



CONSIGLIO NAZIONALE DELLE RICERCHE
ITALIAN NATIONAL RESEARCH COUNCIL



ISTITUTO DI ELABORAZIONE DELL'INFORMAZIONE
INSTITUTE FOR INFORMATION PROCESSING

The Institute



• **Istituto di Elaborazione
dell'Informazione**

• ***Institute for Information
Processing***

• **Director:** Prof. Piero Maestrini

• The scientific and administrative
responsibility of the Institute is
assigned to the Director,
appointed by the President of
CNR.

• The Director is assisted by a
Scientific Council, which is
composed of 4 experts
nominated by the CNR Council
of Presidency, and 4 members
elected by the staff
of the Institute.



• The permanent staff of the
Institute is currently 68:
32 researchers and
technologists, 32 technicians,
4 administrators.
• The number of full-time non-
permanent researchers is 32
(January 2000). The number of
part-time research associates
ranges between 10 and 20.

CNR

• **Consiglio Nazionale delle
Ricerche**

• ***National Research Council***

• The National Research Council (CNR)
is responsible for conducting research
activities in areas of priority interest in
order to promote scientific and
technological progress in Italy.

• The research activities are carried out
primarily by the more than 300 CNR
institutes located throughout Italy, most
of which are grouped into 18 Research
Campuses. The on-going restructuring
process aims at merging smaller
Institutes with compatible interests into
larger ones.

• CNR also promotes and manages
national and international research
programmes of strategic relevance,
within the framework of European
cooperation and integration and
through the collaboration of university
research groups and other public and
private bodies, and guarantees the
dissemination of the results at the
national level.

Activities



Research

The Institute conducts research in Computer Science, Information Technology and related application areas.

In particular, the research activities focus on the following sectors:

- Software Engineering
- Computer System Design
- Information Engineering
- Signal and Image Processing
- Visual Computing

Most of the activity is performed within the framework of national and international research projects.



Teaching and Training

The Institute is also involved in teaching and professional training activities.

Graduate and undergraduate students prepare their PHD and first level degree dissertations under the supervision of researchers at the Institute. Members of the staff lecture at the University of Pisa and other Italian universities, holding courses in computer sciences and engineering. The Institute also runs post-graduate and continuing instruction courses in cooperation with public and private partners.



Technology Transfer

A major activity of the Institute is the transfer of results, expertise and knowhow to industry and the provision of consulting services when requested. Several formal collaborations are currently under way with both Italian and foreign industrial partners in projects financed by the EC and other sources.

IEI Projects

Software Engineering

1.1 Quality and Reliability of Software

Systems

Leader: *Antonia Bertolino*

bertolino@iei.pi.cnr.it

1.2 Models and Tools for Formal

Specification and Verification of

Concurrent, Distributed and Mobile

Systems

Leader: *Stefania Gnesi*

gnesi@iei.pi.cnr.it

1.3 Logic Programming

Leader: *Patrizia Asirelli*

asirelli@iei.pi.cnr.it

Image and Signal Processing

2.1 Numerical Models to solve Inverse

Problems in Image Reconstruction and

Computer Vision

Leader: *Anna Tonazzini*

tonazzini@iei.pi.cnr.it

2.2 Methodologies, Techniques and

Tools for Biomedical Signal

Processing

Leader: *Carlo Navona*

navona@iei.pi.cnr.it

2.3 Non Destructive and Non Invasive

Techniques for Diagnostic and Quality

Control of Materials, Devices and

Industrial Processes

Leader: *Mauro Bramanti*

bramanti@iei.pi.cnr.it

2.4 Models, Algorithms and Systems

for Digital Image Processing using AI

Theories and Techniques

Leader: *Ovidio Salvetti*

salvetti@iei.pi.cnr.it

2.5 Techniques and Digital Systems for

Real-time Audio Signal Synthesis and

Processing

Leader: *Graziano Bertini*

bertini@iei.pi.cnr.it

2.6 Computational Mechanics. Smart

Materials - Applications and

Experiments

Leader: *Maurizio Brocato*

brocato@iei.pi.cnr.it

Computer System Design

3.1 Design and Evaluation of

Dependable Systems

Leader: *Felicità Digiandomenico*

digiandomenico@iei.pi.cnr.it

3.2 Parallel Algorithms and Mobile

Systems

Leader: *Cristina Pinotti*

pinotti@iei.pi.cnr.it

3.3 Self-diagnosis Methodologies and

Applications

Leader: *Piero Maestrini*

maestrini@iei.pi.cnr.it

Information Engineering

4.1 Access to Multimedia Information

Leader: *Pasquale Savino*

savino@iei.pi.cnr.it

4.2 Searching and Accessing Large

Heterogeneous Multimedia Digital

Collections

Leader: *Donatella Castelli*

castelli@iei.pi.cnr.it

Computer Graphics

5.1 Computational Geometry,

Scientific Visualization and

Deformable Object Modeling

Leader: *Claudio Montani*

montani@iei.pi.cnr.it

IEI Services



Hardware and Software Certification

Head: Vinicio Lami

E-mail: lami@iei.pi.cnr.it

A certification service is provided for industry with the aim of promoting the improvement of hardware and software processes and products

