ROES association

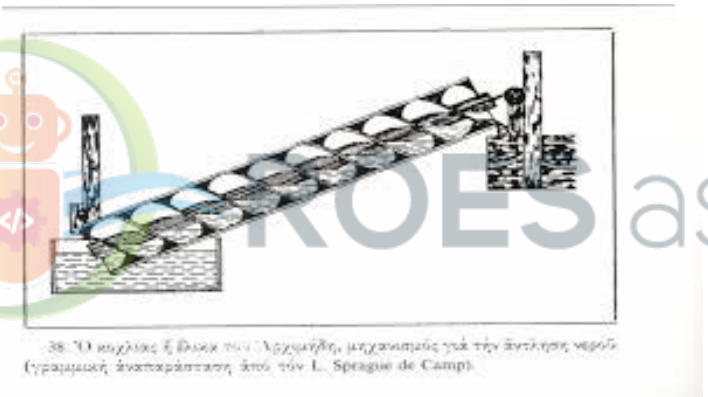
1st ROES Educational Robotics Competition 2020

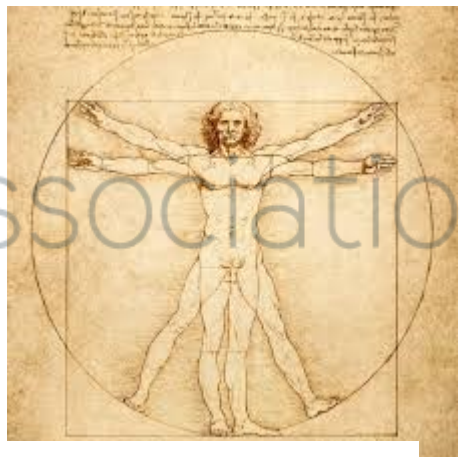
Open Elementary Category

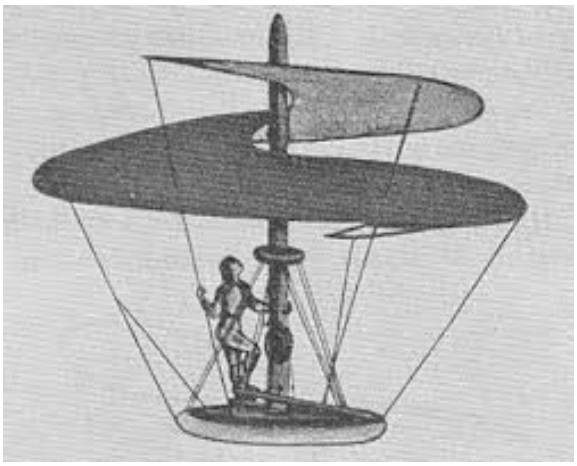
From Archimedes to DaVinci

Regulations and Score

First Edition (May 2020)







Edited by: Anastasios Ladias- Apostolos Ambariotis

Description

Archimedes. The mathematician, philosopher, physicist and engineer Archimedes was one of the greatest geniuses known to mankind. Archimedes (3rd century BC) the greatest scientist of all time except for the treatises he bequeathed to ancient world culture in the fields of Mathematics and Geometry, Physics and Astronomy, Engineering and Hydraulics, Architecture and Shipbuilding, etc. invented a number of inventions, some of which are still in use. Others of these, cause surprise and admiration, while there are some that have been attributed to him by the later "honor" or belong to the field of legend and imagination. The hydraulic screw, the Roman scale, the famous percussion hydraulic clock, the astronomical planetarium, the mighty winch, the construction of the giant «Syracuse» and the terrible siege engines are just some of his incredible achievements. Archimedes is said to have made the following suggestion on the lever: **"Give me a place to stand and I will move even the entire Earth."**

Leonardo di Sir Piero da Vinci (15 April 1452 — May 2, 1519) more common as Leonardo da Vinci or simply Leonardo, he was an Italian renaissance polymath and the fields that interested him included invention, painting, sculpture, architecture, science, music, mathematics, engineering, literature, anatomy, geology, astronomy, botany, writing, history, and cartography. He was often called the father of paleontology, tracing and architecture. He is widely considered one of the best painters of all time.

One of da Vinci's water-related obsessions, again, was the invention of water-moving mechanisms used to transport water: we have plans of water-pumping machines from underground sources or through buildings. But these machines are the product of an effect from Archimedes' famous screw. Some of da Vinci's ideas are the Flying Machine, The Bike, Scuba Diving, Parachute, Calculator, War Machine, Armored Tank, Car, Parabolic Compasses, Folding Bridge.

