TriMARES
AUTONOMOUS UNDERWATER VEHICLE

INESCTEC
TECHNOLOGY & SCIENCE

TriMARES
AUTONOMOUS UNDERWATER VEHICLE

TriMARES is an underwater vehicle designed for autonomous inspection, bathymetry, mapping and data collection. TriMARES' modular structure is based on the underwater vehicle MARES (OceanSys) and allows different sensor package configurations. Its increased capacity to transport sensors allows it to carry an on-board high resolution video camera, as well as different types of sonar equipment. It can move smoothly in the water, increasing the quality and georeferencing of the collected data. TriMARES was developed in 6 months by INESC TEC and commissioned by a consortium of Brazilian hydroelectric power companies (CEB Lajeado, EDP). The first unit was exported to Brazil in 2011.

MAIN FEATURES

Modular construction with reconfigurable sections
Spare ports to accommodate additional payload sensors
Robust and safe, with fully shrouded moving parts
Operates in confined spaces - able to ascend/descend on the vertical
Hovering in the water column - station keeping and close inspection
5 degrees of freedom (surge, sway, heave, yaw, pitch)
Autonomous operation with simple mission definition
Rechargeable Li-Ion batteries
Low maintenance
Optional fibre-optic umbilical for real-time video/data transmission (ROV mode)

SPECIFICATIONS

Length: 1.3 m // Total width: 80 cm // Overall height: 50 cm // Weight: 75 kg
Maximum depth: 100 m
Horizontal speed: 0-2 m/s, variable // Vertical speed: 0-0.3 m/s, variable
Autonomy / Range: 10 hrs / 40 km
Typical sensors: video camera, high sensitivity still camera, multibeam sonar, sidescan sonar, CTD, turbidity, fluorescence

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MARES
AUTONOMOUS UNDERWATER VEHICLE

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MARES
AUTONOMOUS UNDERWATER VEHICLE

Developed by OceanSys (INESC TEC and FEUP), MARES - Modular Autonomous Robot for Environment Sampling is an autonomous vehicle used in underwater operations. This robot can be easily configured and its modular structure allows it to carry a large variety of sensor packages. MARES can be used for different applications such as environment monitoring, underwater inspection and mapping, and surveillance. An acoustic positioning system makes it possible to georeference collected data. This device has been used regularly since 2007 in environmental monitoring operations.

MAIN FEATURES

Modular construction with reconfigurable sections
Spare ports to accommodate additional payload sensors
Robust and safe, with fully shrouded moving parts
Operates in confined spaces - able to ascend/descend on the vertical
Hovering in the water column - station keeping and close inspection
4 degrees of freedom (surge, heave, yaw, pitch)
Autonomous operation with simple mission definition
Rechargeable Li-Ion batteries
Low maintenance
Compact and lightweight - easy transportation and deployment

SPECIFICATIONS

Length: 1.6 m
Diameter: 20 cm
Weight: 32 kg
Maximum depth: 100 m
Horizontal speed: 0-2 m/s, variable
Vertical speed: 0-0.5 m/s, variable
Autonomy/range: 10 hrs / 40 km
Typical sensors: CTD, sonar, turbidity, fluorescence, video camera

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ROBVIGIL
SURVEILLANCE
ROBOT

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ROBVIGIL
SURVEILLANCE ROBOT

ROBVIGIL is an indoor surveillance robot equipped with sensors and video cameras that is capable of collecting and sending information in real time. The robot can be remotely operated or instructed to go on rounds autonomously. It operates independently of light conditions and can cooperate with other robots or humans.

FUNCTIONALITIES

- Robust robot localisation
- Intelligent battery charging system
- Transparent management of different communication technologies
- Multiple cameras and sensors
- People detection and tracking
- Visual programming languages for intuitive robot mission configuration and route planning

MAIN FEATURES

- Sensors: floor, water, fire, smoke, temperature, humidity, movement, gas (CH, GPL and CO)
- Supports videoconferencing
- Transparently selects the best wireless technology: WiFi and 3G (more in the future)
- No need for markers for indoor auto-localisation
- Video: 360º Camera, directional HD, Thermal, IR
- Remote Database

SPECIFICATIONS

Dimensions: 120cm height, 60cm diameter
Autonomy: unlimited with 10 to 15-minute charging every 45 minutes (the robot remains fully functional even while charging);
8 to 12 hours without charging
Max speed: 1.4 m/s

PARTNERS

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ROAZ II
AUTONOMOUS SURFACE VEHICLE

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ROAZ II
AUTONOMOUS SURFACE VEHICLE

ROAZ II is an autonomous surface vehicle designed for aquatic environment monitoring, bathymetry, data collection and oceanography, security and search and rescue missions. With on-board sensor processing and high precision navigation it is capable of operating autonomously in the ocean environment. The robot has a wide range of sensors and advanced on-board controls allowing its use in efficient precision environmental modelling (oceanographic, 3D sea floor modelling), automated intrusion detection, target tracking, identification, area patrol, communications relay in multi-vehicle scenarios and surface support to underwater assets.