The hardware activity is focussed on reliability prediction; safety; MTBF (Mean Time Between Failures) of context dependent systems; quality control; standard compliance assessment.



The software activity is mainly concentrated on the study of reliability evaluation criteria; project methodological analysis criteria; quality control; definition of test plans for special applications; experimentation of tools for automation testing.

Collaborations with both national and European standardisation organisations have been established in order to guarantee compliance with European Standards.



Library

Librarian: Silvia Giannini

E-mail: giannini@iei.pi.cnr.it

The IEI library was established in 1955, and is thus one of the oldest Computer Science libraries in Europe.

The library currently contains more than 8000 books, 600 (400 active) serial collections and 19 abstracting journals.

In addition to its card catalog organized according to the cataloging rules of the US Library of Congress, a number of databases and on-line catalogs are available to the user and can also be accessed through the **WWW** at:

**[http://www.iei.pi.cnr.it/
Library/library.html](http://www.iei.pi.cnr.it/Library/library.html)**

The Library is open to the general public from 9 a.m. to 5 p.m.

Research



Software Engineering

Head: Antonia Bertolino

Tel: +39 050 315 2914

E-mail: bertolino@iei.pi.cnr.it

The research mainly focuses on the development and analysis of models and methods to support system specification, design and validation. The aim is to develop theories, identify methodologies and construct prototype tools based on the use of formal methods for improving the software production process. This problem is examined not only with reference to sequential systems, but also for reactive, concurrent and/or distributed systems. Different methods and approaches are employed, such as logic programming; operational, denotational and algebraic semantics; modal and temporal logics; static analysis and testing. Software tool prototypes are constructed so that the theoretical results can be tested.

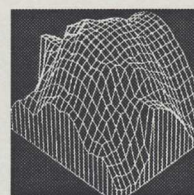


Image and Signal Processing

Head: Mauro Bramanti

Tel: +39 050 315 3137

E-mail: bramanti@iei.pi.cnr.it

Research activities concern models, algorithms and systems for the numerical processing of images with particular reference to computer vision and image restoration, methods and techniques for the solution of inverse ill-posed problems, methods and systems for non-invasive diagnostic and quality control in industrial applications (material technology and power plant combustion processes) and in biomedicine (ophthalmology and radiology). Techniques and instrumentation for electroencephalography and audio signal processing and for dedicated sensors and transducers are also developed.

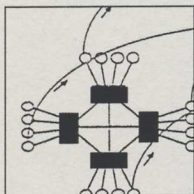


Research Activities

There are five research departments working in the areas listed below. A detailed description of activities can be found on the WWW under

<http://www.iei.pi.cnr.it/research.html>

iei Research



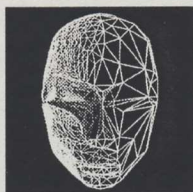
Computer System Design

Head: Fabrizio Grandoni

Tel: +39 050 315 2905

E-mail: grandoni@iei.pi.cnr.it

The department has long been involved in the dependable systems and algorithm complexity fields. Ongoing work relates to design methodologies for systems requiring reliable, continued operation under several classes of faults; target applications are real-time, safety-critical controllers. For more commercially oriented tasks, flexible, low-overhead redundant architectures are being studied and evaluated. A related research thread deals with self-diagnosis procedures to be used in massively parallel systems. This class of systems is also targeted by a study on algorithms to extend the use of data structures, commonly used in sequential algorithms, to the parallel environment. Completely new data structures are also defined, guided by the necessity to balance the data load among the processors as well as to improve the general efficiency of the algorithms.



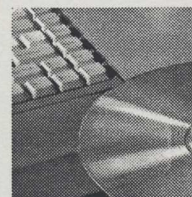
Visual Computing

Head: Claudio Montani

Tel: +39 050 315 2923

E-mail: montani@iei.pi.cnr.it

Research in computer graphics currently focuses on the definition of algorithms and data structures for Scientific Visualization. Research fields include volume rendering, surface simplification, multiresolution and multiple level of detail representation, digital terrain modeling and visualization, applied computational geometry and parallel graphics. Our work also includes studies on Geographical Information Systems.



