



Robotics in School

STEM4inclusive schools
WP2 – Toolbox

Paderborn University



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Structure of the activity

A Introduction

about robotics in Schools

hint/ link to learning outcome matrix
name of the topic, hint to worksheets,
intergration of video link

B Training phase

about the training

Small group work to the topic
hint / link to H5P tasks

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A: About the topic

Robotics in Schools

Which robot is better? A battle for the crown in the classroom

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Robotics in Schools

“Robotics and a variety of developed tools have led to both a more efficient use of robotics for different subjects and application to a broader range of ages of pupils” (KUBILINSKIENE ET AL. 2017, p. 61)

Based on the authors' findings, robots are an excellent topic for teaching. Robots offer many opportunities, particularly in the subjects of maths, science education, technology and for developing general skills.

For example, robots can be used in a supportive way, but especially in a STEM context as a lesson outcome. (cf. Kubilinskiene et al. 2017, p. 67)

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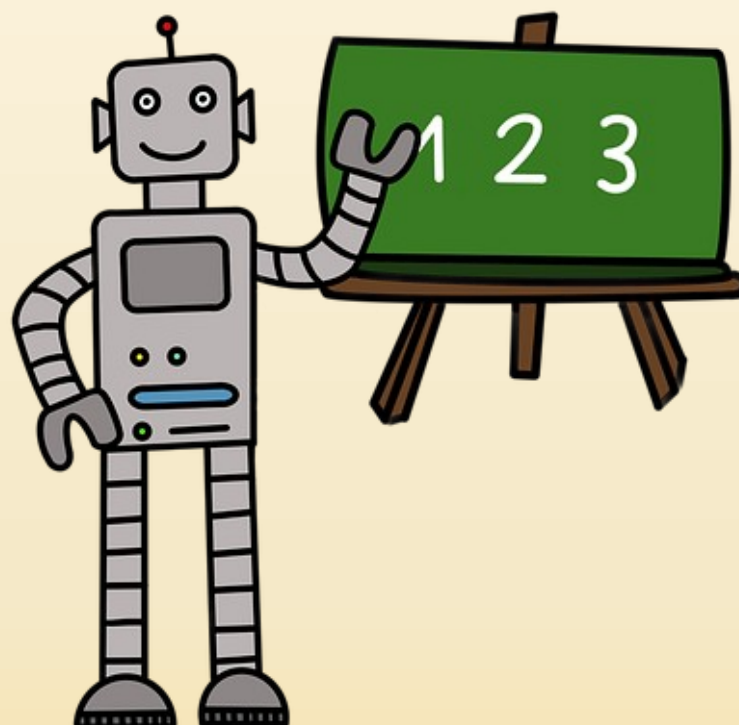
KUBILINSKIENE, Svetlana / ZILINSKIENE, Inga / DAGIENE, Valentina / SINKEVICIUS, Vytenis (2017): Applying Robotics in School Education: a Systematic Review. Baltic J. Modern Computing, Vol. 5 (2017), No. 1, 50-69 <http://dx.doi.org/10.22364/bjmc.2017.5.1.04>



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How do robots work and what advantages do they offer?



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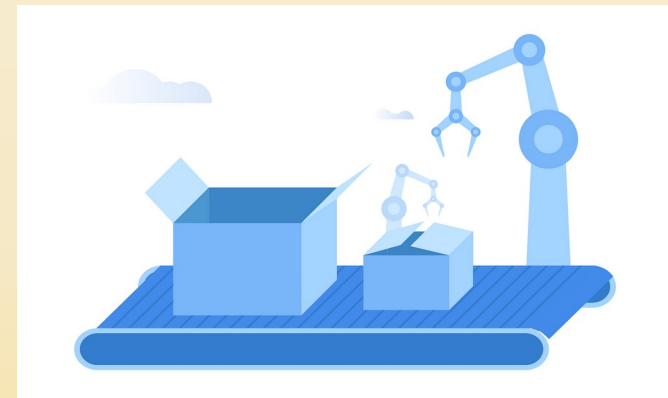
What types of robots exist

- Industrial robots
- Service robots
- Care robots
- Research robots
- Medical robots

Nice to Know:

A robot does not always have to be orientated towards a human / living being. Robots that do this are also called humanoid robots.

Robots often look more like gripper arms, small vehicles or similar.