On-board ROV in coordinated missions makes it a suitable surface platform for underwater inspection and data collection tasks.

This vehicle has already taken part in various operational missions.

MAIN FEATURES

Autonomous operation
GPS with RTK and INS for precise positioning
RADAR for obstacle detection
Infra-red and visible light cameras
On-board image processing
Wireless communication (data/video)
CTD
Multi-beam sonar and side-scan sonar
LiFePO4 Batteries
On-board inspection ROV (remotely operated Vehicle)

SPECIFICATIONS

Length: 4.25 m // Width: 2 m // Weight: 250 kg
Maximum speed: 10 knots
Autonomy: 11 hours
Electric propulsion: 10 HP
Load capacity: 500 kg

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GRIFO
AUTONOMOUS AERIAL VEHICLE

INESCTEC
TECHNOLOGY & SCIENCE

GRIFO
AUTONOMOUS AERIAL VEHICLE

GRIFO is a small scale, fixed wing autonomous flight vehicle (unmanned aircraft) designed for environmental monitoring, security, forest fire prevention, communications relay and search and rescue missions. Developed by a team with more than 10 years of experience in aerial robots, this vehicle with on-board image processing and autonomous flight control can operate without direct communication with the land station. A custom developed inertial navigation system and autopilot allows the tight integration of additional sensors, a high degree of navigation positioning and sensor in the loop custom manoeuvres for particular applications. Advanced on-board image processing is used not only in application tasks (event detection, target tracking etc.) but also in automatic visual detection of obstacles (land and in flight) in order to endow the UAV with the capability of operating in accordance with VFR (Visual Flight Rules) aerial regulations.

MAIN FEATURES

Electric propulsion
Custom developed autopilot
Custom developed small scale inertial navigation system
Low consumption on-board ARM (Cortex A8) CPU
WiFi communication
Autonomous flight control in gliding mode
On-board imaging processing
Image based sense and avoid
LiPo batteries (Lithium-ion polymer)

SPECIFICATIONS

Wingspan: 4 m
Maximum take-off weight: 10 kg
Cruising speed: 50 km/h
Autonomy: 4 to 6 hours
Fibreglass glider airframe

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STRONG
MAR

STRENGTHENING MARITIME TECHNOLOGY RESEARCH CENTER

STRONGMAR
STRENGTHENING MARITIME TECHNOLOGY RESEARCH CENTER

AIM INESC TEC is strongly committed to become a center of excellence in maritime technology and, in particular, deep sea technology. The STRONGMAR project aims at creating solid and productive links in the global field of marine science and technology between INESC TEC and established leading research European institutions, capable of enhancing the scientific and technological capacity of INESC TEC and linked institutions (as well as the capacity of partnering institutions involved in the twinning action), helping raising its staff's research profile and its recognition as a European maritime research center of excellence.

OBJECTIVES The main objectives are: provide services and open access to the European academic and industrial communities; become a recognized maritime research asset; build a well-designed and coherent plan for knowledge transfer and exchange of best practices; and enhance the scientific and technological capacity of INESC TEC and linked institutions. These objectives will be fulfilled through a set of measures: summer schools, winter schools, short-term scientific meetings, long-term staff visits, networking meetings, workshops, conferences, technology transfer workshops with stakeholders, and other dissemination activities.

PARTNERS INESC TEC (PORTUGAL) / CINTAL (PORTUGAL) / HERIOT-WATT UNIVERSITY (UNITED KINGDOM) / NATO SCIENCE & TECHNOLOGY ORGANIZATION (BELGIUM) / UNIVERSITAT DE GIRONA (SPAIN) / UNIVERSITY OF ABERDEEN (UNITED KINGDOM)

START JANUARY 2016 **END** DECEMBER 2018 **BUDGET** ~1 M€

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THE STRONGMAR PROJECT IS FUNDED BY THE EUROPEAN COMMISSION UNDER THE H2020 EU FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION (H2020-TWINN-2015, 692427).

