

## euRathlon - European Robo-Athlon Competition:

### Marine Robotics approach

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*Abstract – The FP7 Project [euRathlon](#), with scoring of 13,5 points over 15 has been funded by the European Commission. The Project is a Coordinated Action, that envisions, inspired by the Fukushima disaster, a competition that requires autonomous flying, land and underwater robots acting together to survey the disaster, collect environmental data, identify critical hazards, and help with the rescue missions. As a preparation for this Grand Challenge to be held in 2015, in 2013 and 2014 a land and a sea robotic competition will be held continuing the ELROB and SAUCE challenges.*

#### INTRODUCTION

The euRathlon FP7 is a consortium of 7 partner institutions (5 EU countries), with a duration of 3 years: Jan. 2013 - Dec. 2015. Lead by the University of the West of England UWE – UK, the consortium brings together the expertise of the land robotics competitions: Fraunhofer FKIE FRAU – Germany and University of Oulu OULU – Finland; the underwater robotics competitions: Heriot-Watt University HWU – UK, CMRE – Italy, and PLOCAN – Spain; and the air robotics domain: FADA-CATEC - Spain

The project aims to spur advances in practical, usable real-world intelligent autonomous robots:

- The world’s first competition which *combines ground, underwater and air robots*, that require intelligent autonomous robots to work together in disaster response scenarios
- Pushing the state-of-the-art in *multi-robot collaboration, cooperation and shared situation awareness* to tackle real-world complex tasks in dynamic environments.

- An open and user-led process of *defining the multi-robot competition scenarios, and related standards* for outdoor robotic vehicles
- An open process for creating research, *industry and user-recognised benchmarks* for robot performance measurement and comparison
- *Workshops* that foster a community of competitors
- Imagination grabbing competitions

## VISION

- To provide real-world robotics challenges that will test the intelligence and autonomy of outdoor robots in demanding mock disaster-response scenarios
- Inspired by the 2011 Fukushima nuclear accident we will create a competition that requires autonomous flying, land and underwater robots acting together to survey the disaster, collect environmental data, and identify critical hazards
- Leading up to this Grand Challenge in year 3, will be directly related land and underwater robot competitions in years 1 and 2, respectively

## THE COMPETITIONS AND WORKSHOPS

Following the experience of ELROB and SAUCE land and sea robotics competitions, the Project will prepare the participant teams to collaborate for the accomplishment of the missions designed for the Grand Challenge in 2015.

The workshops aim to advance the state-of-the-art of the multi-domain robotics field by sharing new algorithms and technologies through papers from attendees and tutorial sessions on topics relevant to real-world robotics including intelligence, autonomy, human robot interfaces, standards and benchmarking. Tutorial sessions will importantly cover the year 2 (underwater) and 3 (combined) competitions; tutorial sessions will be led by seniors from the euRathlon project.

Year 1: euRathlon **Land competition**. A competition to meet demanding outdoor challenges that require (primarily) autonomous land vehicles. Focus on pushing the state of the art in autonomous navigation.

- 23-27 September 2013 Berchtesgaden, Germany
- Draft scenarios already published:
  - Reconnaissance and surveillance in urban structures
  - Mobile manipulation for handling hazardous materials
  - Search and rescue in smoke filled underground structure
  - Autonomous navigation using GPS, GLONASS and GALILEO
  - Reconnaissance and safe disposal of bombs and explosive devices
- Workshop 24-26 September

Year 2: euRathlon **Underwater competition**. A competition with demanding challenges that require (primarily) autonomous underwater vehicles (AUVs). Focus on robust and adaptive sensing and action

Year 3: euRathlon **Grand Challenge**. A competition with a post disaster scenario inspired by the Fukushima accident, that can only be met with a combination of air, land and sea robots working cooperatively. Focus on heterogeneous team working of autonomous vehicles.



Fig. 1: Multi-domain robots interacting to accomplish a mission

#### BENCHMARKING

The consortium will lead an activity to develop new benchmarks co-designed alongside competition scenarios, open process that will build on existing best practice in robotics benchmarking, inviting comments and publishing benchmarks. euRathlon will assess the success of robots in trials using these benchmarks and the performance data sets collected during trials will be uploaded to a repository and made available.

#### BENEFITS FOR THE MARINE ROBOTICS FIELD

The Marine Robotics field will benefit from the whole activities of the project as the other domains will do too. The interaction with other domains, air and land, will provoke standardization issues to arise increasing the communication capabilities and a new range of human-robot interaction. The standardization and the benchmarking outputs of euRathlon, will make it easier to compare robots and the advance of the technology from different domains, and the nurture from solutions of other domains will be naturally increased. At the same time the visibility of the community in the Robotics forum will be increased.

#### REFERENCES

- euRathlon web page: <http://www.euRathlon.eu>
- euRathlon 2013 Land Robotics Competition and Multidomain Workshop: <http://www.eurathlon2013.eu>