

Promoting Robotics Development in Mexico

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I. Introduction

This paper describes the efforts that a group of universities and organizations in Mexico are doing to promote the robotics development in this country. One way to promote this has been done through the organization of national and international robotics competitions in Mexico, as well as promoting the participation of Mexican teams in international ones as the RoboCup. Another way is through the creation of robotics curricula that covers from highschool through graduate studies. These efforts that started more than 15 years ago have made that students, professors and general public to be interested in the robotics area.

II. Robotics Competitions

Since 2000, several Mexican universities¹ started the organization of robotics competitions in Mexico. During these years the events and the experience to organize them has evolved and the Mexican Robotics Federation (FMR, Spanish acronym) has taken charge to do these tasks.

The FMR is an organization that groups research professors with a common interest in robotics and related fields from some of the most prestigious research universities and institutes in Mexico [1].

Several of its current members have been collaborating for over fifteen years in the organization of national and international academic events.

Among the objectives of the FMR are the following: To foster the development of robotics within Mexican territory; to organize regional, national and international robotics competitions; to establish collaboration with similar groups in and outside Mexican territory, to organize research networks in robotics and related fields; to disseminate among the public the results of Research and Development in the field of robotics.

The first event in Mexico to be officially recognized by the RoboCup Federation was the first Mexican RoboCup Open, which took place within the 2008 Mexican Robotics Tournament in Mexico City.

It is important to mention that the Mexican Robotics Tournament [2] is an annual event that hosts simultaneously

several mobile robotics competitions in addition to the Mexican RoboCup Open.

Among those: the Mexican Cleaning Robot Contest, the national preliminaries for the Latin American Robotics Student Competition (annually organized by the Latin American Robotics Council of the IEEE Region 9) and the Robothon (organized by the Seattle Robotics Society).

This national preliminaries means that the winning teams will get support from the FMR to participate in these international events.



Fig. 1. Mexican Open 2008

Mexican teams have been attending at RoboCup since 2002, participating mainly in the following leagues:

Four Legged, Small Size, Humanoid KidSize, Soccer Simulation @Home, Junior Rescue, Junior Soccer, Junior Dance, Junior CoSpace and @Work. In 2012 the RoboCup Federation together with the FMR organized the RoboCup in Mexico City with an attendance of around 3500 foreign participants and an estimated 35,000 spectators [4].

This experience created a lot of interest in the Mexican society, the media coverage was huge.

III. Robotics Curricula

During the RoboCup competition Bremen, Germany, in 2006, we realized that in the Junior leagues, designed for participants between 12 and 19 years old, there were not Mexican teams, neither any Latin American one at all.

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Fig. 2. RoboCup 2012 in Mexico

Thus, a group of professors decided to bring at least one highschool team for the next RoboCup in 2007 in Atlanta, USA. To achieve this goal at the second semester of 2006 we began a program, at the highschool system at the Universidad Nacional Autónoma de México (UNAM), to prepare its teachers to teach robotics and programming skills.

In parallel we started robotics clubs at the Instituto Tecnológico Autónomo de México (ITAM) and at the (UNAM) [5], and other universities, given the opportunity to the students to learn robotics basics, as an extra curricular formation, these clubs were mainly opened in the afternoons and on Saturdays. Thanks to these initiatives the first junior Mexican team participated in the Robocup in 2007 and in 2014 one junior team of the UNAM's highschool system got a first place in the Junior Co-Space league.

In 2008 in the Mexican RoboCup Open some of the RoboCup Junior leagues were included, the teams that obtained the first places got an spot in the RoboCup competition in China and also they got support to travel there.

Since 2008 the interest and enthusiasm to participate in the Mexican RoboCup Open has been increased substantially. One thing that we noticed is that the majority of students participating in the junior leagues later decide to continue studies in Engineering or Sciences.

For bachelor students in EE and computer science in their last semesters and master students at the beginning of their studies there are several courses at the Engineering School at the ITAM and UNAM that can help them to specialize in the robotics area. The following courses are offered: Robotic Manipulators, Mobile Robots, Vision and Image Processing, AI, Speech Recognition and Natural Language Understanding, etc. These courses have helped the students to have better understanding of the robotics field and they have created robots that are competitive in worldwide competitions like the RoboCup or Rockin. For example, in 2007 the Team Pumas UNAM [6] obtained third place in the @home league



Fig. 3. UNAM's Highschool team obtained a first place in Co-Space Junior in Brazil's RoboCup 2014

and in the Rockin of 2014 in Toulouse France [7] their robot Justina obtained a first place.



Fig. 4. Robot Justina developed at UNAM

IV. Robotics' Academic Networks

In 2011 the Mexican National Council of Science and Technology (CONACYT acronym in spanish), that is the equivalent of USA's National Science Foundation, it is the Mexico's entity in charge of the promotion of scientific and technological activities, promoted the creation of research networks between scientists and engineers to share knowledge in different areas.

One of them was the Robotics and Mechatronic Network [8] that included the main researchers in the robotics' area

in Mexico. This network organized workshops and meetings that help different groups of researchers to know each other, with the goal to work together in the future in robotics' projects.

Unfortunately the resources given to this kind of networks finished and they are not supported by CONACYT any more. At least the first contacts between researchers were established and some groups still are working together.

V. Robotics in the Industry

Despite the fact, that there are too many factories that use industrial robots, specially in the transnational manufactories, the main majority of them come from abroad, there is only an incipient industry of robots used in education, that provide small robotics kits for primary and high schools [9].

There is a need of government policies to promote the creation of factories that will be able to produce robotics components and equipment.

VI. Discussion

There is no doubt, that by the organization of robotics' competitions, together with an update in the teaching curriculum from the highschool to graduated studies, have increased the interest on robotics in Mexico.

These kind of initiatives require not only economic resources, but we consider, that the most important thing is the work that the voluntaries make.

The first seeds to create a robotics' culture in Mexico are already set, the main problem is to make now that these seeds keep growing, and for that, there is a need that universities, government agencies and the industry work together to accomplish this goal.

REFERENCES

- [1] <http://femexrobotica.org/>
- [2] <http://www.tmr2015.mx/>
- [3] <http://www.robocup.org/>
- [4] <http://www.robocup2012.org/>
- [5] http://www.cchazc.unam.mx/?page_id=744
- [6] biorobotics.fi-p.unam.mx
- [7] <http://rockinrobotchallenge.eu/rockin2014.php>
- [8] <http://english.robmec.org/>
- [9] www.sandorobotics.com