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## THE CHALLENGE FOR ARTS & CULTURES





# **NAO CHALLENGE**

The Nao Challenge is an educational contest for high school students organized for the first time in Italy in 2015 by Scuola di Robotica (School of Robotics) in collaboration with SoftBank Robotics and the Italian company CampuStore.

The aim of the competition is to increase the knowledge of students in the use of humanoid robotics by challenging them to develop software to be used in plausible and real-like situations with the aim of spreading the social potential of service robotics.

In the coming years, technological development in robotics and ICT will be driving humans to relate more and more with machines capable of taking autonomous decisions and that, very often, will have a humanoid form.

Scuola di Robotica is convinced that education and culture in all the subjects, STEM and Arts, technoscience and humanities, are important tools to prepare future generations for the challenges that the current technological revolution will bring and for this reason it invests resources in the organization of a contest dedicated to humanoid robotics which requires skills and knowledge in both fields.

In fact, working for the NAO Challenge students can acquire skills to spend in professional and business fields, including:

- \* Develop problem-solving, organisational and cooperation skills.
- \* Acquire technical and planning skills.
- \* Develop creativity and communication skills.
- \* Discover promising professions and careers.

The Italian Ministry of Education, University and Research (MIUR) has included the NAO Challenge among the competitions that allow access to the National Register of Excellence.



The teams, made up of a maximum of ten students, are divided into two categories for the semi-finals: those who own the robot Nao and those who do not.

The school that wants to participate in the NAO Challenge does not need to have the humanoid robot. All teams can use the NAO simulation software and, during the school year, have the opportunity to test their program on a Nao robot made available by the organizers through a hosting network.

The tests are different for each edition with the aim of stimulating students to explore the potential of humanoid robots in different areas of everyday reality.

# For the 2020 edition, the theme is the protection and promotion of cultural heritage.

To participate, the teams must select and present the beneficiary(s) of the project and outline how they arrived at the proposed solution through various tests that include the study of specific cases, the analysis of existing solutions and interviews with experts.

The 2020 edition of the Nao Challenge has the following objectives:

- \* Programming the NAO robot to identify new applications to safeguard, protect and promote Italian cultural heritage through the interaction between the robot and other devices.
- \* Identify and cooperate with a cultural institution interested in experimenting with new technologies and work with it to create a project to be presented during the contest.

## A GREAT OPPORTUNITY

## For Students

- \* Acquire technical and programming skills.
- \* Develop problem-solving, organisational and teamwork skills.
- \* Develop creativity and communication skills.
- \* Discover promising professions and careers.
- \* Become part of a community of designers and developers in the field of robotics and new technologies.
- \* Meet with the NAO user community, technical teams and specialists who will offer special assistance throughout the competition.
- \* Discover the fascination of robotics and its distinctive spirit of initiative and entrepreneurship, a world that combines technology, innovation, creativity and passion.

## For Teachers

- \* Promote greater interest in science and technology.
- \* Capture students' attention by stimulating their imagination.
- \* Experiment with flexible learning modes.
- \* Promote gender education for girls.
- \* Stimulate inclusion through the creation of heterogeneous working groups.
- \* Get free training on site and online.
- \* Develop interdisciplinary pathways by combining scientific subjects with humanities.

## Who can participate

Enrolment is reserved for teams from secondary schools. Non-school teams will not be admitted.

Each school may apply for more than one team.

Each team must be composed of a minimum of three and a maximum of ten students and will be accompanied by a teacher-tutor.

Each teacher-tutor may follow a maximum of three teams.



## **HOW TO REGISTER**

## For teams from schools that own NAOs

The fee, which is a contribution to the costs of the Challenge organization, is 150 euros per team and each school can enroll more teams. From the second team from the same school registered the fee is 120 euros.

Teams with the NAO robot have direct access to STEP 2.

# For teams from schools that do not have NAOs

The teams that do not have NAO have to pass a pre-selection through the creation of a video presentation and a descriptive document of the project. This part of the selection is PHASE 1.

To register to STEP 1 the fee is 50 euros. For each class or school that enrols more teams the fee is 50 euros for each team enrolled.

Once passed STEP 1 the selected team goes to STEP 2, the semi-finals and, in case of passing the round, it can access to the Final.

To access STEP 2, each selected team will pay a fee of 100 euros.

Phase 2 includes the possibility to test the NAO robots at the NAO Hosting.



## **JURIES**

During the semi-finals, the teams presents their projects to experts of the juries. Each jury contributes to the global evaluation of all teams.

At the end of the competition day, the teams selected to participate in the Final are announced.

Each test has a duration of 15 minutes of which:

- \* 5 minutes of preparation
- \* 5 minutes of presentation
- \* 5 minutes of questions from the jury.

## **FINAL**

The Final lasts two days. The teams present their projects through the four tests carried out for the semi-finals.

