DNA AND PERIODIC TABLE WITH MBOT

STEMJAM Teaching Guide

Developing make spaces to promote creativity around STEM in schools

Acronym: STEMJAM
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DNA AND PERIODIC TABLE WITH MBOT

ABSTRACT

In this project, we tried to describe the nucleotide matching in the DNA helical structure and the grouping of the periodic table using the colour sensor. Genetic disorders can arise if the nucleotide matches in the DNA helical structure are wrong. We have also examined the factors that may cause genetic defect when designing this project.

DIDACTIC OBJECTIVES

- Students know what the DNA and the Periodic Table are and what theirfunction.
- To know the DNA helical matching.
- To know periodic table groups, grouping purposes.
- To know the colors recognized by the color sensor and the working principle of the sensor.
- To know how to design products for 3D printer. (We used the Thinkercad program).
- Knowing how to print from 3D printer.

STEM Subject: Science☒ Technology ☐ Engineering☐ Mathematics☐

Education Level: 12-14 years☒ 14-16 years☐

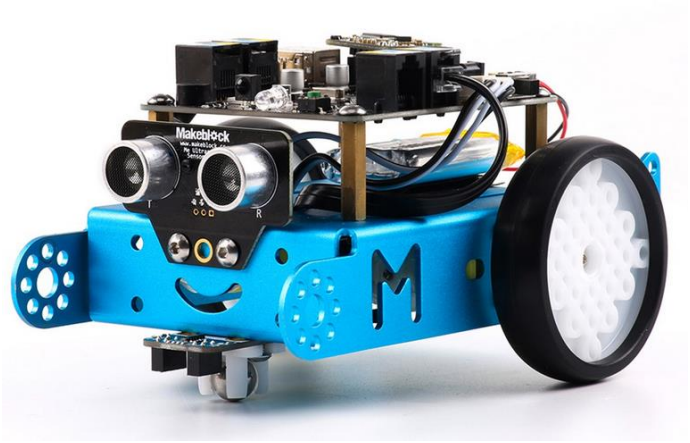
PROBLEM STATEMENT

Learning periodic table based on memorization and insufficiency of permanence.

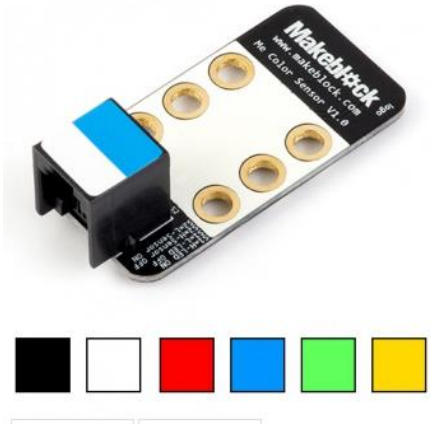
Difficult learning of nucleotide matches in DNA helical Structure.

BOM (Bill of Materials Needed)

- mBot => Ref. 90054



- Me **Colour Sensor**:

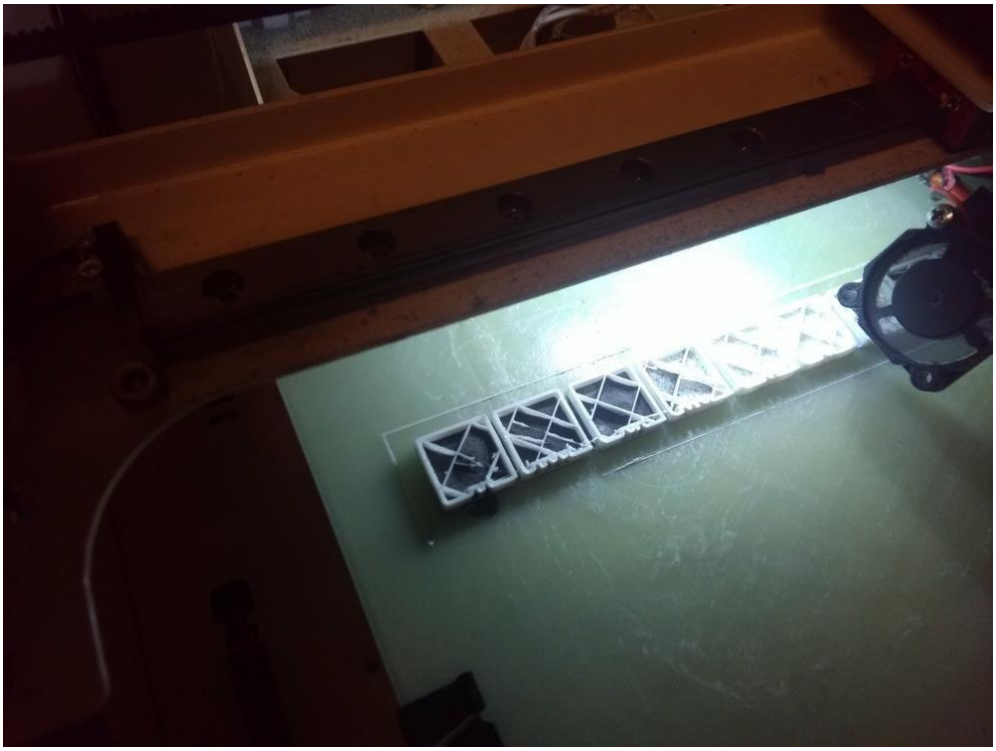


- Thinkercad or Sketch up programs.
- Spray or acrylicpaint.
- Some cardboards and papers, globe.
- Some cutter materials.
- Magnet.

