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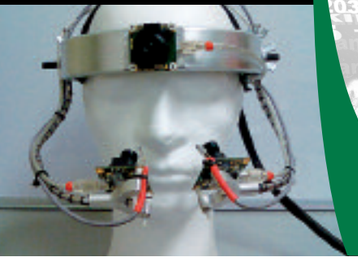

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Laboratory Modelling Intelligence Process Systems

EA2332

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FST Mulhouse
Faculté des Sciences et Techniques

IUT COLMAR

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UHA Université de Haute-Alsace Mulhouse-Colmar

UNIVERSITÉ DE HAUTE-ALSACE

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Laboratory Modelling Intelligence Process Systems

The MIPS Laboratory (EA2332) links research in control theory and in its border-fields with mechanics, optics and networks at the University of Haute-Alsace.
The unifying theme for the whole MIPS team is: **"Intelligent Structures and Machines"**.

This theme is divided into three axes each of them including 2 groups:

Automatic Control

- **Modelling and Identification in Automatic and Mechanic**
  M. BASSET, E. AUBRY
- **Signal & Learning**
  J.P. URBAN, J. MERCKLÉ

Signal & Image Processing

- **Optical functions & Information Processing**
  P. AMBS, L. BIGUÉ
- **3D microscopy imaging & image processing**
  O. HAEBERLÉ, A. DIETERLEN

Computer Science & Networks

- **Software engineering**
  M. HASSENFORDER
- **Telecommunications & Networks**
  P. LORENZ

The MIPS laboratory is composed of 75 members including 38 faculty members (14 University Professors) and 25 PhD students. The laboratory has long time experience in industrial relations through research contracts and technology transfer.

Modelling & Identification in Automatic and Mechanic

Modelling / Identification / Observation / Data Fusion / Control

Research theme
> **Modelling & Identification in Automatic and Mechanic**

- Experimental modelling and physical time varying parameters estimation of uncertain complex systems
- Quasi-static and dynamical analysis of structures and systems
- Model order reduction applied to uncertain and/or switching systems
- Advanced control of uncertain systems, or switched systems
- Observation and data fusion in a strongly noisy environment

Competences
- Modelling of the Driver-Vehicle-Environment system
- Aided design of vehicles and their subsystems (automotive, aeronautic)
- Design of smart aid systems for drivers and engines
- Design of tools for precision measurement, modelling and testing
- Finite element computation

Products and services
- Models, simulations, simulators, experimental protocols
- Design of specific sensors and actuators
- Embedded systems

Signal & Learning

Artificial neural networks / Signal and image processing / Learning algorithms for object recognition

Research theme
> **Signal & Learning**

- Design of neural network algorithms for complex systems
- Automatic image acquisition, analysis, and classification in electron microscopy
- Algorithm optimization for real time control of power systems

Expertise
- Real-time control of electrical systems
- Optimization of industrial systems
- Design of learning algorithms for image analysis
- Image analysis and object recognition in microscopy images

Products and services
- Quality analysis of electrical grids
- Active Power Filtering of low voltage electrical networks

Optical Functions & Information Processing

Dynamic optical functions for information processing

Research theme
> **Optical functions & Information Processing**

- Fundamental research in optical information processing
- Applied research : applications of computer generated holography - optical metrology - polarimetric imaging

Competences
- Computed diffractive optics, CAD of holograms: from design to implementation
- Dynamic diffractive optical elements on spatial light modulators
- Characterization and control of spatial light modulators
- Design of optical processors for real time pattern recognition
- Design and realization of systems for studying the surface state of fabric
- Design and realization of polarimetric imaging systems

Products and services
- Computation of diffractive optical elements and applications
- Spatial light modulators characterization and applications
- Design and realization of SLM-based optical systems

3D microscopy imaging & Image processing

Image and signal processing / 3-D imaging in fluorescence microscopy and tomographic microscopy / 3-D quantification in microscopic imaging

Research theme
> **3D microscopy imaging & image processing**

- Deconvolution and quantification in 3-D imaging
- Modeling and characterization of optical acquisition systems
- Instrumental developments in microscopy
- 3-D monocular vision: development and applications

Competences
- Image and signal acquisition and processing
- Deconvolution in 3-D optical sectioning microscopy
- Analysis and quantification in 3-D optical microscopy
- Design and integration of optical acquisition systems

Products and services
- Feasibility studies for imaging and industrial vision

Software engineering

Modelling and metamodelling of complex systems / Software architecture, intelligent platforms

Research theme
> **Software engineering**

- Study, modelling, metamodelling, simulation and synthesis of information systems
- Fundamental and applied research on software architectures and their modelling
- Formalization and proposal of dedicated and open architectures for intelligent structures and machines

Competences
- Model Driven Engineering
- UML, object-oriented software engineering, architecture, patterns
- Intregated design of software systems
- Embedded software systems

Products and services
- Modelling, metamodelling and design of software systems

Telecommunications & Networks

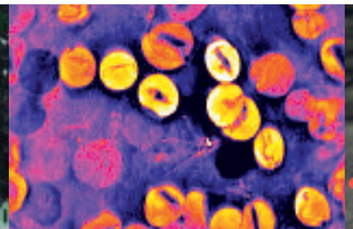
Networking and telecommunication / Protocols of communication

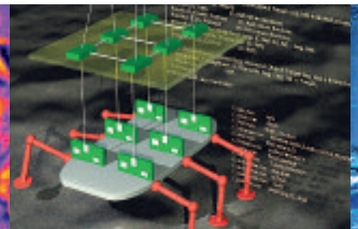
Research theme
> **Telecommunications & Networks**

- Development of new multimedia applications for next generation networks
- Study of telecommunication of wired/wireless networks
- Basic and applied research on new communication architectures to be used in the future very high data rate networks

Competences
- Study and modelization of communication protocols
- Simulation of protocols with NS2
- Engineering for models

Products and services
- Development of models and specific protocols
- Simulation of protocols





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