

REGIONAL

Robotics Activities in Portugal— An Overview

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Portugal is the westernmost country of Europe and is bordered by the Atlantic Ocean to the west and south and by Spain to the north and east. The Atlantic Ocean has been an important navigation spot for the Portuguese economy and science. Portugal was a pioneer in navigation techniques and ship (naval) technologies during the age of discovery when Portugal founded new territories. This allowed many European countries to expand their influence and become major economic, political, and military powers.

Since Portugal joined the European Economic Community (EEC) in 1986, the Portuguese universities took the opportunity to leverage their research activities and play an active role in the progress of technology and innovation at an international level. As a result of EEC/European Union structural and cohesion funds, the Portuguese universities, research institutions, and companies progressed the research in the robotics field considerably and consequently.

The robotic research activities had a significant impulse mainly due to the efforts of the Institute of Systems and Robotics (ISR), an institution closely linked to different universities in Coimbra, Porto, and Lisbon. The Universities of Minho and Aveiro followed this tendency by creating new and active robotic research groups.

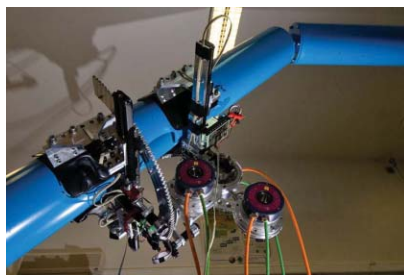


Figure 1. A climbing robot developed at the University of Coimbra.

These research efforts have been leveraged by a parallel effort in the promotion of robotics in primary and

high schools. This was strongly supported by the Portuguese Society for Robotics (SPR; www.spr.ua.pt) and the Portuguese government agency Ciência Viva.

The SPR is a nonprofit association that acts closely with initiatives from the IEEE Robotics and Automation Society (RAS) Portuguese Chapter (<http://ieeer-as.isr.uc.pt>), and both cooperate for common coordinated initiatives.

The RAS Portuguese Chapter, founded in October 2005, has been very active in the promotion of engineering, science, and robotics. The RAS Portuguese Chapter has been responsible for an annual scientific meeting with a typical duration of one day with two tracks of talks. During the last few years, an average of 25 scientific articles has been presented with the latest research developments of the Portuguese robotics community. The conference is highly interactive, with speakers and attendees discussing the latest developments in the area. The conference is noticeable by its large incidence of young robot scientists and Ph.D. students that present their most recent scientific work.

The Portuguese scientific community has been internationally active on exploring different topics in robotics toward more intelligent devices such as artificial perception systems, multirobotic cooperation, or multisensing autonomous robots. The scientific developments are remarkable with different teams specializing in different robotic topics and



Figure 2. An instrumented car developed by the University of Aveiro.

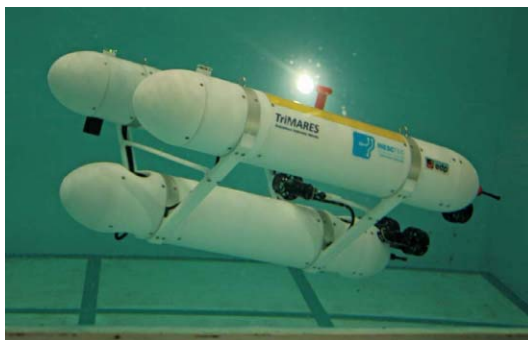


Figure 3. A semiautonomous underwater vehicle developed by the University of Porto.

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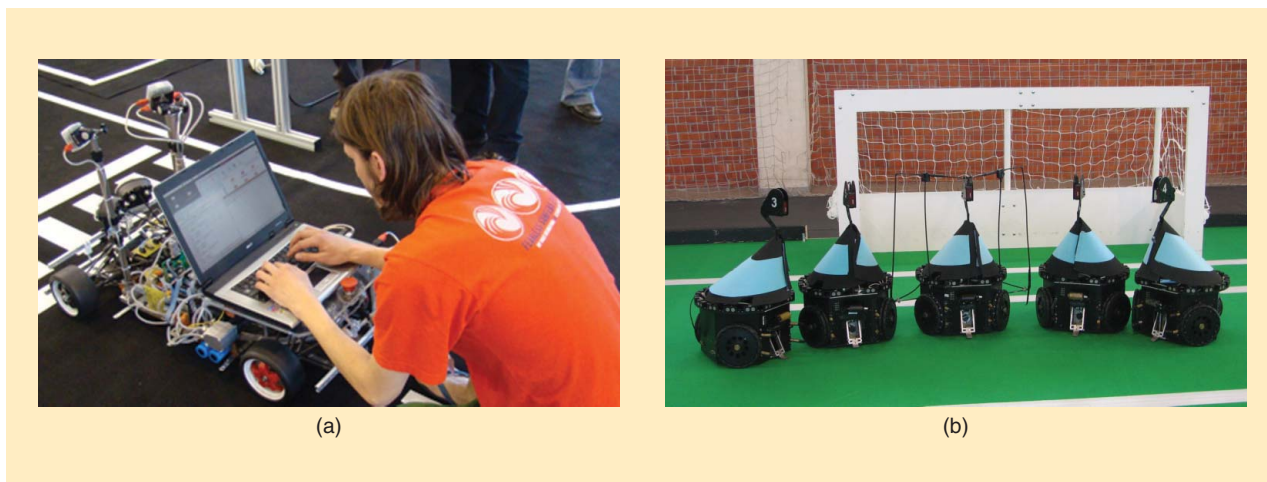