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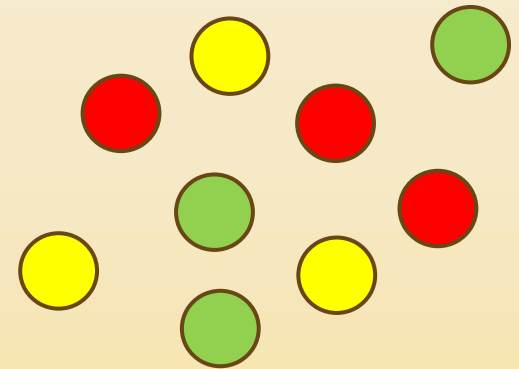




Inclusive STEM education

- Lessons adapted to the needs and starting points of the respective pupils
- Tied to the interests of the students (independent selection of topics)
- Computer support
- Fine motor support

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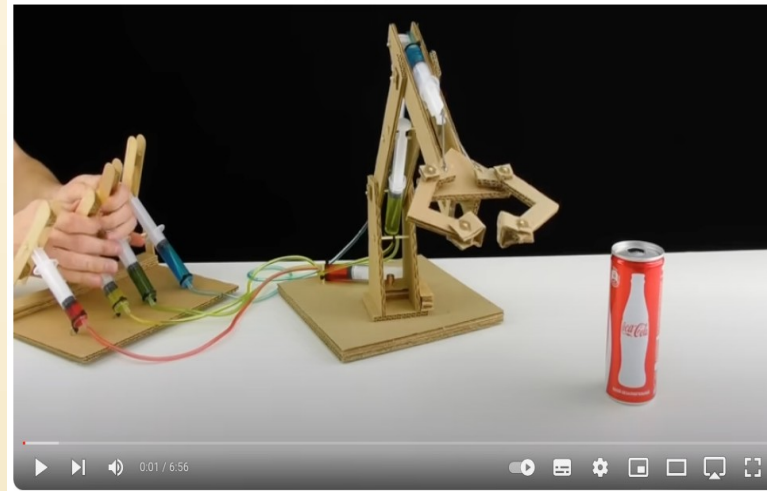


Robotics in School



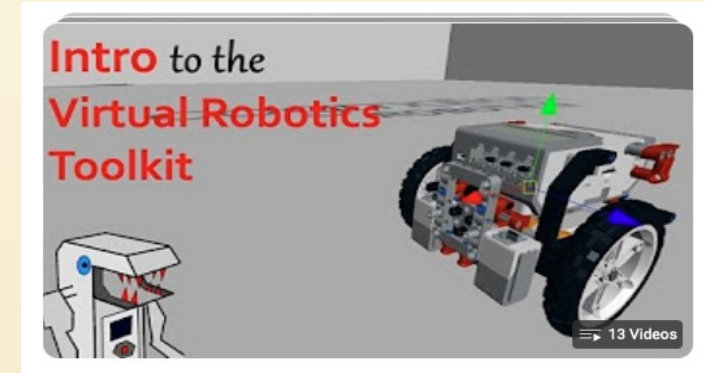
<https://www.youtube.com/watch?v=WLu2Eols0BI>

Beginner



<https://www.youtube.com/watch?v=P2r9U4wkjcc>

Difficult /
Challenging



https://www.youtube.com/watch?v=Hoed6Fu77vs&list=PLqTmtNjaVpovvImKFTsM7r1qp_gVmJ65H

Expert Level



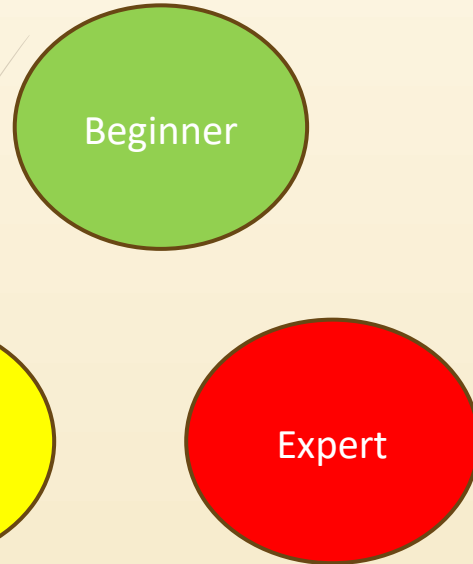
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Station work



- The students are allowed to choose a station in individual or partner work.
- The stations are organised into three different levels of difficulty.
- The students can decide for themselves which level of difficulty they choose to ensure inclusion
- A competition with the following criteria is organised for each station: Design, performance and technical know-how

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Beginner

Task:

Design, build, and program a robot to compete in a local or national robotics competition.