In addition, a hackathon will be organized in which all teams will participate. The rules will be communicated at the end of all semi-finals.



## **GLI ORGANIZZATORI**



Scuola di Robotica is a non-profit association founded in 2000 by a group of roboticists and scholars of human sciences. The main objective of Scuola di Robotica is the promotion of culture through education, training, education and dissemination of the arts and sciences involved in the process of development of robotics and new technologies.

Over the years Scuola di Robotica has become a national and international reference point for many research activities and application of robotics in various areas of society such as education, ecology, disability and many others.

Scuola di Robotica is a partner of many European projects and since 2009 has been certified as a training center by the Ministry of Education, University and Research for the updating of teachers.



**SoftBank** designs and manufactures interactive and friendly humanoid robots. Since the beginning the goal of SoftBank Robotics has been to make robots accessible to everyone so that they become daily life companions.

In less than 10 years SoftBank Robotics has become a leader in the humanoid robotics market and now offers robots that assist professionals in areas such as education, research, healthcare, retail and tourism.

The first NAO robot was designed in 2006 and currently there are nearly 13,000 NAOs currently in use worldwide.



CampuStore is the website and brand of the educational activities of Media Direct Srl, a reference point for educational robotics since at least 2000, when it was the first company to bring an educational robot to Italy.

Over the years, CampuStore's attention to robotics has grown exponentially and today the offer of educational solutions is the largest and most targeted in Italy, with articles designed for teaching coding from 4 years of age, up to tools suitable for university departments.

CampuStore is convinced that educational robotics is a very useful and also unique tool for every child, boy, girl and graduating students: then, for the educational system of every Nation.



## **HUMANOIDS FOR CULTURAL HERITAGE**

As the UNESCO definition says "Heritage is our legacy from the past, what we live with today and we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration, our touchstone, our reference point, our identity".

Furthermore, as the International Council on Monuments and Sites (ICOMOS) makes clear, "cultural heritage is the expression of ways of life developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values".

For the social and economic development of a nation, cultural heritage is a fundamental strategic resource. This statement is all the more valid for Italy, which has the largest number of sites on the UNE-SCO World Heritage List. In UNESCO's list there are 54 sites, of which 5 are natural sites: Aeolian Islands, Monte San Giorgio, Dolomites, Mount Etna, Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe ,and 7 are cultural landscapes: Amalfi Coast, Portovenere, Cinque Terre and Islands (Palmaria, Tino and Tinetto), National Park of Cilento and Vallo di Diano.

This immense heritage needs new methods to be protected, preserved, promoted, discovered and told. This is why Scuola di Robotica has chosen the protection and defence of cultural heritage as the main theme for the 2020 edition of the Nao Challenge.

The teams will have to select, contact and collaborate with a museum, educational, scientific and cultural organization to create, in synergy, a project with the humanoid robot Nao to develop paths for the protection of cultural heritage to be presented during the contest.

## **RESOURCES TO START**

All teams will have the opportunity to follow an online programming course on the NAO robot about the Choregraphe software. In addition, inspirational tips will be provided with video and information material dedicated to the competition.

## **TEAM ORGANIZATION**

**Coach:** Each team will be coordinated by a teacher-coach who will facilitate the work of the students through scenario analysis, the organization of working time and transfers necessary to participate in the competition.

**Team leader:** Each team elects its own team leader. He/she receives all official communications from the organizer on the rules, deadlines and any other news related to the competition. The task of the team leader will be to communicate the main information to the team and to coordinate the work with the coach.

**Media responsible:** The communication manager proposes to the team the communication plan to promote the project on social and media. He/she manages with the NAO Challenge organizer how to share the material produced.

# THE CHALLENGE

## Selection of teams for the semi-finals. This phase is dedicated exclusively to teams that do not have NAOs.

In order to participate in the semifinals, all teams that do not have NAOs must go through a selection phase.

The selection takes place through the creation of a video and a descriptive document of the project to be carried out.

#### Presentation of the project description

the document must be sent together with the video presentation, must be in pdf format and must not exceed ten slides.

#### Video presentation

the video must have a maximum duration of three minutes, must be uploaded to the team's YouTube channel, promoted on social networks with the hashtag #naochallenge2020 and #scuoladirobotica and must follow the following structure:

- \* Brief presentation of the team
- \* Problem detected
- \* Solution designed
- \* Type of prototype that the team wants to make
- \* Cultural/museum institution to which collaboration is to be directed.

#### **Attention!**

Videos longer than the indicated duration will not be evaluated and will receive score zero.

The teams must deliver the materials by 23:59 on 15 December 2019 through the form on the website naochallenge.it.

Scuola di Robotica will obtain the necessary rights to promote the videos on its website and on social media.

#### **Evaluation criteria:**

- \* Innovation and feasibility of the submitted project.
- \* Originality of the video.
- \* Clarity and quality of written presentations.

