	ADAPT *IST–2001-37173* *Artificial Development Approach to Presence Technologies*

Deliverable Item 1.1
Project presentation

Delivery Date: January 25th, 2003
Classification: Public
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Partners Contributed: All

Short Description: This deliverable briefly describes ADAPT.

FET Proactive Initiative 2002
PRESENCE RESEARCH ACTIVITIES

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

One-page summary

Also on the web at: http://www.lira.dist.unige.it/adapt

The sense of presence arises from the perception of the relationship between our body and the environment and originates from our senses as well as from our past experiences. The main objective of ADAPT will be to study how the perception of self in the environment emerges during the early stages of human development and to implement an artificial instance of such developmental processes in an embodied artifact. In particular we propose to investigate the process of building a coherent representation of visual, auditory, haptic sensations. To achieve this, a twofold strategy is pursued. On one side we aim to realize an artificial system capable of building internal representations. On the other side we will investigate when and how the developing brain starts to produce a unique experience-based repertoire of intentional percepts and actions.

The main objective of ADAPT is to study the process of building a coherent representation of visual, auditory, haptic sensations and how this representation can be used to describe/elicit the sense of presence. The goal is the 'understanding' of representation in humans and machines. We intend to pursue this in the framework of development e.g. by studying the problem from the point of view of a developing system. Within this framework we will use two methodologies: on one side we will investigate the mechanisms used by the brain to learn and build this unified representation by studying and performing experiments with human infants; on the other side we intend to use artificial systems (e.g. robots) as models and demonstrators of perception-action representation theories.

We will employ a synthetic methodology (e.g. a methodology of 'understanding by building') which consists of three parts or steps: i) modeling aspects of a biological system; ii) abstracting general principles of intelligent behavior from this model; iii) apply these principles to the design of intelligent artifacts.

These steps are not performed in sequence but rather in parallel and iteratively.

The work will be organized along 4 main lines (corresponding to the 4 technical work packages of the project): 1) study and propose a theory of presence from a multidisciplinary perspective spanning cognition, perception and robotics; 2) study the sense of presence with the framework of embodiment and body morphology; 3) study how the perception of self evolves during the early stages of human development; 4) implement an artificial instance of such developmental process in an embodied artifact as a synthetic model and demonstrator.

Objectives

The sense of presence arises from the perception of the relationship between our body and the environment and originates from our senses as well as from our past experiences. The main objective of ADAPT will be to study how the perception of self in the environment emerges during the early stages of human development and to implement an artificial instance of such developmental processes in an embodied artifact. In particular we propose to investigate the process of building a coherent representation of visual, auditory, haptic sensations. To achieve this, a twofold strategy is pursued. On one side we aim to realize an artificial system capable of building internal representations. On the other side we will investigate when and how the

developing brain starts to produce the unique experience-based repertoire of intentional percepts and actions.

Description of work

The main objective of ADAPT is to study the process of building a coherent representation of visual, auditory, haptic sensations and how this representation can be used to describe/elicit the sense of presence. The goal is the "understanding" of representation in humans and machines. We intend to pursue this in the framework of development i.e. by studying the problem from the point of view of a developing system. Within this framework we will use two methodologies: on one side we will investigate the mechanisms used by the brain to learn and build this unified representation by studying and performing experiments with human infants; on the other side we intend to use artificial systems (i.e. robots) as models and demonstrators of perception-action representation theories. We will employ a synthetic methodology (i.e. a methodology of "understanding by building") which consists of three parts or steps: (i) modeling aspects of a biological system, (ii) abstracting general principles of intelligent behavior from this model, and (iii) applying these principles to the design of intelligent artifacts. These steps are not performed in sequence but rather in parallel and iteratively. The work will be organized along 4 main lines (corresponding to the 4 technical workpackaes of the project):

1) Study and propose a theory of presence from a multidisciplinary perspective spanning cognition, perception and robotics.
2) Study the sense of presence with the framework of embodiment and body morphology.
3) Study how the perception of self evolves during the early stages of human development.
4) Implement an artificial instance of such developmental process in an embodied artifact as a synthetic model and demonstrator.

Milestones and expected results

At the end of the project we expect to have a functional artifact incorporating model of the sense of presence and a demonstrable theory of the development of coherent multisensory representation in humans. The major milestones will be:

1) Realization of different robotic setups to test the effect of morphology.
2) Experiments on the effects of changes in the morphology of the artifacts.
3) Results of behavioral experiments in infants.
4) Modeling of coherent representations.
5) Artificial intentional architecture.

Some pictures of the setups

Robotic setup at DIST – The Babybot

Production and imitation experiments at CNRS Paris

Some of the robots at the AI-Lab in Zurich

List of participants

Partic. Role	Partic. no.	Participant name	Participant short name	Country	Date enter project**	Date exit project**
C	1	DIST - University of Genova	DIST	I	Start of project	End of Project
P	2	University of Zurich – Dept. Information Technology	UNIZH	CH	Start of project	End of Project
P	3	UMR7593, CNRS, University Pierre & Marie Curie, Paris	CNRS	F	Start of project	End of Project

Costs

Total eligible cost: 1.335.141 €
Maximum community contribution: 469.000 €

Project start: October 1st, 2002
Project duration: 36 months

Further information

Project web site: http://www.lira.dist.unige.it/adapt
Repository of documents and deliverables: http://www.lira.dist.unige.it/adapt/docs/Docs.htm

Additional document to this deliverable: slide presentation (also available from the repository)