

Syllabus of Fall Semester, 2018

Course Title	Creative Advanced Robotics	Course Code	MN73684	Section	001
Department	Intelligent Control and Automation in the School of Mechanical Engineering	Level	All	Credit - Theory - Practice	3.0 - 3.0 - 0.0
Class Hours & Classroom	Tue. 16:30-19:30 303-826				
Lecturer	LEE,MIN-CHEOL	Office	M 819	Office Hours	Thur 17:00 ~ 18:00
		Telephone	051-510-2439	E-mail	mclee@pusan.ac.kr
Methodology of Instruction					
Evaluation and Grading	<p>Midterm Exam. - 40% , Paper Presentation and Term Project Presentation -40% , Report , and Attendance Rate of Class - 20%</p> <p style="color: red;">* Students with disabilities can request an extension of the exam hour, and they can take exams by getting writing assistance or by using a computer.</p>				
Prerequisites					
Course Objectives	<p>These days, the importance of creative intelligent service robot has been increased according to a progress of from industrial robot to expert intelligent service robot. This course introduces the basic robot theory, robot control, creative intelligent mobile robot, intelligent personal service robot, expert service robot, and the related techniques. And also machine vision based image processing technology for a robot is introduced. This course aims for students to get a concept of intelligent robot and apply to their robot design.</p>				
Course Description	<p>This course introduces the basic robot theory and recent intelligent robot researches. In first 3 weeks, the kinematics, dynamics, control, and trajectory planning of industrial robot are introduced.</p> <p>Next 4 weeks, intelligent robot control algorithm, path planning, visual servoing technique are introduced.</p> <p>Next 4 weeks, intelligent personal service robot, surgery robot, military robot, humanoid robot, and underwater robot are introduced.</p> <p style="color: red;">* Students with disabilities can negotiate with the Disabled Student's Academic Support Center regarding course materials and assignments.</p>				
Textbooks and References					
Required Textbooks	<ol style="list-style-type: none"> 1. K.S. Fu, R.C.Gonzalez, C.S.G.Lee, ROBOTICS : Control, Sensing, Vision, and Intelligence, McGraw-Hill, 1987 2. Saeed B Niku, Introduction to Robotics Analysis, Systems, Applications(), Prentice Hall, 2001 				
References	<ol style="list-style-type: none"> 1. M.W. Spong, M. Vidyasagar, Robot Dynamic and Control, John Wiley & Sons, 1989. 2. John.J. Craig, Introductions to Robotics Mechanics and Control, Addison-Wesley, 1989. 3. R. P. Paul, Robot Manipulators, The MIT Press, 1981. 4. M. Brady, J. M. Hollerback, T.L. Johnson, Robot Motion, Planning and Motion, The MIT Press, 1982. 5. D.R. Malcolm, Robotics an Introduction, PWS-KENT Pub, 1989. 6. Y. Nakamura, Advanced Robotics : Redundancy and Optimization, Addison-Wesley, 1991. 7. J.M. Skoronsky, Control Dynamics of Robotic Manipulators, Academic Press, 1986. 8. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, Tutorial on ROBOTICS, IEEE Computer Society, 1983. 9. Yoram Koren, Robotics for Engineers, McGraw-Hill, 1987. 10. R. J. Schilling, Fundamentals of Robotics, Prentice Hall, 1990 11. P. J. McKerrow, Introduction to Robotics, Addison-Wesley, 1991 12. James G. Keramas, Robot Technology Fundamentals, Thomson Learning, 1999 13. Robert M. Haralick and Linda G. Shapiro, Computer and Robot Vision Vol I & II, Addison Wesley, 1992 				

14. V. Utkin, J. Guldner, and J. Shi, Sliding Mode Control in Electromechanical Systems, Taylor & Francis, 1999.

Weekly Schedule of Classes

Week No.	Course Material	Assignments and Other Notes
Week 1	[Orientation and Education on Academic Misbehavior(e.g. Cheating, Plagiarism) and Safety Education on Experiment and Practice] Introduction and Kinematics of Robot Manipulator	
Week 2	Dynamics of Robot Manipulator	
Week 3	Control and Trajectory Planning of Robot Manipulator	Kinematics, Dynamics, and Control of 2 DOF Manipulator
Week 4	Intelligent Manipulator Control	
Week 5	Sliding Mode Control	Sliding Mode Control of 2 DOF Manipulator
Week 6	Surgery Robot	Paper Survey and Presentation for Surgery Robot
Week 7	Mobile robots and sensors	
Week 8	Midterm Examination	
Week 9	Introduction of Intelligent Robot	
Week10	Intelligent Mobile Robot – Path Planning	Paper Survey and Presentation for Path Planning
Week11	Intelligent Mobile Robot – SLAM	Paper Survey and Presentation for SLAM
Week12	Personal Service Robot/Humanoid Robot	Paper Survey and Presentation for Personal and Humanoid Robot
Week13	[Fusion Lecture by Prof. Kang Dong Jung] Special Topics of Machine vision: Introduction of Machine Vision and Image Processing	Paper Survey and Presentation for Military and Underwater Robot
Week14	[Fusion Lecture by Prof. Kang Dong Jung] Special Topics of Machine Vision: Vision based Application to Mobile Robot and Automobile Vehicle	Paper Survey and Presentation for Visual Servoing Technique of Mobile Robot
Week15	Military & Underwater Robot and Summary	Paper Survey and Presentation for Visual Servoing Technique Application to Mobile Robot or Automobile Vehicle
Week16	Final Exam (Term Project Presentation)	
Attachment		