EYESHOTS Project Warm-up meeting ---- Genoa, 30-31 Feb 2008

Present: Giorgio Cannata, Angel del Pobil, Patrizia Fattori, Claudio Galletti, Markus Lappe, Silvio Sabatini, Fabio Solari, Marc van Hulle.

Apologies: Fred Hamker.

In attendance: Andrea Canessa, Manuela Chessa, Nick Chumerin, Giulia Gastaldi, Agostino Gibaldi, Nicoletta Marzocchi, Karl Pauwels, Jayathu Samarawikrama.

- 1. Welcome and reference to the motivations for the warm-up meeting. Short introduction to the project's spirit. [Silvio]
- 2. Considerations on Project's workplan: The structure of the WP can be basically subdivided into two major components: (i) active vision (i.e., a robotic systems for interactive visual stereopsis) composed of novel engineering solutions for the robotic eye system and software vision modules; (ii) model of a multisensory egocentric representation of the 3D space, based on a conventional platform = robotic arm + stereo vision system. The two components are hinged by the research activities related to WP3 that will provide saliency, attentional, and cognitive clues for guiding behavior. The relevance of these issues for the success of the project has been remarked.

3. Partners presentations:

The Vision Problem (Sensors)

Silvio: Cortical architectures for dynamic stereopsis

Marc: Network paradigms for intelligent vergence control (Nick Chumerin) + Independent motion detection and real-time issues (Karl Pauwels)

The Motor *Effectors* (eye + arm)

- Giorgio: The oculomotor mechatronic system: from biological to artificial solutions.
- Angel: Overview of the activities in the "Robotic Intelligence lab". The "vision for action" paradigm as a shortcut for interacting with objects without requiring a full object model. General model that relies on interactions between dorsal and ventral streams.
- Markus: (i) Saccade adaptation: experimental evidences and modeling perspectives. (ii) The "shared attention" paradigm.
- Patrizia: Experimental characterization of neural correlates in area V6 (Nicoletta Marzocchi)

4. Discussion:

How to start: initial interactions among WPs. On the basis of partner's presentations a grid of interactions has been outlined (see Encl.1). Strong interactions exist between UG and KUL for the active vision system, and among UBO, WWM and UJI for the eye-arm system. In general, Silvio pointed out that some key-issues have not been touched by the presentations:

(1) reference frame transformations, (2) behavioural strategies for joint shortrange saccadic (version) and vergence movements in active voluntary exploration within a single frament; (3) cognitive strategy to guide attentive exploration of the scene.

- i. *Specific issues considered in the discussion:*
 - Major differences between the conventional pan-tilt systems and the envisaged anthropomorphic mechatronic system.
 - Necessity of a visual search strategy for selecting the next fixation point (e.g., saliency detection [low-level] and object detection [cognitive level]).
 - Preliminary considerations on the experimental set-ups for neurophysiological experiments (e.g., control of the positioning of visual stimuli in the 3D space by a robotic arm).
 - Space variant retinal sensing. The active foveation paradigm implies the introduction of a space-variant mapping of the retinal image characterized by high resolution in the central field and low resolution in the peripheral field (\rightarrow the reduction of the computational load comes at the price of space-variant processing).
 - Composite eye movements in fixation tasks. Cooperation between vergence and version movements: biological behaviour and implications for the control strategy for interactive stereopsis.
 - Learning strategies (optimization process to maximize the total activity of the retinocentric map; open-loop control: repeat saccades until one gets nominally a zero error; ...), and training data sets (binocular image sequences, camera position, real vs. virtual environment).
- *ii.* Sharing resources/know-how necessary for the start-up of the project
 - Binocular real-world image sequences will be provided to partners KUL and WWM as training set for learning.

Action: UG-Dibe (Silvio), UJI (Angel)

- A geometrical model of realistic eye movements to generate realistic binocular image sequences in a virtual environement. (First the model will be static [i.e., purely geometric], then it will be extended to consider the dynamics [i.e., eye movement trajectory] on the basis of realistic assumptions).

Action: UG-Dist (Giorgio)

- Gathering information on psychophysical data and models on the interplay between vergence and version during free active exploration. Contribution to the literature database on the website.

5. Admin/manging issues:

i. *Web-site and mailing list.* We are making ready a mailing list for facilitating communication within the consortium. Awaiting for the development of the official new web-site of the project, the web-page used during the preparation of the proposal will still be used as a repository for research papers on the topics related to the project (an ordering by topics will be introduced to ease its consulting).

ii. *Transfer of funding*. Pre-financing will be transferred to partners in the forthcoming days.

- 6. Plan for the kick-off meeting. As previously agreed, the meeting will take place in Bologna on 7-8 March. To avoid a clear-cut sequential separation between all the workshop style presentations by the partners and the general discussion, the proposed agenda alternates tutorial and discussion sessions on topics grouped on the basis of the major project's research streams (see Encl.2). PO will be invited to attend. Representatives of other related EC projects will not be present (see also specific point). The tutorials should be intended as detailed presentations (50 min) by each partner on (i) the problem tackled, (ii) the necessary background, (iii) the approach one intends to follow, (iv) how the approach (and expected results) fits with other project's components.
- 7. Interactions with related EC projects. The projects that more closely relate to ours are: POP (Perception of Purpose) and Decisions in Motions. A close reading of the documents (Annex, reports and published papers) available on the corresponding web-sites is encouraged. In particular, the POP project addresses specific active stereovision issues. In the next days Silvio will contact the coordinators of the above mentioned projects also for planning a brief discussion during the CogSys Conference in Karsruhe (Apr 2-4, 2008) on possible synergies among such projects.

Action: Silvio

8. Other matters: Angel raised the issue of a possible early organization of the Summer School. In case we decide to organize the school this year within the IURS of the UJI partner, we should start now for holding it in September (2nd or 3rd week). Since in the Annex (Task 8.4) we have not taken any specific commitment on this point, two different options emerge: (i) organizing the school at the end of the project for disseminating the results of the project, or (ii) organizing the school at the beginning for training the PhD students hired on the project. Option (ii) seems not very effective, unless thinking the School as a framework for gathering the legacy/experience of other EC related projects on topics that intersect those of EYESHOTS. No specific decision taken. Further information required on possible synergies with POP and "Decisions in motion".

The meeting finished on Jan 31st at 13.30pm.