!
  - Final workshop: combination of scientific poster-session and start-up pitch
  - Present your working demo/code/application/results

Application

- **2 stage process:**
  - Register in TUM Online
    https://matching.in.tum.de/
  - Submit questionnaire and upload CV + Transcript
    https://forms.gle/a77Bb3ahXqGuSp8K7

➢ Deadline: 19 February 2025

- Ca. 20 students will be selected (usually 100+ applications)
- Info on Course Websites

AT3DCV: https://www.cs.cit.tum.de/camp/teaching/practical-courses/advanced-topics-in-3d-computer-vision-ss-2025/

Course Dates

Individual Phase

24.04. Introduction Session
Lecture Material
+ 4 Challenges are provided
08.05. Tutor Session

21.05. 23:59 CEST
Hand in 2 of 4 Challenges

Group Phase

15.05. Group Project Introductions
22.05. Project Planning Session (Idea Workshop)

05.06. Group Meeting Slot
12.06. Individual Slot for Group
26.06. Group Meeting Slot
03.07. Mid-Term Presentations
10.07. Group Meeting Slot
17.07. Group Meeting Slot
24.07. Additional (Group Meeting) Slot

XX.07. Final (external) Workshop, TranslaTUM

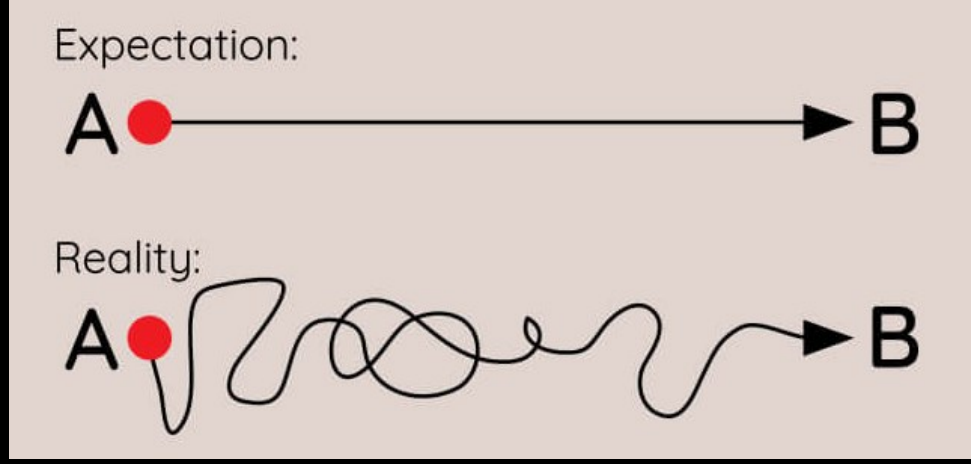
In Person / Virtual – Hybrid

- Mostly onsite in person
- Option to attend virtually via zoom (if necessary)
- Thursdays at 16:00 in MI 03.13.010

Group Projects

- Groups of 3-4 students
- Students will be matched taking their preferences into account
- Project direction can be steered by the ideas of the group
- Project proposals will be discussed in workshop session
- Projects either on real world problems OR open research questions

What we expect



- Interest in Computer Vision
- Independent and pro-active participation
- Actively asking for help [team members and tutors]
- Coding knowledge
- Team work towards achieving the group / project goals

Questions

E-Mail us on

at3dcv@camp.cit.tum.de

Your AT3DCV Team:

Benjamin Busam, Niko Brasch, Boody Elskhawy, Junwen Huang, Mert Karaoglu,

Mert Kiray, Kunyi Li, Mengze Li, Felix Tristram, Sen Wang

Web:

https://www.cs.cit.tum.de/camp/teaching/practical-courses/advanced-topics-in-3d-computer-vision-ss-2025/