## **STEP II**

## Semifinals

## TRIAL 1 HERE IS OUR TEAM!

During this test, students should describe to the jury their team, the roles within the team, the working method used and the challenges faced to complete it.

The clarity of the presentation, the role of the team members and the new skills acquired during the course will be evaluated in this test. In addition, the evaluation will take into consideration the team cohesion, the pursuit of objectives and the working method used by the students.

The NAO robot should actively participate in the presentation through interaction with the team, the juries and possibly also with the audience present.

The teams will also have to produce a 70 cm X 100 cm poster that will be displayed during the presentation. The following information must be specified on the poster:

- \* Team name
- \* Team logo
- \* Organizer logo
- \* Project information
- \* Institute and place of origin of the team

### **Evaluation criteria:**

- \* Creativity and innovation
- \* Team inclusion and cohesion
- \* Using the Nao robot
- \* Clarity of display and poster



## TRIAL 2 NAO, CAN YOU HELP ME TO...?

In this trial, teams have to devise a method for using humanoid robotics for our cultural heritage with the aim of creating intelligent and fun applications to protect, promote and defend it.

Each team identifies an institution operating in the field of cultural and natural heritage such as museums, archaeological, historical and natural sites and collaborate with this reality to create a project to be presented during the test.

In cooperation with the partner organisation, the team have to identify the issue related to this institution, devise the solution and create the work plan. The project should include the making of an external hardware connected to the robot that allows the achievement of the goal set with the partner. In addition, teams are invited to test their prototype with the partner.

The design and implementation of the project has to be developed with great attention to engineering, design and communication aspects, but everything has to be fun and exciting.

During the test, the teams outline the problem faced and present the way in which they arrived at the proposed solution. Hardware support requirements

- \* Possibility to connect to NAO robot
- \* The hardware support must have at least one sensor. Any data-sensing object connected to the NAO robot is valid (e.g. Smartphone).

#### Demonstration

\* The activity demo must be interactive and involve the NAO and at least one team member.

### **Evaluation criteria**

- \* Presentation of the solution and the project.
- \* Innovation and feasibility of the proposed idea.
- \* Quality of the prototype.
- \* Innovation of the prototype.
- \* Software: technical choices, fluidity, stability, dialogues, interactions.
- \* Quality of the demo: design, fun, animations, accessories, originality.



## TRIAL 3 X-NAO

For this test the team designs and presents a play with the aim of telling and promoting the cultural and natural heritage selected. Of course, also the NAO participates in the play.

During the rehearsal, the team has to perform in front of the jury and the public. A team representative should present the project to the jury while the other members prepare for the show.

The total duration of the test is fifteen minutes.

#### **Evaluation criteria**:

- \* Interaction between the robot and humans.
- \* Quality of the show.
- \* Team participation.
- \* Scenery and props.



## TRIAL 4 NAO MEDIA AND COMMUNICATION

In recent years the way of communicating has changed radically thanks to the advent of new media and social networks. In this test we want to stimulate your imagination to devise a new way of communicating.

The test dedicated to communication will not take place during the semi-finals but the organizer will judge the work of the teams analysing the work done daily by the teams on social networks and evaluating the material produced.

#### What can the teams do?

- \* Create the team's Facebook page, Instagram, You-Tube channel and/or website.
- \* Contact the local press to promote the project.
- \* Publish videos and photos on social media to tell about the team's work.

## **Evaluation criteria**

- \* Quality of the messages produced
- \* Communication efficiency
- \* Diffusion and interactions created
- \* Dissemination in the local and national press, television and radio



## HOSTING

Each team that does not have the NAO robot will have the robot available for four full days a week before the semi-final.

The teams will have to find a museum or other cultural institution to work with and entrust the robot to during these days.

The organizer will pr

ovide a list of hosting centers to which the robot can be entrusted. If the team identifies a potential hosting not present in the list, they can propose it to Scuola di Robotica by 15 November 2019. The new institution will be approved only if it agrees to sign the agreement for the hosting sites and appoint a project manager. The agreement will be available at www.naochallenge.it

Teams participating in the Final will be able to use the NAO robot within the chosen museum institution for the entire period from the semi-final to the Final.

## CALENDAR

#### **Pre-registration**

by 31 August 2019

#### Registration

from 1 September to 15 October 2019

### Phase 1

Deadline for submission of applications documents for selection: 15 December 2019

The teams admitted to the semi-finals will be announced at 12:00 on 13 January 2020 on the website www.naochallenge.it

Teams admitted to the semi-finals must complete the participation fee by January 20, 2020.

## Semifinals

February - March 2020

The calendar of the semi-finals will be announced by the end of September 2019 on the website naochallenge.it.

#### Final

April - May 2020

The place and date of the final will be announced by December 2019.











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