STAMINA

SUSTAINABLE AND RELIABLE ROBOTICS FOR PART HANDLING IN MANUFACTURING AUTOMATION

INESCTEC
TECHNOLOGY & SCIENCE

STAMINA

SUSTAINABLE AND RELIABLE ROBOTICS FOR PART HANDLING IN MANUFACTURING AUTOMATION

The STAMINA Project is focused on building the Factory of the Future with the help of new robotics technologies.

By increasing the flexibility of production facilities, handling an ever increasing customisation of products and production volumes variation, the STAMINA Project aims to find profitable solutions to increase the competitiveness of EU factories. The end result of the STAMINA project is a fleet of mobile manipulators capable of navigating and performing kitting operations on a complex logistic supermarket.

A Vertical Integration solution, aimed at bridging the fleet of mobile manipulators with the production systems is being developed by INESC TEC. A 3D spatial representation of the working environment, allowing a continuous assessment of inconsistencies between reality and the modelled information, is also in development.

PROJECT BENEFITS

- Robotic fleet capable of operating on environments designed for human use.
- Set of sustainable robotic technologies, software and hardware, capable of being transferred to industrial use.
- Robust object recognition and grasping for a large variety of parts.

TECHNOLOGICAL INNOVATION

- 3D Vision for part picking and inconsistency detection.
- Skill / Task based robot programming.
- Navigation without infrastructure.
- Web based Vertical Integration with the factory production system.

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S SEVENTH FRAMEWORK PROGRAMME FOR RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION UNDER GRANT AGREEMENT NO 610917.

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SmartAGV

SMART AUTOMATED GUIDED VEHICLE

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SmartAGV
SMART AUTOMATED GUIDED VEHICLE

The SmartAGV is an Automated Guided Vehicle designed for applications facing challenges which call for a flexible and intelligent flow of materials with an effective cost/benefit ratio. This mobile robot is capable of using different types of localisation systems such as a contour based system, without the need for environment preparation, beacons or magnetic tape. The main objective is to achieve a system that is easily adapted, installed and used.

MAIN FEATURES

- Several Localisation techniques:
  - contours (no environment preparation required)
  - beacons
  - magnetic tape
- Autonomous management of battery charging

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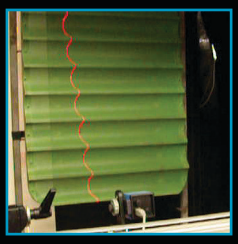
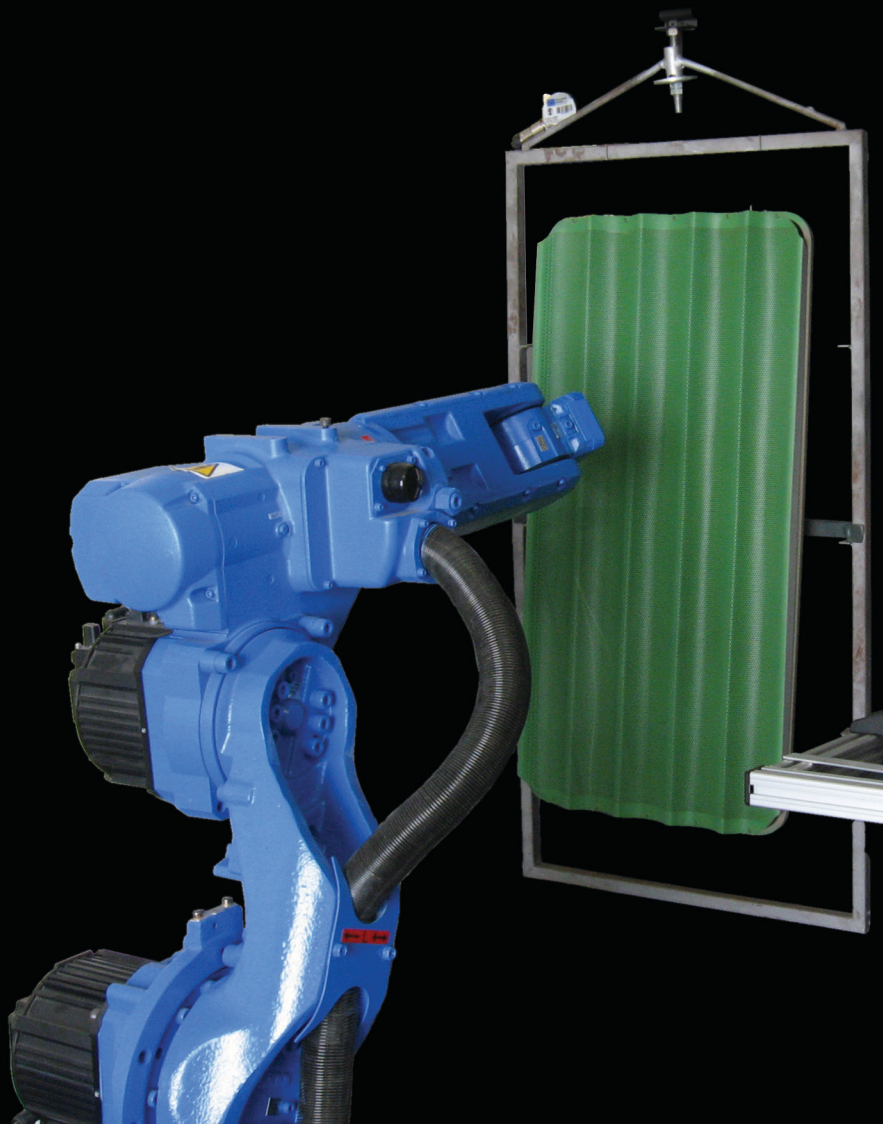


