

IVR - Spring 2016

Wk	Date	Lecture content	Learn Section	Lecture content	Readings
1	Mon Jan 11	Introduction (MH)	Intro PDF (no video)	Overview of the course, Some definitions, Applications for robotics and vision, The challenge, Historical highlights	M Ch 1, M 6.6-7, R & N 25.1, 25.8
1	Thurs Jan 14	Image and Capture I (MH)	I.1, II-2	Vision Introduction, Image Basics, Image Physics	R & N 24.1-2
2	Mon Jan 18	Image and Capture II (MH)	II.3-II.6	Capture Problems, Image Geometry, Matlab Examples, Homography	R & N 24.3
2	Thur Jan 21	Image Segmentation I (MH)	III.1-III.5	Motivation, Thresholding-based segmentation, 2D Convolution, Background removal, Mean-shift segmentation	R & N 24.3
3	Mon Jan 25	Description of Segments (MF)	IV.1-IV.3	Introduction, Moment descriptors, Shape signatures	
3	Thur Jan 28	Simple Object Recognition (MF)	V.1-V.5	Recognition, Probabilistic Object Recognition, Multivariate Gaussian, Distribution Model, Recognition Algorithmics, Shape Recognition	
4	Mon Feb 1	Matching and Active Vision (MF)	V.6, VI-1-VI.2	Chamfer-Based Shape Matching, Active Vision Introduction, Visual Attention	
4	Thur Feb 4	Active Vision and Vision (MF)	VI.3, VII.1	3D from Motion, IVR Vision Conclusion	R & N 24.6
5	Mon Feb 8	Sensing the world (MF)	I (video to be edited)	Sensors, Factors that affect capability, Contact sensing, Proximity and range sensors, Occupancy grids	M: 6, 11.1-11.3; R & N Ch 24, Ch 25.2-3
5	Thurs Feb 11	Effectors and Actuators (MF)	II (video to be edited)	Mechanisms, Degrees of freedom, Methods of locomotion: wheels, legs, manipulation: arms, grippers, Methods of actuation & choices	R & N 25.2
		Interactive Learning Week		No Lecture	
6	Mon Feb 22	Visual Servoing (MH)	V	Introduction, Formal model, Estimating joint movements, Conclusions	
6	Thurs Feb 25	Introduction to Robot Control (MH)	VI	Problems, tasks that need control solutions, The control problem, Linear dynamic models	R & N 24.6
7	Mon Feb 29	Control 2: Open-loop Control (MH)	VII	Process characteristics, Forward models, Open-loop control	M 2,4; R & N 25.6-7
7	Thurs Mar 3	Control 3: Feedback control (MH)	VIII	Open loop, feed-forward and feedback control. Proportional error and integral error control, Second order system model	
8	Mon Mar 7	Control 4: PID control (MH)	IX	PID Control, Tuning, Limitations and Summary, Robot architectures	
8	Thurs Mar 10	Reaching and Grasping (MF)	III (video to be edited)	3D coordinate systems, Joints, kinematics, Configuration space, specifying robot positions, Grippers, contact & grasping	R & N Ch 25.2
9	Mon Mar 14	Sensing self-motion (MF)	IV (video to be edited)	Self-sensing, Proprioception; position, velocity and Odometry, Navigating with beacons, Haptic perception	M 6.4-5; R & N: 24.6, 25.2-3
9	Thurs Mar 17	Vision for robots (MF)	X	Simple visual cues for reactive behaviour, Vision for proprioception: Optic Flow, Vision for robots	

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Wk	Lab Session	
1	None	No Lab session
2	Intro to Matlab	
3	Intro to Vision 1	
4	Intro to Vision 2, start vision assignments	
5	Vision assignment	
	Interactive Learning Week	No Lab session
6	Vision assignment due	Due on Thursday 25 February at 4pm
7	Intro to Robotics 1	
8	Intro to Robotics 2, start robotics assignment	
9	Robotics Assignment	
10	Robotics Assignment due	Due on Thursday 24 March at 4pm