Although Leonardo da Vinci was, in fact, a pacifist, like all the engineers of his time, he was forced to use his infinite ingenuity in the field of martial engineering and architecture. So he designed machines like the Giant Crossbow, The Catapult, Chariot, Sickle Tank, Cannon of Three Cannon, Multi-Cannon.

Leonardo Da Vinci spent thirty whole years of his life studying and observing birds. It was and is clear from his subsequent action, that one of the greatest goals of his life was to realize one of the most ambitious thoughts of man, the universal desire of flight, which is illustrated by a large number of his designs and inventions around this topic such as Parachute, Flying Boat and Glider, The Helicopter (Aerial Screw)

The theme of this year's Open Category challenge for elementary school students of the 1st ROES Educational Robotics Competition is **"From Archimedes to DaVinci".**

The pupils who will compete will have to present a project with automation, which will relate to the theme of the competition **"From Archimedes to DaVinci".**

Source: https://el.wikipedia.org

Participants

- Ages: 3rd - 6th grade (up to 12 years old)
- Individuals per group: 3-6 children

Ideas - Suggestions

Taking the inventions from Archimedes to Da Vinci as a source of inspiration, "tease" them, changing either the form of energy they use to function or the way they are controlled (from mechanical automation to programmable).

Evolve the inventions and create your own "prototype machine" that fits into a broader functional theme, integrating technologies of our time. Start become the inventor of the 21st century.

Regulations

- The LEGO WeDo robotic kit (1.0 or 2.0) will be used for the construction.
- Only Scratch (any version) will be used as software.
- The use of other materials (in addition to LEGO) is only allowed for the project scene.
- There must be at least two automations in the project. Automation is the process by which a real-world stimulus is perceived by a sensor*, the program, after being informed by the sensor, processes the data and gives a command that changes the status of the **actuator****.
- The types of sensors that are allowed to be used are the tilt, distance sensors and the computer microphone.
- ** The types of actuators that are allowed to be used are the motors, the computer speakers.
- Up to two PCs can be used in the project.
- During the presentation in the competition, the constructions (their robotic part) can be prefabricated and pre-assembled.
- In the competition during the execution of one of the automations, a reproduction of automation implemented by simulation - animation in the scratch environment must be presented on the computer screen. The code (in Scratch) of automation and simulation must be presented using a poster (painting, collage or a digital image) that will be displayed with a projector (detailed instructions will follow) ➢ Each group can have from three to six students.
- The coach must be at least 20 years old.
- Projects that are not relevant to the subject of the competition will not be evaluated.

WeDo-related clarifications

- The sensors are connected to the computer via a hub (WeDo) and USB connection (except for the audio sensor which is the computer's microphone).
- In case a group does not have **two hubs,** the first sensor can be placed in the hub to display the first automation and then they can remove the first sensor and install the second sensor to show the second automation.
- All parts of the construction that contain automations or mechanical parts moving with motors must be made with LEGO elements. The rest of the construction parts can be made with any other material (such as foil, paper, etc.)
- The We Do 2.0 in the MAC environment works normally. In windows environment it works normally with Offline Scratch 2.0 with the following prerequisites: https://education.lego.com/en-us/support/wedo-2/system-requirements

AUTOMATION EXAMPLES

1. I have the escalator on the subway that rolls depending on whether passengers are passing or not, and I assume that the passengers are detected by a weight sensor.

i. If the weight sensor is simply activated by the weight of the person (or a dog or a suitcase) THEN this is automation

ii. If the weight sensor is a button that the passenger has to press with the foot (handling) THEN this is NOT automation (it does not work with the dog or the suitcase).

2. I have a drone and a tilt sensor

i. The sensor is on a drone (a quadcopter) and takes values depending on the inclination of the quadcopter, transmits them to the computer and it fluctuates the intensity in each engine to balance: THEN this is automation.

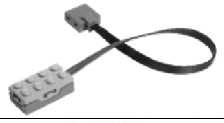
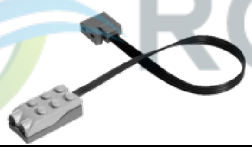
ii. I demonstrate the previous one without throwing the drone but holding the drone by hand and giving it inclinations to simulate the flight, THEN this is automation.

iii. I use the sensor as a joystick to (tele) operate the drone THEN this is NOT automation.

Contest materials

The motors and sensors of the competition that are allowed are LEGO only. It is not allowed to convert other materials so that they work with WeDo.