SmartPAINT

SMART ROBOTISED PAINTING CELL

INESCTEC



SmartPAINT
SMART ROBOTISED PAINTING CELL

The SmartPaint is a system that may lead to an increase in competitiveness in small series robotised painting. Some of the system's key factors include accumulated know-how which can be recorded and the capacity to increase production at a lower manufacturing cost, as well as the flexibility to rapidly adapt to new products and processes. This system aims at responding to these challenges by developing an intelligent robotised painting cell capable of acquiring, in a fast and intuitive way, the know-how accumulated by specialised technicians and optimised during several years of experience. The acquired trajectories are recorded and automatically translated to the language of the manipulator, which is taught by means of demonstration.

MAIN FEATURES

- Programming of manipulators through demonstration
- Modular and flexible system for automatic recognition of object geometry
- Capable of translating the independent commands of the programming language to the commands supported by the concrete robot installed for production
- Advanced interface for management and control, supporting both local and remote interaction

FLUPOL SURFACE ENGINEERING

cei by ZIPOR

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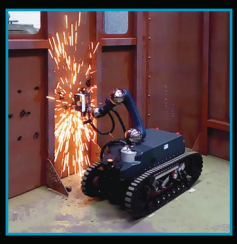

CARLoS

COOPERATIVE ROBOT FOR LARGE SPACES MANUFACTURING

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CARLoS
COOPERATIVE ROBOT FOR LARGE SPACES MANUFACTURING

CARLoS project applied recent advances in cooperative mobile robotics to a representative industrial scenario in shipyards. The final prototype was demonstrated as a robot co-worker for outfitting operations (stud welding and marking) inside blocks of ship superstructures. Currently, there is no automated solution for these tasks.

FUNCTIONALITIES

- Autonomous stud welding
- Cooperative behaviour under uncertainties
- Semi-autonomous decision-making on the work to be done
- Highly usable and easy controlled by a shipyard worker

MAIN FEATURES

- High mobility inside ship blocks
- Projection mapping augmented reality based interface
- 3DOF and 6 DOF localisation with natural features
- Close to walls path planning for the mobile platform
- Skills-based programming

TECHNICAL SPECIFICATIONS

- Platform absolute localisation accuracy: < 6cm
- Stud placement accuracy: <1cm
- Platform maximum speed: 1.5m/s
- Force application on the wall:>160N (depending on the arm configuration)
- Payload of the platform: 100 Kg

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S SEVENTH FRAMEWORK PROGRAMME FOR RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION UNDER GRANT AGREEMENT No 606363

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UNMANNED CAPSULE

AUTONOMOUS ROBOT FOR SEARCH AND RESCUE OPERATIONS

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UNMANNED CAPSULE
AUTONOMOUS ROBOT FOR SEARCH AND RESCUE OPERATIONS

The Unmanned capsule is a small size autonomous surface vehicle designed for search and rescue operations at sea. This robot carries an uninflated life raft and is capable of inflating it close to survivors in large-scale maritime disasters. It can be remotely controlled or operated autonomously, and can be deployed from shore or from a mother ship.

The capsule was designed to operate in adverse environmental conditions, and is also equipped with a video camera and other sensors to provide information about victims and the disaster to operators on shore. This system was developed as part of project ICARUS (FP7 – Security).

MAIN FEATURES

- Automatic inflation of life raft
- Autonomous navigation
- Live video stream to shore

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