ACTIVITY DESCRIPTION

Step 1: We design DNA nucleotides and periodic table elements on a computer in a 3D program.

Step 2: We print them from the printer. We put iron dust while it is printing.



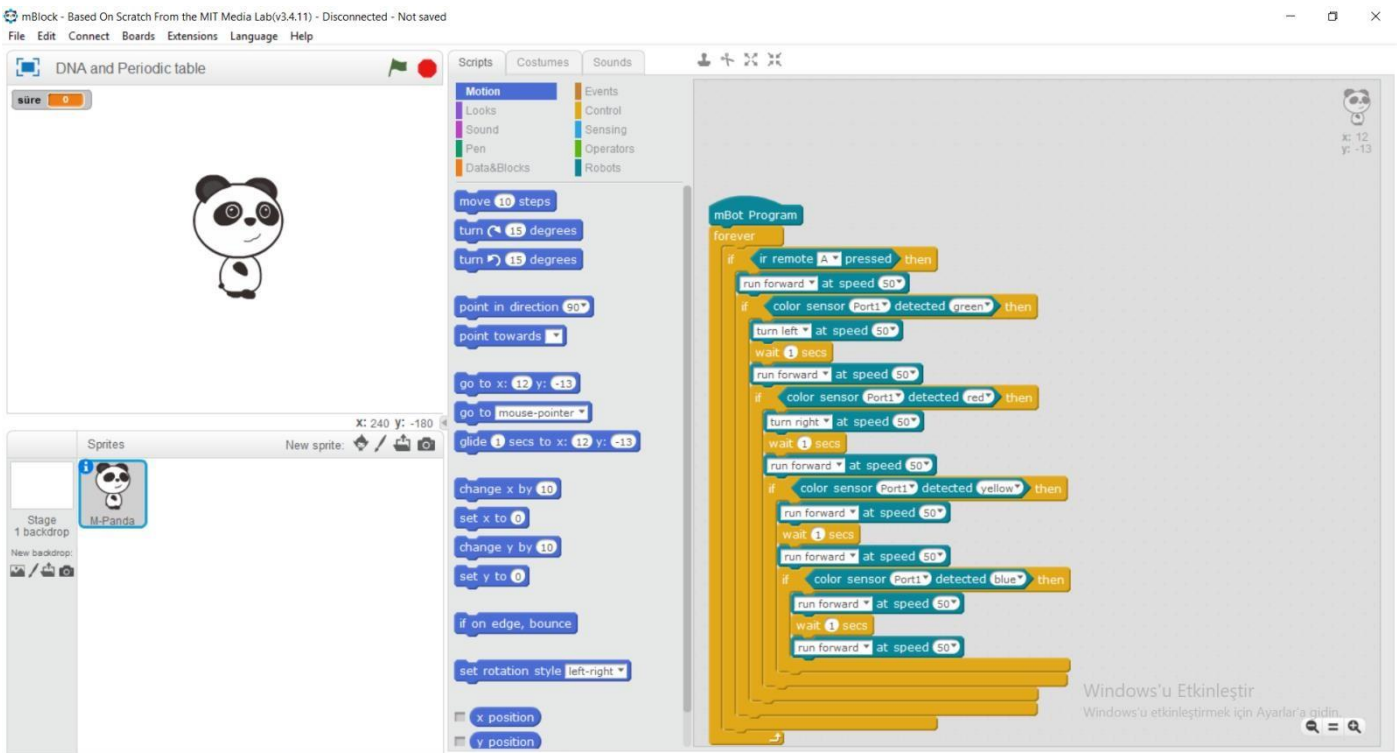
Step 3: We color output.

Step 4: We design the periodic table.

Step 5: We make our cardboard blocks where the DNA nucleotide names are written.

Step 6: We're preparing the platform.

Step 7: mBlock codes (For DNA)



Usage: There are right and left carton blocks on the platforms we have prepared. We also put magnets in these cardboard blocks. We also make a mBot forearm with a plastic insert we removed from the 3d printer. There will be nucleotides in different colors on this arm. We place the color sensor in place of the ultrasonic sensor. We place green, blue, yellow and red cardboard flags on the road, so as not to close the path.

Example: When you press A, mBot moves forward. The color sensor sees the green cardboard on the road. The color sensor turns to the left and sets itself in its cardboard block. mBot is pulled by the nucleotide magnet located in front of it and containing iron dust, and mBot places other nucleotides in its place in the same way.

The color sensor is connected to the line monitoring device of the mBot. It carries the elements according to colour groups.

STUDENT'S EVALUATION

Project students who are in the 6th grade have learned by having fun. Through this study, students are aware of the concept of inheritance. Students will understand the causes and consequences of gene disruption caused by misplacement in the helix of DNA.