

Name: First name: Matr.-Nr.:

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Questionnaire in 3D Computer Vision

This short questionnaire was designed to support the team building process in the lab course 3D computer vision. The results of this questionnaire will not influence your final grade in any way. However, to be able to participate in a group that will take special assignments on video augmentation you will have to prove your knowledge in the field. The participation in this special groups doing more assignments is voluntary once you achieved the required credits within this questionnaire. Please do the questionnaire yourself and mention the time and material you needed. **Good Luck!**

PART 1: About Yourself

Email Birthdate
Major Minor Semester

Personal Study history of relevant courses:

- 3D Computer Vision (Prof. Navab)
- Computer Graphik (Prof. Westermann / Dr. Kipfer)
- Augmented Reality I (Prof. Klinker)
- Augmented Reality II (Prof. Klinker)
- Image Processing (Prof. Radig)
- Other relevant Lectures, Lab Course (e.g. Augmented Reality), Seminars, or SEPs:

Desired Team Members (max. 2)

How long did you need to answer this questionnaire? (fill in once you finish this questionnaire)

What material did you use? (fill in once you finish this questionnaire)

I would like to participate in the advanced team

PART 3: Background Knowledge in 3D Computer Vision and Image Processing

a) List all properties of a 3D Rotation Matrix you know:

b) Here are some examples of homogeneous point. Please complete the equal(=) or not equal(\neq) signs.

$$\begin{pmatrix} 1 \\ 1 \\ 1 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 2 \\ 2 \\ 2 \\ 1 \end{pmatrix}, \quad \begin{pmatrix} 0.1 \\ 0.05 \\ 0.2 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 1 \\ 0.5 \\ 2 \\ 20 \end{pmatrix}, \quad \begin{pmatrix} 1 \\ 2 \\ 2 \\ 1 \end{pmatrix} \quad \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}, \quad \begin{pmatrix} 4 \\ -20 \\ 8 \\ 4 \end{pmatrix} \quad (-5, 25, -10, -5)^T$$

c) Give the definition of expectation $E[x]$ and variance $Var[x]$ for a gaussian distribution:

d) What is a image histogram?

e) What is a gradient image? What will be a good choice for a discrete filter to compute them.

f) Write down the general form for an affine (T_{aff}) and projective (T_{proj}) 3D transformation:

g) What is the dimension and rank of a fundamental matrix?

h) What is the DLT? Describe the algorithm.

i) Rotate a point p with quaternion q ? What is a quaternion?