TÉCNICO LISBOA

Institute for Systems and Robotics | LISBOA

INSTITUTE for SYSTEMS and ROBOTICS

José Santos-Victor
jasv@isr.tecnico.ulisboa.pt

LARSyS
Laboratory of Robotics and Engineering Systems

Outline

- Mission and vision
- Facts and figures
- Research
  - Computer and Robot Vision (VisLab)
  - Dynamical Systems and Ocean Robotics (DSOR)
  - Evolutionary Systems and Biomedical Engineering (LASEEB)
  - Intelligent Robots and Systems group (IRSg)
  - Signal and Image Processing (SIPg)
- Advanced training
- Tech transfer
- Outreach

Mission and Goals

ISR-Lisbon is an RD&I institution, affiliated with **Instituto Superior Técnico (IST)** where advanced and multidisciplinary research activities are carried out, in the areas of Robotic Systems and Information Processing.

Research domains:

Systems and Control Theory -> Robotics -> Signal Processing -> Computer Vision -> Optimization -> AI and Intelligent Systems -> Biomedical Engineering.

Three-fold activities:

Research, advanced Training and Outreach

Science, Technology and Society

Facts and figures

Foundation: 1992

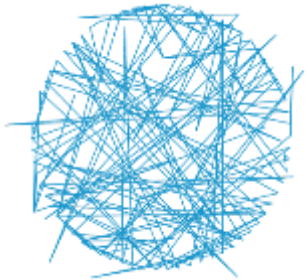
Faculty: 33
Post docs: 20
PhD students: 65
PhDs awarded (2013-17): 62

Evaluation (2015-17): **Excellent**

Funding (2013-17):

FCT: Institutional 3.5M€
Projects: 1.6M€
Grants: 2.8M€
International: 4.6M€
Other: 0.24M€
Total: **12.9M€**

Member of



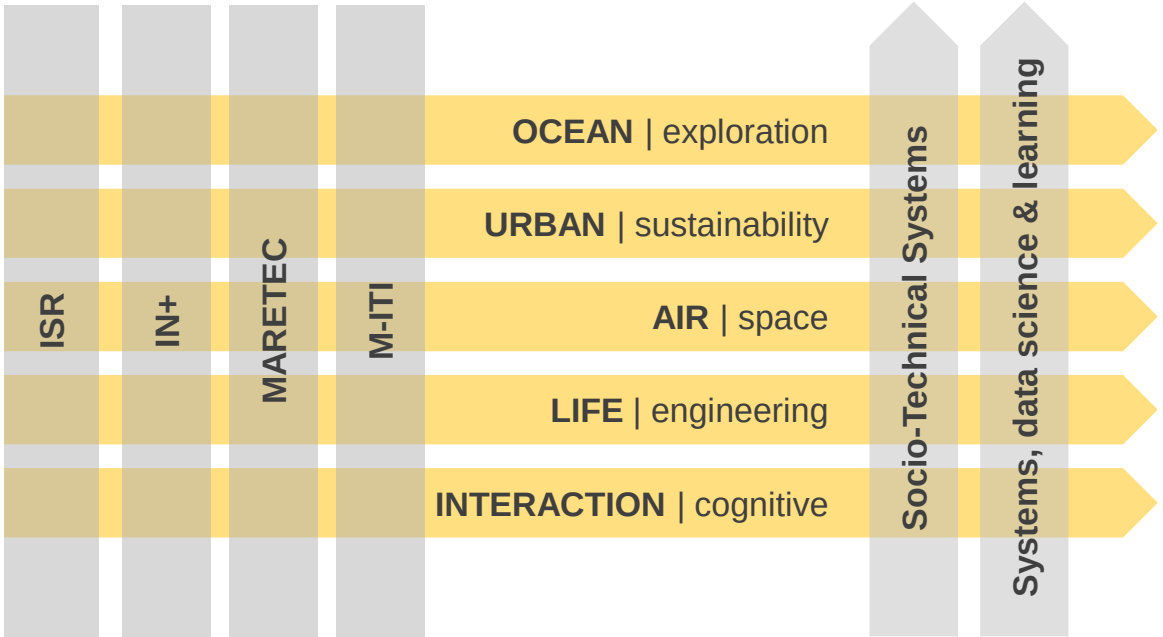
LARSyS
Laboratory of Robotics and Engineering Systems

