

Robotics in the Iranian Schools

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Introduction

It is almost two decades that robotics has attracted many students in the Iranian schools to envision creativity and innovation. Science, Technology, Engineering and Mathematics (STEM) are essential to empower youth with innovative and critical thinking. Extra-curricular and project-based learning can attract more students to STEM beyond formal education and prepare them to be deep thinkers and problem solvers. It brings also an opportunity for youth to develop their own knowledge and have chance to become innovators and researchers.

Robotics are phenomenal for this target, we will present a brief survey about robotics in the Iranian schools, how it started and its most important advancements.

Robotics e-Club at Schoolnet

Schoolnet established under the supervision of Sharif University of Technology in early 2000s as a school portal to empower youth in the information era. Schoolnet was a pioneer to support development of information technology in the Iranian schools and provided e-contents and a teamwork platform for students and teachers. Schoolnet mainly was focused on STEM education through e-Clubs as sub-sections on the portal, to support project-based and collaborative learning. e-Clubs covered various subjects but robotics was essential since attracted many students to the new concept.

A pathfinder robot designed by the schoolnet partners, and kits provided for more than 100 schools. Robotics team of each school included 3, 4 students assembled robots and the challenge was how to tune them for better performance. In an independent robotic fest at the Sharif University, all students gathered and a contest between pathfinders motivated them more.

Schoolnet served as a pioneer and attracted many students to information technology and robotics.

Khwarizmi Youth Science Fair

After success of schoolnet in bringing robotics to schools, Tehran Education Department (Ministry of Education) considered robotics as an extra-curricular activity for the school kids and provided training sessions either in programming and simulation or physical robots. Training for simulation included programming in C++ and graphics libraries. Also training in mechatronics for physical robots.

Later on, many other schools nationwide considered robotics as a mean of hands-on learning to support STEM and advancements of information technology.

More development happened and some Robotics team of high school students participated in the international RoboCup leagues in football and rescue. They participated either with physical robots or in simulation, successes motivated schools and students more and more.



Fig. 1. Football Simulation 2D.



Fig. 2. Football Simulation 3D.

In later years, Khwarizmi Youth Science Fair, considered robotics as a major field and attracted more students. Khwarizmi Youth Science Fair is an annual event focused on STEM and students across the country participate in a two round contest. Students submit their own projects to the local fairs across the country and selected projects can compete in the final round. In robotics they considered different branches such as:

- Rescue Simulation.
- Football Simulation (2D and 3D).
- Junior Football (1-on-1, 2-on-2).
- Mine detection robot.
- Rescue robots.

For few year robotics were the heart of the Khwarizmi Science Fair and many students nation-wide in team-works motivated to work on robotics and attracted to STEM as well.

The wheels were on the road! Many robotics club and contests organized throughout the country and many students attracted to robotics.



Fig. 3. Repairing the program for the contest.



Fig. 4. Preparation for the contest.



Fig. 5. Robotics is attractive for all ages.



Fig. 6. Pathfinder contest.

Sharif NAD Cup

Robotics and technology clubs and competitions have been organized and are very active across the country but one of the most successful one is the Sharif NAD Cup which is under support of Sharif University of Technology. Sharif NAD Cup is a science and technology competition which has been organized by the NAD Company.

A group of young talented scientists and educators are founders of NAD Co. The company is focused on STEM education for K12 through training workshops and contests.

Various subjects such as microelectronic, robotics, physics, chemistry, biotechnology, nanotechnology and etc. are under coverage. The approach is beyond curriculum in subjects such as physics and chemistry but being pioneer in new concepts as nanotechnology, robotics and etc. The company organizes workshops by requests from schools but organizing science fair and contests are essential, almost 2,000 students participate in the science fair annually.

Robotics still is the point of attraction for the Iranian students in the science fair. The participants are in different age groups and through various rounds they compete and can reach to the final round.

Robotics has been considered in various forms such as football leagues or robot fighters. Robotics team through different levels as elementary to higher levels compete in rounds and winners are recognized nationwide by receiving the Sharif NAD Cup.



Fig. 7. Sharif NAD Cup, Science Fair.

RoboCup IranOpen

RoboCup is an international research and education initiative¹. It is an attempt to foster artificial intelligence and intelligent robotics research by providing a standard problem where wide range of technologies can be integrated and examined, as well as being used for integrated project-based learning. For this purpose, RoboCup chose to use football game as a primary domain, and organizes RoboCup.

Iranian teams have been an active participant of RoboCup events since 1998. College and school teams can apply for participation by submitting a research paper to RobCup and qualified teams will receive admission for participation. The number of



Fig. 8. IranOpen Football League.



Fig. 9. IranOpen 2017, repairing programs.

¹ <http://www.robocup.org/>



Fig. 10. IranOpen 2017, more advancements.

Iranian teams has been largely increasing over the past years. Thereby, the need to have a regional event seemed rather necessary. Furthermore, since the overall number of world interested teams in RoboCup has increased; regional events may and can be a proper field for RoboCup leagues. Technical committees to observe team's qualities for RoboCup world competitions qualifications.

IranOpen is a place for teams willing to take part in RoboCup world competitions in order to show their qualities and standards. It is also a place for fresh teams to gain experience and become ready to join the world class teams. RobCup mostly has attracted college students but high school students also have had chances to participate.

Robotics and Artificial Intelligence in Schools

Artificial Intelligence (AI) considered by what so called "Turing Test" and the idea was that a computer could be said to "think" if a human could not recognize it through conversation. It started with some game development such as chess playing by computer but more advancements have enriched AI in the last decades. Increasing the computing power and more developments in Virtual Reality (VR), Augmented Reality (AR), Chatbots and etc. are break through for artificial intelligence.

Artificial Intelligence is essential for new advancements in science and technology and must be reflected in K12 education properly. Robotics is a true mean of AI for school kids and can attract youth to STEM and computer programming and can open new doors in education.



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