



EASE EuropeAn network of
steam Educators



LESSON PLAN

Mariapia Borghesan
from **Italy**

mariapia.borghesan@gmail.com

TITLE:

Mini-robot powered by magnetic forces

GRADE LEVEL: 3RD, 4TH AND 5TH GRADE

STEAM AREAS: SCIENCE, TECHNOLOGY,
ENGINEERING

MATERIALS NEEDED:

- Carboard;
- Cardboard boxes or paper tube or something similar;
- Glue, hot glue, adhesive tape;
- Foil (aluminum film);
- Wooden sticks;
- Straws;
- 4 plastic caps (or a compact disk);
- Scissors;
- Iron or copper wire;
- Permanent marker.

OBJECTIVES:

- Students will be able to make a small cardboard mini-robot following instruction;
- Students will observe how magnetic forces can move objects;
- Students will be able to solve issues related to the construction of the mini- robot and its movement.

PROCEDURE:

This is the step by step procedure to build a mini cardboard robot which can move using magnetic forces.

Step 1: gathering the materials. (15 minutes)

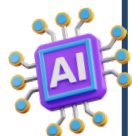
You need carboard and cardboard boxes or paper tube or something similar, glue, hot glue, adhesive tape, aluminum film, wooden stick, straws, 4 plastic caps (or a compact disk) scissors, iron or copper wire, adhesive plastic eyes, permanent marker.

Step 2: building robot body (15 minutes)

Join two small cardboard boxes to form the body and the head of the robot. You can use glue or hot glue (with supervision of an adult) or scotch tape to fix them. If you have not small cardboard boxes you can cut cardboard pieces to build them or use a cardboard tube or something similar.

Step 3 : decorating the body (15 minutes)

Cover the body of the robot with glue and later add aluminun film. Add eyes, mouth and antennae. You can use adhesive plastic eyes or alternatively you can draw them with a permanent marker. For the antennae you can use a small piece of iron or copper wire, a piece of straw, a wooden stick or whatever works for you. You can add other decorations as desired such as nose, clothes, hair etc .



PROCEDURE:

Step 4 : adding arms (10 minutes)

Build 2 arms using pieces of wooden stick and cover them with aluminum film. Then add the arms to the body using hot glue or adhesive tape. You can also use cardboard to create arms.

Step 5 : preparing the wheels (15 minutes)

Make a hole in the center of the plastic caps and insert a wooden stick in two of them (the length of the stick should be a little larger than the size of the robot's body). Fix the stick to the plastic cap with hot glue.

Step 6: completing the moving mechanism (15 minutes)

Cut two pieces of straw (the length should be a little smaller than the wooden sticks) and attach them to the bottom part of the robot's body (you can use hot glue to make it stick better). Insert the wooden sticks inside the two straws, add the other two wheels and secure the stick to the plastic cap with hot glue. Check if the wheels move, if not, try to fix the problem.

Step 7: adding magnets (5 minutes)

Attach a magnet to the back, to the lower part of the mini- robot's body. Add another small magnet to a wooden stick. It is important to find the right orientation of the two magnets so that they repel each other causing the movement of the mini- robot.

Step 8: moving the mini-robot (5 or more minutes)

Using the stick with the magnet try to make the mini-robot move. The mini-robot move faster on a plane surface.

Youngest students instead of wheels can use a CD attached to the bottom part of the mini-robot and the mini robot will still be able to move on a fairly smooth surface. This is easier to build than the moving mechanism with plastic caps, straws and wooden stick.

Conclusion and Reflection (10 minutes)

Discuss the success of the mini-robot construction and encourage students to reflect on their experience. Emphasize the importance of following instructions, troubleshooting, and persistence in problem-solving.

Note: The time duration provided are approximate and can be adjusted based on the pace and needs of the students.

ASSESSMENT:

- After building their mini-robot the students will describe the entire construction process, the problems encountered and the way they solved them;
- They also have to tell what they have learned about magnetic forces.

REFERENCES:

- <https://doodleandstitch.com/kids-crafts/tin-foil-robot-craft>
- <https://sparrowinnovations.com/portfolio/valentines-robot-box/>
- <https://pin.it/4jWxZir9K>