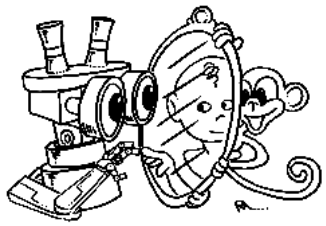

MIRROR

IST–2000-28159

Mirror Neurons based Object Recognition

Deliverable Item 1.3

Management Report N°:1

Covering period 1.9.2001-28.2.2002

Delivery Date: April 30, 2002

Classification: Internal

Responsible Person: Prof. Giulio Sandini – University of Genova

Partners Contributed: ALL

Contract Start Date: September 1st, 2001 Duration: 30 Months

Project Coordinator and Partners:

DIST - University of Genova (Prof. Giulio Sandini)

Department of Biomedical Sciences University of Ferrara (Prof. Luciano Fadiga)

Department of Psychology – University of Uppsala (Prof. Claes von Hofsten)

Istituto Superior Tecnico – Computer Vision Lab – Lisbon (Prof. Jose Santos-Victor)

Project funded by the European Community under the "Information Society Technologies" Programme (1998-2002)

Content list

1. Coordination and collaboration activities

The mirror project started the first of September 2001 with a consortium is composed of 4 partners.

The research activity was initiated without delays with a **kick-off meeting** that was held in Genova on September 7-8. The meeting was attended by all partners. A copy of the agenda with the list of attendees is enclosed. The kick-off meeting objectives were two: 1) update the mutual knowledge about the scientific activities of the partners; 2) plan in more details the initial steps of the project.

The **second meeting** was scheduled at month six and was held in Lisbon. All partners attended the meeting. A copy of the agenda is enclosed here. The main objective of this meeting was to report the activities of the first six months and to plan activities for the next months.

During the management part of the meeting documents describing the procedures and format for the preparation of the first year report and the cost-statement (both due in September) were presented. It was decided to hold the next meeting possibly simultaneously with the first-year review in the final week of September.

Besides these formal meetings the cooperation during this initial phase of the project went on particularly through e-mails and phone calls. The major issues discussed were related to the different experimental set-ups being implemented at the different laboratories. Discussions about joint experiments were also very interesting both before and during the discussions periods of both the kick-off as well as the Lisbon meeting.

Considering that this is the initial phase of the project when everybody is preparing for the following experimental part the cooperation activities are proceeding as planned.

2. Research activity

The research activity is proceeding as planned with some changes as detailed in the individual reports here.

2.1. DIST - University of Genova

The research activity at DIST has been mainly devoted to the design and implementation of the biological data acquisition and of the robot set-up. These activities will be reported more in details in deliverables 2.1 and 3.1. In summary, the set-up for biological data acquisition composed of a data-glove and a pair of stereo cameras is now close to be completed (data samples were shown at the meeting in Lisbon). The performance of the simultaneous acquisition of motor and visual data is still not totally satisfactory (25Hz) but corrections and changes are already planned. For the time being we thought it was more important to acquire data even if not with optimal sampling frequency, so that we can start testing our visual and visuo-motor processing algorithms. The robotic set-up is also on its way. A **change with respect to the original plan** is that we decided to proceed first with the realization of the robot's hand and afterward with the realization of the arm. The mechanical drawings of the hand were presented at Lisbon. We are now selecting the sensors to be used to measure the position of the fingers (based on Hall effect position sensors). The hand is expected to be finished during the month of June. As to the robot arm the decision to postpone its realization is motivated by the fact that we wanted to continue the tests on our elastic-actuators before proceeding with the design of the full arm. The reason for this is the fact that we would like to be able to control a large range of stiffness and therefore we need to test springs with different elastic constants and number of turns. At the end of this phase we expect to have all the data necessary to decide: 1) if we really can use these elastic actuators; 2) the kinematic properties of the arm. After that we will continue with the design

of the overall arm. **For this reason it is expected that Deliverable 2.2 (robot set-up) will be delayed 4-6 weeks.**

2.2. DBS – University of Ferrara

During the first six months of the project the efforts have been directed to collaborate with DIST in biological data acquisition setup designing (see WP 4), to implement the experimental protocol for monkey experiments, to significantly improve the technical aspects related to the surgical implant of the animal (both in terms of experimental reliability and in terms of benefits for the animal). More details about the experimental protocol will be presented in deliverable 4.1.

In addition to what originally planned, and still in the framework of the scientific problem of action recognition on which the MIRROR project is based upon, we decided to investigate some aspects in humans with electrophysiological techniques. By using transcranial magnetic stimulation (TMS) we made some preliminary observations showing that a motor resonance, similar to that observed in monkey mirror neurons, can be evoked not only by action viewing but also when a subject is passively listening verbal stimuli acoustically presented (Fadiga et al, Eur J Neurosci, 2002;15, 399-402). With this aim we will apply repetitive TMS (that blocks for hundreds milliseconds the stimulated area) on speech-related premotor centers during a phoneme discrimination task to demonstrate that such an inhibition will induce a specific “deafness“ related to the phonologic characteristics of the presented stimuli.

