

# VIBOT Master

## Elements of Geometric Computer Vision

### Short course

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<b>Introducton and math Review</b>	<b>1h</b>		
<b>Pin-hole Camera Geometry (review)</b>	<b>1h</b>		
2.1 The camera projection matrix . . .			
2.2 Camera anatomy . . . . .			
2.3 Camera calibration (or resection)			
<b>Two-View Geometry (review)</b>	<b>2h</b>		
3.1 Epipolar Geometry . . . . .			
3.2 Triangulation . . . . .			
3.3 The calibrated case . . . . .			
3.4 The weakly calibrated case . . .			
3.5 Homographies . . . . .			
3.6 Epipolar Rectification . . . . .			
<b>More on Calibration</b>	<b>3h</b>		
4.4 Zhang's alhorithm . . . . .			
4.4.1 Estimating intrinsic pa- rameters . . . . .			
4.4.2 Estimating extrinsic pa- rameters . . . . .			
4.4.3 Radial distortion . . . . .			
4.6 Orientation . . . . .			
4.6.1 Absolute orientation (with scaling) . . . . .			
4.6.2 Exterior orientation . . .			
<b>Multiple View Geometry</b>	<b>3h</b>		
5.1 Trifocal geometry . . . . .			
5.2 The trifocal constraint . . . . .			
5.2.1 Trifocal constraint for lines.			
5.2.2 Trifocal constraints for points. . . . .			
		5.2.3 Point transfer. . . . .	
		5.3 Reconstruction . . . . .	
		5.3.1 Euclidean Reconstruction	
		5.3.2 Projective Reconstruction	
		5.4 Multifocal constraints . . . . .	
		<b>Autocalibration</b>	<b>2h</b>
		6.1 Counting argument . . . . .	
		6.2 A simple direct method . . . . .	
		6.3 Stratification . . . . .	
		6.3.1 Geometric interpretation	
		6.3.2 Solution strategies . . . . .	
		<b>Getting practical</b>	<b>2h</b>
		7.1 Pre-conditioning . . . . .	
		7.2 Algebraic vs geometric error . . .	
		7.2.1 Geometric error for resec- tion . . . . .	
		7.2.2 Geometric error for trian- gulation . . . . .	
		7.2.3 Geometric error for F . . .	
		7.2.4 Geometric error for H . . .	
		7.2.5 Bundle adjustment (re- construction) . . . . .	
		7.3 Robust estimation . . . . .	
		7.3.1 M-estimators . . . . .	
		7.3.2 RANSAC . . . . .	
		7.3.3 LMedS . . . . .	