Figure 4. (a) Robotic competitions and (b) Robot Soccer Team from IST Technical University of Lisbon.

technologies. The figures illustrate a few examples of prototypes for these technologies developed in the country. Remarkable work has been done on robots to explore the different forms of locomotion, such as the climbing robot shown in Figure 1 or an unmanned ground vehicle (Figure 2). The unmanned robots are used for research on autonomous navigation on full-sized cars and for hybrid control nature, where the vehicle may be operated in a shared and configurable manner between computers and a real human driver. Pursuing the historical characteristics of ocean explorers, the Portuguese robotic researchers have been developing unmanned vessels and robotic submarines. Figure 3 is an example of an underwater robotic prototype for dam inspection, and it is one of the examples of robotics devices for ocean exploration, harbor surveillance, and inspection, developed by research groups in the Technical University of Lisbon and University of Porto.

The RAS Chapter also promotes other activities sponsored by the IEEE, which include technical meetings conducted by the Distinguished Lecturers Program. The majority of these events are coordinated with the SPR, which is responsible for the organization of a large annual event on robotic competitions named “Festival de Robotica.” This national

event is very popular and, through the years, has been held in different Portuguese cities. The objective of the event is to promote robotics among young community, schools, and professors. The event always has a large participation of colleges and universities from the country, and more recently, several teams from Spain joined this Portuguese robotics event for the sake of competition (Figure 4).

The event has been, a tremendous success among the Portuguese robotics community. Many of the participants also participated in the RoboCup competition, where some Portuguese teams rank the top positions or obtain prizes and awards. The article “Robotics Educational Activities in Portugal:

A Motivating Experience” [1] clarifies the genesis of these initiatives and provides a larger view about Portuguese experience in these educational activities.

The collaboration between the IEEE Chapter and SPR is extended for the common effort of joining academia and industry in the robotics fields. For that purpose, members from both entities promoted a series of discussions and debates about the thematic of robotics in Portugal and its opportunity on societal development. Several robotics researchers and companies participated in the discussion. The result was the *Portuguese Robotics White Book* that describes the historical robotics development in Portugal and included its major challenges and opportunities in the society. The *Portuguese Robotics White Book* was officially presented to the public on 20 June 2009 at the Lisbon International Fair.

This effort motivated other initiatives by promoting robotics as an opportunity for a new technological market. Since then, several Portuguese companies developed commercial robotics products that are currently available in the market. These products include new mobile chairs for handicapped people (Figure 5), new transport options for cities, based on semiautonomous mobile



Figure 5. Autonomous mobile chair, which is a commercial product developed by a spin-off robotic company from the University of Minho.

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platforms (Figure 6), and new devices for emergency first responders and search and rescue activities (Figure 7).

The next International Conference on Intelligent Robots and Systems

(IROS 2012; www.iros2012.org) will be held in Vilamoura, Algarve, Portugal, on 7–11 October 2012 and will be strongly centered on robotics for quality of life and sustainable

development. This event celebrates 25 years of IROS and provides an opportunity to contact not only colleagues but also the local Portuguese robotics research teams and universities in Portugal.

In the name of Portuguese RAS Chapter, welcome to the IROS 2012 in Vilamoura, Algarve.



Figure 6. Move the transport unmanned vehicle, which is a commercial product developed by a spin-off company from the Instituto Pedro Nunes technology-transfer institute from the University of Coimbra.



Figure 7. Raposa the search and rescue vehicle, which is a commercial product developed by a spin-off robotic company from the Technical University of Lisbon.

References

- [1] P. U. Lima, "Robotics educational activities in Portugal: A motivating experience [Education]," *IEEE Robot. Automat. Mag.*, vol. 14, no. 2, pp. 16–17, June 2007.
- [2] *Portuguese Robotics White Book (Robotica no Mapa)* [Online]. Available: <http://www.spr.ua.pt>

