


From Knowledge Generation To Science-based Innovation




Robotic tools for maritime search & rescue

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Robotics @ INESC TEC
Exponor, Matosinhos | May, 2012

Research and Technological Development | Technology Transfer and Valorization | Advanced Training | Consulting
Pre-incubation of Technology-based Companies

Presentation Outline


1. INESC TEC / Robotics@INESC TEC
2. Prototypes of robotic tools for MSAR
3. ICARUS project – MSAR tools



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INESC TEC

- Interface institution, recognized by Portuguese government and “Laboratório Associado” – for its top quality research
- Joins researchers from several schools
 - Universidade do Porto
 - Instituto Politécnico do Porto
 - Universidade do Minho
- 600 researchers, 200 PhDs




Highly qualified human resources

Journal papers, dissertations

Journal papers, conference papers, models

Conference papers, prototypes

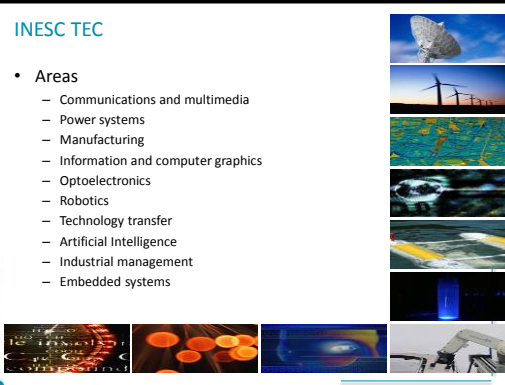
Products, consulting, patents, licensing, spin-off companies



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INESC TEC


- Areas
 - Communications and multimedia
 - Power systems
 - Manufacturing
 - Information and computer graphics
 - Optoelectronics
 - Robotics
 - Technology transfer
 - Artificial Intelligence
 - Industrial management
 - Embedded systems



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Robotics @ INESC TEC


- Robotic tools allow for the increase of process effectiveness and efficiency, creating value for the society
- Research in robotic should be driven by such goals
- Our mission: contribute to the knowledge creation and to the design and implementation of innovative solution in the areas of land, water, aerial and industrial robotics, and in intelligent systems



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Robotics @ INESC TEC

| | |
|--|--|
| <p>Team</p> <ul style="list-style-type: none"> 20 full time researchers (12 PhD) 25 PhD students 2 technicians 15 MSc students (average/year) 12 undergraduate students (average/year) | <p>Funding</p> <ul style="list-style-type: none"> Direct contracts with industry National programs European programs Other international programs and contracts |
| <p>Facilities</p> <ul style="list-style-type: none"> More than 1000 m² of lab space 2 water tanks Mechanics and electronics shops | <p>Research Budget (2011/2013)</p> <p>> 1.5M€/year</p> |



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Robotics @ INESC TEC

Expertise areas

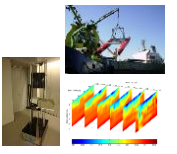
- Platform development
 - Aerial, land and water robotics
 - Industrial and services robotics
- Operations with autonomous robots
- Smart sensors and systems

Research lines

- Reconfigurable systems
- Distributed perception
- Cooperative robotics
- Long term autonomy
- Rapid teaching


Application areas

- Surveillance, security and defence
- Environmental monitoring and mapping
- Risk analysis
- Search and rescue
- Process automation




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Robotic platforms




ROAZ II ASV

- mapping
- surveillance
- rescue




FAST ASV

- surveillance
- monitoring
- mapping




triMARES AUV

- mapping
- monitoring
- inspection



MARES AUV

- mapping
- monitoring
- inspection




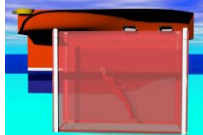
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Robotics for MSAR – Some projects...

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AGaPaS - Autonomous Galileo-Supported Rescue Vessel for Persons Overboard


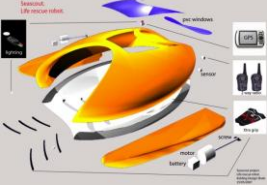
- Technical University of Berlin research project
 - Life saving jacket equipped with sensors and radio transmitter
 - Robotic rescue vessel
 - Automatic launch from ship
 - Autonomous / remotely operated modes

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Seascout – robotic capsule for search and rescue


- Concept designed in Denmark
 - Catamaran like capsule
 - Launching from shore, air or ship
- No prototypes built...

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EMILY – EMergency Integrated Lifesaving lanYard

- Robotized board/buoy for search and rescue build by Hydronalix
 - Autonomous / remotely operated modes
 - Equipped with sonars for survivor detection
 - Launching from shore or air
 - Main specs:
 - Weight: 10 kg
 - Max speed: 40 knots
 - Buoyancy: 30 kg



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ICARUS Project – maritime search and rescue





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ICARUS Project – maritime search and rescue

- Addressed scenarios
 - Mainly large scale disasters
- Multi role for robotic tools
 - Detection and tracking of survivors
 - Deployment of first aid support
- Multi system approach
 - Survival capsules
 - Medium size USVs
 - Aerial systems

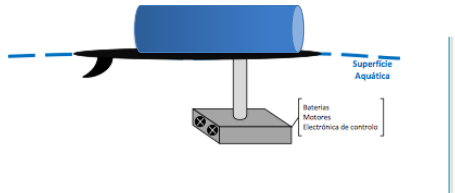
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ICARUS Project – maritime search and rescue

- Survival capsules
 - Robotized life rafts
 - Short range (before inflation)
 - Providing floatation/thermal insulation, ... to survivors
 - Under development by INESC TEC and CINAV



Superfície Aquática

Baterias
Motores
Electrónica de control





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ICARUS Project – maritime search and rescue

- Medium size USVs
 - Short range detection of survivors
 - Transportation of robotized capsules over large distances
 - Already existing assets: NURC, Calzoni and INESC TEC partners




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ICARUS Project – maritime search and rescue

- Aerial systems
 - Fixed wing / quadrotor / gyropendulum
 - Detection and tracking of survivors
 - Deployment of first aid support
 - Establishment of communication links
 - Already existing assets: CTAE and ETH partners

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Thank you...



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