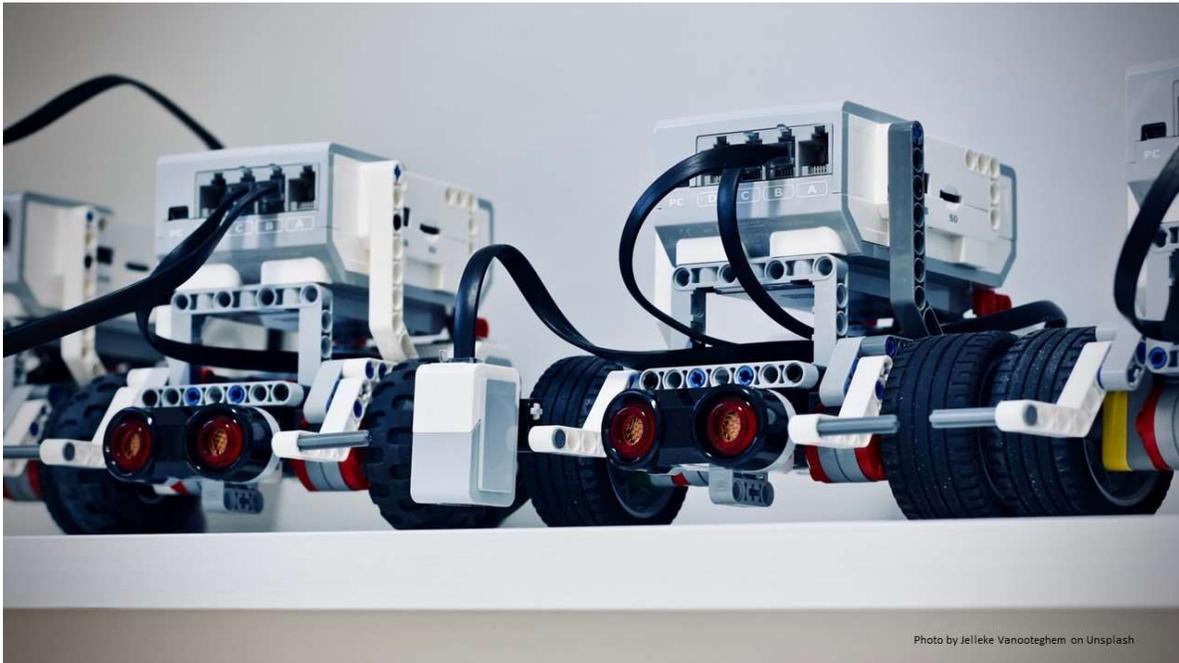


ROBOtics Learning for empowering the new GENerations of EU Innovators

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ROBOGENIUS Contest methodology

Short version

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Introduction

The contest methodology created under the Erasmus+ KA2 strategic partnership project “*Robotics Learning for empowering the new Generation of EU innovators*” is designed to provide a framework for the organisation of a robotics competition at pre-university level. The contest methodology has as a main goal to prepare learners for mechatronic national and/or international contests organised with mixed teams from secondary to tertiary education. Therefore, the contest organiser can adapt the provided framework according to his/her needs and specific objectives.

The contest is an opportunity for learners to apply the knowledge in an independent fashion while also providing a challenging and enjoyable environment. Moreover, due to the nature of the competition, the contest participants will also develop their soft skills such as communication, time management and team work.

For this contest methodology, LEGO Mindstorms/Education EV3 kits are used at the core of the design of the contest and also in the given examples. However, a contest organiser can adapt this methodology so that it can be used with other robotics kits. Moreover, the difficulty level of the challenges and/or tasks can differ depending on the background and skills of the participants in the contest and of the intended target groups.

Contest phases

This contest methodology provides a framework for a three-phase contest. However, the contest organiser is free to determine the number of phases as well as their duration, depending on his/her needs and specific objectives.

Each of the three phases of the competition should be aimed to explore different aspects of the robotics field (e.g. motion, sensing, software).

Note: This section assumes the fact that the robots are already build and provided to the competing teams. However, the contest organiser can decide to add extra phases in which the building of the robots is done by the teams, using the robotics kits.

Phase 1: Motion

The first phase aims to explore a team’s ability to move a robot according to a specific task/challenge.

Phase 2: Sensing

The second phase aims to explore a team’s ability to program the robot to perform certain actions based on various sensor signals.

Phase 3: Software

The third phase combines the use of sensors and motion in a more complex task than in the previous phases focuses more on a team’s ability to create efficient programming that can control the robot through various situations. This refers to programming concepts such as nested loops.

Guidelines

The contest is to be ranked based on a multidimensional scale that includes the dimensions the contest organiser wants to explore or assess. As an example, scoring dimensions can be related to the technical aspect of the contest (e.g. design of the robot, time required for completing a task, the efficiency of the software etc.) and also to the interpersonal skills (e.g. teamwork, communication, responsibility etc.).

Regarding the teams, it is advised to have 2 to 4 participants in each team, depending on the objectives of the contest organiser. It is important to be aware of the fact that – even though in some cases, 1 person can be enough for completing a challenge – team work and interpersonal skills should also be addressed during the organisation of the contest. Therefore, the contest organiser should encourage the splitting of roles within a team such as one member responsible with the programming, one responsible with the building of robots etc.

If the contest organiser desires to give awards, a winning team can be selected based on the cumulative scoring of the dimensions defined before the competition. Furthermore, awards can be given for the teams that scored the most for the individual dimensions (e.g. award for the team with the most efficient software, award for the best teamwork etc.). This underlines the importance of participation and acknowledges the fact that each team has its own strong points, some being better in the technical part such as software design and others in the communication area.

It is advised not to reveal the ranking of the teams involved in the contest until the end of the competition. This is based on the idea that if the scoring is visible throughout the whole duration of the competition, the teams scoring lowest may feel discouraged, reducing in this way the enjoyment of the competition. Moreover, if the scoring is visible throughout the whole duration of the competition, if a team realises that it cannot reach first place anymore, it will not focus completely on the competition task.

Another advice is that the scoring should not be done in terms numerical values but in terms of awards (e.g. gold medal, silver medal, bronze medal) for each individual scoring dimension. This means that no penalties will be given to the teams and the ranking will be determined based on the total number of awards/medals acquired at the end of the competition.



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