LARSyS Architecture

VISION

an **excellence research center** in the design of **complex, socio-technical engineering systems**

- cross-disciplinary research agendas
- societal challenges
- industry involvement



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- Conclusions

Computer and Robot Vision Lab (VisLab)

Research Areas

- Image Analysis & Surveillance
- Visual Navigation & Calibration
- Bioinspired Vision and Learning
- Cognitive Robots

- 8 Phds (4 Faculty + 4 PostDocs)
- 16 PhD students
- 18 PhDs awarded (2013/2019)
- Hosts of the iCub

Dynamical Systems and Ocean Robotics group ($DSOR_G$)

Research Areas

- Dynamical systems theory
- Networked estimation and control,
- Geophysical navigation,
- Cooperative aerial & marine robots

Areas of intervention:

- Technologies for ocean exploration including networked air and marine robots
- Robotic systems for the inspection of critical marine infrastructures

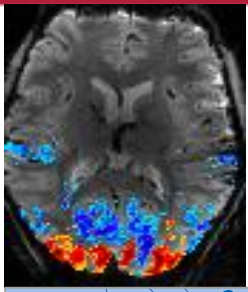
13 PhDs (4 Faculty + 9 PostDocs) 14 PhD students

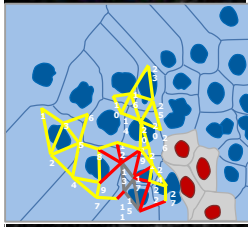
Evolutionary Systems and Biomedical Engineering (LASEEB)

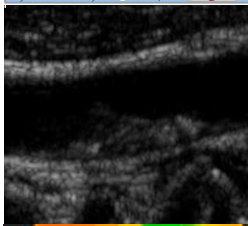
Research areas:

1. Neuroengineering (sleep, emotions, neurofeedback)
2. Neuroimaging (EEG, fMRI, brain dynamics and networks)
3. Biological and medical imaging
4. Biologic inspired optimization and complex systems simulation

- 4 Faculty
- 2 Postdocs
- 14 PhD students
- 4 Active Projects



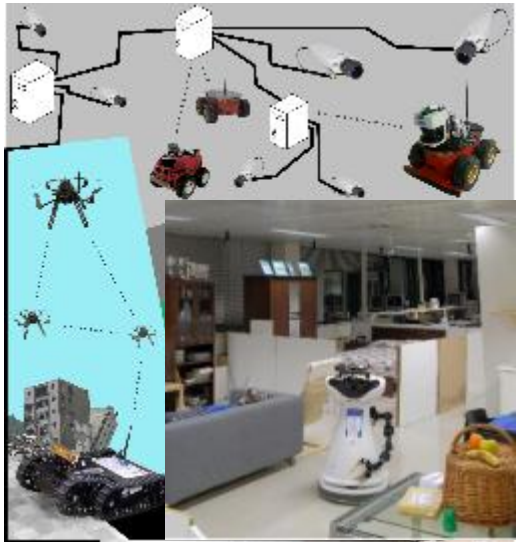




Intelligent Robots and Systems group (IRSg)

Research Framework:

Holistic view of complex systems control and coordination, following approaches that fuse Systems, Control, and Decision Theories with Artificial Intelligence.



