PhD proposal: Augmented Visual Perception

Research laboratory:

UMI 2955, Image and Pervasive Access Lab. (IPAL)

## Thesis advisors:

- Nizar OUARTI (Associate Professor UPMC ISIR/IPAL)
- Joo-Hwee LIM (Senior Researcher I²R,A*STAR)

Contacts: ouarti@isir.upmc.fr   joohwee@i2r.a-star.edu.sg

Abstract:

Visual perception is based on a complex sensor: the retina. This sensor measures the amount of light, the color, the movement of an object and the salient points. Is it possible to increase the capacity of the retina, for normal or pathological retina? The approach proposed in this thesis is to implement a system of augmented visual perception. Applications based on augmented reality are quite numerous: obstacle avoidance, environment mapping, place recognition [1], gesture recognition [2], or 3D-tracking of objects [3] or individuals. To test the different assumptions and algorithms, Google Glasses will be used during this thesis.
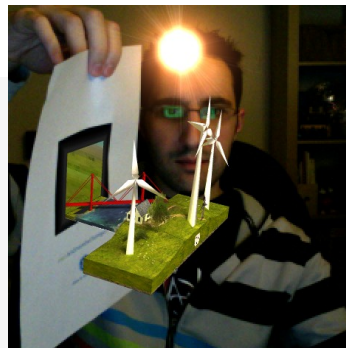
Required knowledge:

A good knowledge of image processing and Matlab is required. A mastery of C / C + + would be appreciated. Knowledge on Embedded technology and ARM programming are a plus.

Location:

This thesis will take place in the laboratory IPAL which is in Singapore, this laboratory is a partnership between: UPMC, I²R from A*STAR, NUS, CNRS and les Mines Telecom.

References:

[1] Lim, J. H., Li, Y., You, Y., and Chevallet, J. P. (2007, July). Scene recognition with camera phones for tourist information access. In *Multimedia and Expo, 2007 IEEE International Conference on* (pp. 100-103).

[2]Ouarti, N. and Sanda, N. and Le Brun, J. and Pineau, S. and Sahel, J.A. and Safran, A. (2012). Real-time video processing to specifically highlight the moving parts of the image, and alleviate visual handicap. Proceedings of ARVO. Pages 25.

[3] Ouarti, N. and Sauvet, B. and Haliyo, S. and Régnier, S. (2013). RobPosit, a robust pose estimator for operator controlled nanomanipulation. Journal of Micro-Bio Robotics . Vol 8 No 2 Pages 73-82.