Due to the amount of work done and in program we provide to this part of the project some more “person months” by **recruiting an additional full-time researcher** (although if that will not change the global estimation of personnel costs).

2.3. DP – University of Uppsala

During the first six months of the project UU has been setting up two kinds of experiments aimed at studying the early development of mastering the adjustments of hand orientation in manual tasks, "the rotating rod experiment" and "the rod-hole experiment". The experiments are proceeding as expected. 28 infants have been tested in "the rotating rod experiment" and 15 in the "the rod-hole experiment". Calculations are underway. More details about the experimental protocol will be presented in deliverable 4.2. It is worth stressing the fact that the “rotating rod experiment” is also an objective, even if in a slightly different set-up, of one of the learning experiments with the robot at DIST.

2.4. ISR – Instituto Superior Tecnico in Lisbon

During the first six months of the project the activity at IST has been devoted to the initial implementation of a robot architecture oriented toward action understanding and also in the direction of studying computational tools that could be used learn how to recognize manipulative actions on the basis of visual information. Cooperation with UNIFE on the measurement of hand posture from multiple cameras is also ongoing as well as cooperation with DIST for the implementation of the biological data acquisition set-up.

3. Deliverables

The following table lists all the deliverables due at month 6.

Currently DI1.1 has been completed and the web-page of the project has been published at www.lira.dist.unige.it/mirror. The web-page is still “work in progress”. The delivery of Deliverable 1.2 (Dissemination and use plan) is expected to be delayed because we concentrated our efforts more on the technical and scientific aspects of the project.

All other deliverables are being completed after the meeting in Lisbon where the last details have been defined. The delay is due to the extra effort required initially to establish a common procedure.

Num.	Deliverable Name	Lead	Type	Due
1.1	Project Presentation	DIST	Web Report	1
1.2	Dissemination and Use Plan	DIST	Report	6
1.3	Management Report 1	DIST	Report	6
2.1	Robot setup specifications and design	DIST	Report	6
3.1	Biological data acquisition setup specifications	UNIFE	Report	6
4.1	Protocol for the monkey experiments	UNIFE	Report	6
4.2	Protocol for the behavior development experiments	UU	Report	6

4. Effort and costs

As it often happens the start of the activities is limited by how fast it is possible to recruit young researchers and post-doc. This is happening also in Mirror where some partners are a bit late in recruiting (e.g. UU and to some extend also DIST). We expect this to be corrected before the end of the first year. No major deviation from the original expenses is foreseen even if a more detailed impression will be possible as the project approaches the end of the first year.

5. Agenda of Kick-off meeting - Genova September 7-8, 2001

September 7: Past and Present

14:30	Mirror Introduction and News	Giulio Sandini
	LIRA-Lab	"
	University of Ferrara	Luciano Fadiga
	University of Uppsala	Claes von Hofsten Kertsin Rosander
	IST - Lisbon	Josè Santos-Victor
		Alex Bernardino

September 8: Future

9:00	LIRA-Lab	Giorgio Metta
	University of Ferrara	Luciano Fadiga
	University of Uppsala	Claes von Hofsten Kertsin Rosander
	IST - Lisbon	Josè Santos-Victor
		Alex Bernardino
	Discussion	
13:00	Lunch	

Attendees:

LIRA-Lab: Giorgio Metta, Lorenzo Natale, Sajit Rao, Giulio Sandini, Matteo Schenatti

Universty of Uppsala: Claes von Hofsten, Kertsin Rosander

University of Ferrara: Luciano Fadiga

IST-Lisbon: Alex Bernardino, Josè Santos-Victor, Raquel Vassallo

6. Agenda of 1st meeting – Lisbon April 5-6, 2002

April 5, 2002

9:00 Welcome

9:15: Technical Presentations

"Update on robot hand design", Giulio Sandini

"Experimental setup infant reaching", Claes von Hofsten.

"Experimental set-up for the acquisition of visuomotor grasping data", Matteo Brunettini

"Infant visual tracking of different sized objects", Kerstin Rosander

"Human behavioral data on a strict link between action and perception", Laila Craighero

"Experiments on mirror neurons: state of the art", Luciano Fadiga.

"Preliminary experiments on hand pre-orientation in babybot", Wouter Aupers

"A modular architecture for learning by imitation with a single camera", Manuel Lopes

"Is this my arm? - learning a model of ones own arm", Sajit Rao

"Ineffable vision", Giorgio Metta

"Deterministic annealing for perceptual grouping", Alexandre Bernardino

April 6, 2002

9:00 Management meeting

10:00 Technical/Scientific discussion

Attendees:

DIST: Wouter Aupers, Matteo Brunettini, Giorgio Metta, Lorenzo Natale, Sajit Rao, Giulio Sandini

UU - Kerstin Rosander, Claes von Hofsten

UNIFE – Laila Craighero , Luciano Fadiga,

IST – Alexandre Bernardino, Roger Freitas, Manuel Lopes, José Santos-Victor