Information Engineering

Head: Costantino Thanos

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E-mail: thanos@iei.pi.cnr.it

The research focuses on: (1) modelling the retrieval of multimedia information (including text, image and video data) based on probabilistic terminological logic models; (2) the design of high performance multimedia object stores including access methods in multilevel storage hierarchies and methods for multilingual access and querying on multimedia information bases; (3) formal specification and design methodologies and tools for the development of database applications; (4) interoperability and metadata for networked library systems. The aim is to contribute to the development of a new generation of networked multimedia information management systems.

International Cooperation



· · **International** · · **Cooperation**

- Research groups at the Institute are
- actively involved in collaborations
- with many European and North
- American research institutions



· · **IEI and ERCIM**

- The Institute coordinates the
- participation of CNR Institutes in the
- European Research Consortium for
- Informatics and Mathematics
- (ERCIM). Through the definition of
- common scientific goals and
- strategies, the thirteen national
- member institutions of ERCIM aim
- to foster collaborative work within
- the European research community
- and to increase co-operation with
- European industry.



· · **IEI and GMD**

- In the context of the bilateral
- agreement for scientific collaboration
- between the German National
- Research Centre for Information
- Technology (GMD-Forschungszentrum
- Informationstechnik (GmbH)),
- Germany, and the CNR Institutes IEI
- and CNUCE, Italy, signed on 16
- December 1997, IEI is involved in
- three joint projects:
- ■ Automatic Acquisition and Real-
- Time Visualisation of Cultural
- Heritage in 3-D
- ■ CNR-GMD Virtual Library
- ■ Dependable Cooperative Real-Time
- Systems.

International Cooperation



European Commission Projects

The Institute coordinates and/or participates in many projects of the European Commission projects. It is currently involved in the following projects:

DELOS - A Network of Excellence on Digital Libraries (IST-1999-12262)
01/01/2000 to 31/12/2002 - Euro 100,000
Project Scientific Coordinator:
Costantino Thanos



ECHO - European Chronicals On-line (IST-1999-11994)
01/02/2000 to 31/07/2002 - Euro 350,000
Project Scientific Coordinator:
Costantino Thanos

EUROGATHERER - A Personalised Information Gathering System (IE-8011)
01/04/1998 to 31/01/2000 - Euro 250,000
Project Scientific Coordinator:
Costantino Thanos

INDUCE - Advanced Integrated NDT Concepts for Unified Life-Cycle (BRPR-C - 98-0805)
01/03/1999 to 28/02/2002 - Euro 43,000
CNR Manager: Ovidio Salvetti



SOFTWARE QUALITY

EVALUATOR - LEONARDO DA VINCI - (94/819/CE)
02/12/1996 al 31/01/2000 - Euro 28,000
CNR Manager: Mario Fusani

SCHOLNET - A Digital Library for a Virtual Scientific Community (IST-1999-20664)
Start Date: 01/07/2000 - Euro 400,000
Project Scientific Coordinator:
Costantino Thanos



Pisa: A Very Special Place for Informatics

The foundation of IEI contributed to the creation in Pisa of one of the largest concentrations of research and development in the computer science and IT sectors in Italy. Close to IEI, there are another three CNR institutes working in this area: Istituto **CNUCE** (CNUCE); Istituto di Linguistica Computazionale (ILC); Istituto di Matematica Computazionale (IMC). By 1997, these Institutes should all move to the **new CNR Area of Research**, which will become the site for all CNR research in Pisa. In order to promote know-how and technology transfer, the CNR Institutes contributed to the creation of the **Pisa Research Consortium**, which has been set up as a joint initiative of CNR and IRI (Institute for Industrial Reconstruction). IEI has also played an important role in the establishment of the **Department for Computer Sciences and the Department of Information Engineering of the University of Pisa**. IEI collaborates actively with these two departments; many members of staff hold courses and/or are responsible for supervising first and second level degree theses at the University. Two other colleges of excellence or universities in Pisa that have departments active in computer science and

engineering related disciplines are the **Scuola Normale Superiore** and the **Scuola Superiore di Studi Universitari S. Anna**. The presence of this concentration of research and academic activity in Informatics has also greatly contributed to the establishment in the Pisa area of a number of **industrial R&D centres** (e.g. ALENIA, Data Management, FINSIEL, INTECS, OLIVETTI). **Pisa is thus one of the most important centres of Italy for R&D in Information Science and Technology and related areas.**

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