COURSE of VISUAL SERVOING
by
Dr. François Chaumette

For a long time, 3D reconstruction was considered as an essential, independent prerequisite for robot motion generation modules in a non-perfectly known environment. With computer vision, this requirement, which was fully justified by the enormously expensive computation times required by image processing algorithms, has given rise to much useful research, in particular in the stereo-vision field. Over the last fifteen years, technological and algorithmic advances have allowed perception and action to be more closely linked, by directly integrating the measurements provided by a vision system in closed-loop control laws. This approach, commonly called visual servoing, is the subject of this course.

Visual servoing techniques use the information provided by one or several cameras in order to control the motions of a robotic system. By controlling between one and all the degrees of freedom of a system, we can carry out a great number of positioning tasks, or mobile target tracking. Whatever the sensor configuration, which can vary from one on-board camera to several free-standing cameras, the aim is to select the best set of measurements allowing to control the desired degrees of freedom, and to elaborate a control law so that these measurements reach a desired value.

Biography of François Chaumette

François Chaumette was born in Nantes, France, in 1963 and graduated from Ecole Nationale Supérierure de Mécanique, Nantes, in 1987. He received the Ph.D. degree and "Habilitation à Diriger des Recherches" in computer science from the University of Rennes in 1990 and 1998 respectively. Since 1990, he has been with IRISA/INRIA, Rennes. His research interests include robotics, computer vision, and especially the coupling of these two research domains (vision-based control, active vision and purposive vision). Dr. Chaumette received the AFCET/CNRS Prize for the best French thesis in automatic control, in 1991.

Recent publications

E. Malis, F. Chaumette, S. Boudet. - **2 1/2 D Visual Servoing.** - *IEEE Trans. on Robotics and Automation*, 15(2):238-250, Avril 1999.

E. Marchand, F. Chaumette. - **Active vision for complete scene reconstruction and exploration.** - *IEEE Trans. on Pattern Analysis and Machine Intelligence*, 21(1):65-72, Janvier 1999.

F. Chaumette. - **Potential problems of stability and convergence in image-based and position-based visual servoing.** - In *The Confluence of Vision and Control*, D. Kriegman, G. Hager, A.S. Morse (eds.), LNCIS Series, No 237, pp. 66-78, Springer-Verlag, 1998.

E. Marchand, E. Rutten, H. Marchand, F. Chaumette. - **Specifying and verifying active vision-based robotic systems with the Signal environment.** - *Int. Journal of Robotics Research*, 17(4):418-432, Avril 1998.

V. Sundareswaran, P. Bouthemy, F. Chaumette. - **Exploiting image motion for active vision in a visual servoing framework.** - *Int. Journal of Robotics Research*, 15(6):629-645, Décembre 1996.

F. Chaumette, S. Boukir, P. Bouthemy, D. Juvin. - **Structure from controlled motion.** - *IEEE Trans. on Pattern Analysis and Machine Intelligence*, 18(5):492-504, Mai 1996.

Scheduling:

The course is organised in 5 sessions: 3 sessions concerning the theory of visual servoing and 2 sessions in which the assistants will test the algorithms using computers with OS Linux.

Monday, April 30th
15:30 – 17:30. Room "Sala-Microscopia". *Theroretics*

Wednesday, May 2nd
15:30 – 17:30. Room "Sala-Microscopia". *Theroretics*

Thursday, May 3rd
15:30 – 17:30. Room "Sala-Microscopia". *Theroretics*

Friday, May 4th
10:00 – 12:00. Room "CC7", *Teaching practice*
15:30 – 17:30. Room "CC7", *Teaching practice*

Organized by

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