Tiny speed car



<https://www.youtube.com/watch?v=WLu2Eols0BI>

Activities:

- Plan and design the robot according to competition rules.
- Build and program the robot, testing and refining its performance.
- Compete in the robotics competition, analyzing performance and iterating on design

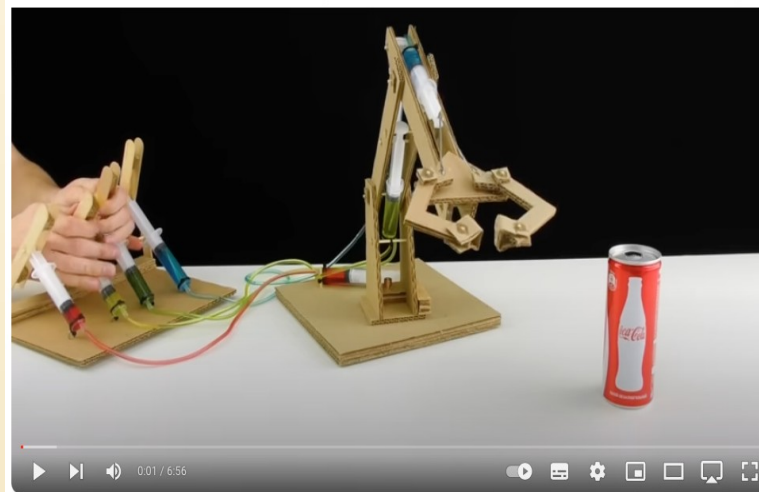




Hydraulic Robotarm

Task:

Design, build, and program a robot to compete in a local or national robotics competition.



<https://www.youtube.com/watch?v=P2r9U4wkjcc>

Activities:

- Plan and design the robot according to competition rules.
- Build and program the robot, testing and refining its performance.
- Compete in the robotics competition, analyzing performance and iterating on design





Expert Level

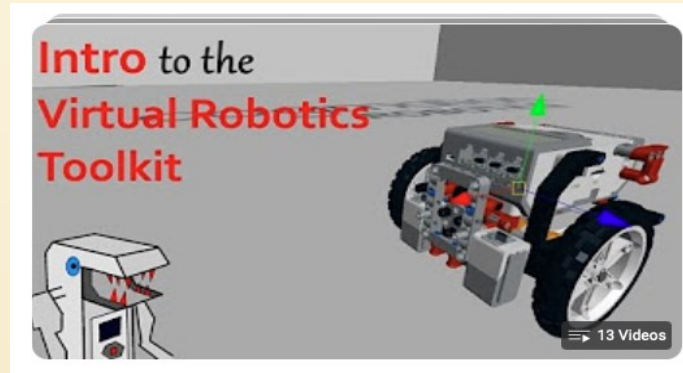
Task:

Design, build, and program a robot to compete in a local or national robotics competition.

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Virtual Robotics Toolkit



https://www.youtube.com/watch?v=Hoed6Fu77vs&list=PLqTmtNjaVpovvImKFTsM7r1qp_gVmj65H

Activities:

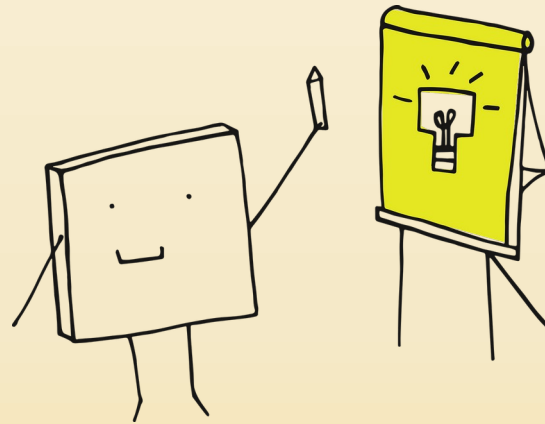
- Plan and design the robot according to competition rules.
- Build and program the robot, testing and refining its performance.
- Compete in the robotics competition, analyzing performance and iterating on design



B: About the training



Training phase



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Task 1:

- Decide on a station alone or in pairs. The stations are divided into beginner, difficult and expert.
- Follow the instructions at the station and create the best possible version of your prototype
- You have 2 hours to create it.
- Prepare to present your prototype to a competition jury



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H5P- Tasks:

Robots always look like people or animals.

- True
- False (X)

The following factors are important when creating a hydraulic robot arm

- substructure
- Choice of colour of the hydraulic fluid (X)
- Correct amount of fluid (X)
- Precise gripper arm (X)





H5P- Tasks:

The Virtual Robotics Toolkit offers the following advantages

- Design without material costs (X)
- Deepening of fine motor skills
- Creates material awareness
- Promotes out-of-the-box thinking (X)

The following factors are important when creating a Tiny Speed Car

- at least 3 tyres (X)
- light triangular construction (X)
- choice of colours
- Choice of product (heavy materials rather than plastic or wood)





Congratulation!

You mastered the activity on Robotics in School!

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