Permitted materials, sensors and motors:

	**708882** PowerFunctions XL Motor
	**709584** LEGOWeDo Slope Sensor
	**708881** PowerFunctionsBatteryBox
	**708871** PowerFunctionsExtensionWire 20 ”
	**708886** PowerFunctions 8 Extension Cable
	**709583** LEGOWeDo Motion Sensor
	**709670** E-Motor
	**709581** LEGOWeDo USB Hub
	**708870** PowerFunctionsLight
	**708883** PowerFunctions M-Motor

The following WeDo 2.0 materials are also allowed:

	**745301** Smarthub 2 - WeDo 2 Interface With PC Or Tablet
	**745303** Medium Motor LEGO® Education WeDo 2.0
	**745305** Climate Sensor BlaGO® Education WeDo 2.0
	**745304** LEGO® EducationWeDo 2.0 Movement Sensor
	**745302** LEGO® Education WeDo 2.0 Add-On Power Pack

Technical specifications

- ✓ In the competition, each group will be given a space of approximately 1.5m x 1.5m and should fit all the parts of the project in it.
- ✓ There will be a back stand about 2m high ✓ In this space there will be a table of size about 100cm x 60cm and electricity will be available. The mock-up of the project should not exceed the dimensions of the table.

Required deliverables

At least 7 days before participating in the Competition of their country, the teams will have to post on the ROES website, the portfolio described below. Steps for posting the portfolio:

1. The teams will create a dropbox account that belongs to them and there they will post the portfolio described below.
2. The link leading to the team's dropbox will be shared with ROES. Specifically, the teams will edit their original registration form and fill in the "Required deliverables" field with the link to their dropbox.
3. Groups can find and edit the registration form at any time

Contents required portfolio:

1. Documents with the consent of the parents for the use of their photos, or videos showing their faces (special printable forms to be posted on the ROES website)
2. A word document where the program will be pasted in scratch (or the link that leads to the program in scratch will be given), a small description of the project will be made and the problem that it solves will be explained.
3. Clear photos showing the stages of construction, and in particular the construction of the mechanisms (Zip file)
4. At least 1 video where students will show and describe the operation of the construction, with emphasis on automation (ideally, zoom-in to make the automation visible) in operation. Size should not exceed 100MB
5. The "**file**" should be available either in electronic form (pdf, jpg, png, xls) or in a digital photo if it is in printed form. (collage)
6. Compressed ZIP file containing presentation, diagrams or any other project-related material

❖ For the above you will create separate folders 1 to 6 in the dropbox of the group where you will upload the files (not compressed all together).

In addition to the above deliverables, which will be posted on the ROES website, at the day of the competition and during the presentation to the judges they must be given a single-page or twopage printed presentation with the main features of the project and a photo in A4 with the poster depicts the code.

Tender Process

During the (National or International Final) competition, teams must:

- Install their project in the space that will be allocated to them (including poster placement, visual code representation, etc.).
- Get tested for compliance with regulations.
- Demonstrate and present the project to the judges and answer their questions
- Demonstrate and present the project to the public

During the presentation to the judges, they should be given a one-page or two-page printed presentation with the main features of the project and a photo in A4 with the poster depicting the code. (3 to 4 copies)

Evaluation

There will be limited time for each project to be judged by each group - indicatively **seven minutes**, one part of which (e.g. five minutes) will be for presentation by the group and the rest of the time for questions from the judges.

- Students will present the project they have created and will report how it relates to the theme of the competition.
- There will be a demonstration of the operation of the project, with emphasis on the presentation of automation.
- Scratch software will be presented via analog or digital poster, with reference to the automation interface and control, as well as virtual representation with automation animation.
- Students will choose one of the automations and display it in the Scratch virtual environment.
- Students will answer to possible questions from the judges related to the project

During the evaluation, any kind of help from the coaches to the teams is not allowed.

Evaluation process

Details of the procedure to be followed during the evaluation will be described in the Final post on the site: www.roes-association.org

Evaluation Criteria

CATEGORIES #	CRITERIA	DEGREES
Project Concept	**TOTAL DEGREES: 30**	
	1 Creativity, Research and Idea Development	15
	2 Construction and Quality solution of the challenge	15
Educational Robotics / Automation	**TOTAL DEGREES: 50**	
	1 Mechanical Manufacturing, Aesthetics	20
	2 Mechanical Performance, Automation Operation	30
Scratch program	**TOTAL DEGREES: 40**	
	1 **Codevision- Visual Code Representation**	40
Virtual world	**TOTAL DEGREES: 40**	
	1 Software Accuracy, Software Complexity and Automation	20
	2 Representation of automation with animation, Interface, Aesthetics	20
Presentation	**TOTAL DEGREES: 40**	
	1 Presentation Evaluation, Communication Skills and Collaboration	30
	2 Decoration, Videos, Posters	10
Maximum Points: 200		