Since 2002:

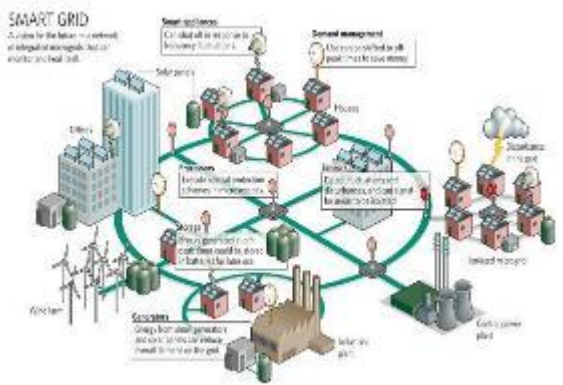
- *19 PhDs finished*
- *Currently 11 PhD students*
- *6 faculty (IST) and 2 Post-Doctoral Fellows*
- *~3 M€ in R&D projects (FCT, AdI, EU, ESA) through competitive funding*
- *4 Books, 112 journal papers and 312 conference papers*

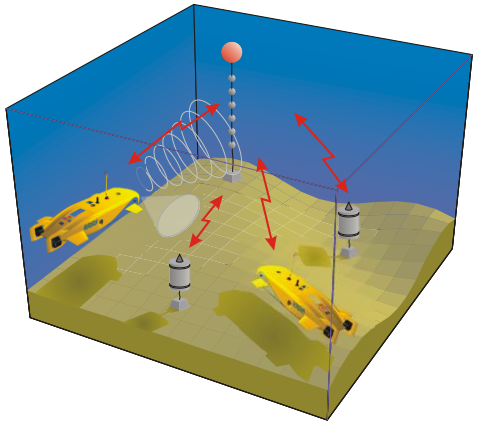
Signal and Image Processing Group (SIPg)

Research Areas

- Large Scale/Nonlinear/Distributed Signal Processing
- Image/video recognition,3D reconstruction
- Ocean acoustics

- 20 PhDs (19 Faculty+1 Researcher FCT)
- 22 PhD students
- 23 PhDs awarded (2005-2015)





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Advanced training/ infrastructures

Premium partnerships

- CMU – Portugal: Dual PhD Program
- IST-EPFL Joint Doctoral Initiative

FCT Doctoral Programs

- RBCog:Robotics, Brain and Cognition
- NetSys: Networked Interactive Cyber Physical Systems

National Roadmap of Research infrastructures

- Robotics, Brain and Cognition Lab
- Brain Imaging Network (BIN)
- European Multidisciplinary Seafloor Observatory

Advanced research infrastructure in many areas

- Robotics (underwater, aerial, indoors, outdoors, humanoids)
- Test-bed for benchmarking in EU robotic competitions

Nurturing innovation: spin-off companies

observit
tecnologias de visão por computador

mind

reverse

Blue Edge

QUE NÃO SE MUDA JÁ COMO SOIA
ALBATROZ ENGENHARIA

DISTALMOTION

selfTech

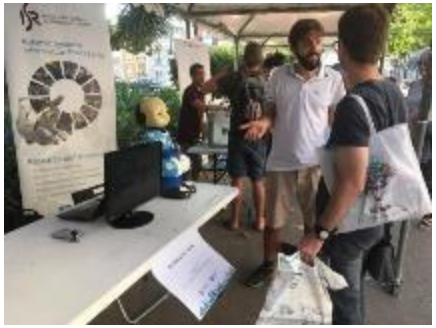
boomApp

ROBOPTICS
TECHNICAL CONSULTING AND RESEARCH

Outreach

S&T EDUCATION THROUGH ROBOTICS TO STUDENTS

- More than 300 students from more than 40 high schools in Summer activities since 2000
- Educational partnerships with schools
- Frequent visits from school groups of all ages



PARTICIPATION & CO_ORGANIZATION OF EVENTS

- RoboCup 2004 (1500 participants)
- European Researchers Night and Encontro Ciência 2018
- Portuguese Robotics Open
  - Robótica 2011 (700 participants)

www.isr.tecnico.ulisboa.pt
info@isr.tecnico.ulisboa.pt
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