cMinds

Education and Culture DG

Lifelong Learning Programme

Collaborative Tasks for Students

Let's work together with programming concepts

30/09/2011

ACTIVITY 1: Commanders and Interpreters

Brief Description:

Students are divided into two groups: the commanders and the interpreters. The commanders address orders to the robot; the interpreters predict the behavior of the robot after the address of each command. Only the commanders know the scenario.

Possible scenarios:

'Make the robot move by the right end of the landscape jumping over the obstacle'.

'Make the robot approach the apple tree, pick up an apple and place it into the basket. The robot has to jump over the obstacle'.

'Make the robot approach the apple tree. If the apple is ripe the robot grabs it; otherwise it does nothing'.

'Make the robot approach the apple tree and grab an apple. Given the type of the apple the robot has to carry out specific actions: (a) if the apple has worms the robot does nothing (b) if the apple is not ripe (in other words it is too young) again performs no activity (c) if the apple is ripe the robot grabs the apple'.

'Make the robot approach the apple tree. The robot uses its antennas to tell whether an apple is ripe. As long as the robot identifies a ripe apple, it grabs it and places it in the basket'.

Execution of the game:

The group of the commanders addresses the commands so that to regulate the behavior of the robot according to the given script. Each commander addresses one order at the time. After the placement of the order the interpreters discuss and type down in a paper card their prediction (what will be the outcome of the given command). At the end the execution of the script takes place…

Did the commanders do a good job? Does the robot operates in accordance to the given scenario?

Did the interpreters do a good job? Did they identify the results of the commands? Did they interpret commanders' job with success.

Points:

If the robot operates in accordance to the given scenario and the interpreters interpreted the actions with success, each group takes one star .

If the robot does not operate in accordance to the give scenario and the interpreters interpreted the actions with success, only interpreters take one star.

If the robot operates in accordance to the given scenario and the interpreters interpreted the actions wrongly, no star is given to the interpreters.

If the robot does not operate in accordance to the given scenario and the interpreters interpreted the actions wrongly, no star is given to both groups.

General info:

Roles: commanders, interpreters

Desired number of students in each group: 3 to 4

Material: paper cards, pencils

Points are made of paper by the teacher

Teacher acts as an **advisor** and **tester** and tries to encourage the dialogue among the members of each group.

ACTIVITY 2: The poster makers

Students are divided into groups. The role of each group is to make a poster where the actions that robot can undertake are explained. Students first draw the actions. Then, in simple words the students explain each graphical action.

This activity includes more than one level. In level 2, students are moved to create a poster for the graphical tests. In level 3, students are call to show how the simple if operates. In level 4, the students explain and present how the if-then-else construct operates.

Level 5 focuses on the 'switch' construct whereas level 6 focuses on the 'while'. Students are encouraged to provide examples and to express themselves in words and drawings.

The posters are delivered in the other groups and are tested for mistakes. The teacher acts as a facilitator.

General info:

Stages: brainstorming , drawing, writing, composing, sharing, reflecting, editing, designing.

Material: pencils, crayons, paper

This material can be digitalized and published online.

ACTIVITY 3: Playing roles

Students are divided in groups; each group consists of 6 students, who collaboratively represent how a script is executed after its composition. For this game you need: 1 decorator, 1 dispatcher, 1 processor, 1 carrier and 2 programmers.

The decorator is responsible for setting the scenery. This is taking place randomly.

The dispatcher is responsible for carrying out actions and asking questions.

The processors' duties is to carry out tests and mathematical operations.

The carrier's duties is to transfer the queries from the dispatcher to the processor as well as to transfer the results from the processor to the dispatcher.

There is a scenario that the dispatcher has to execute. This scenario is written by the two programmers.

After the composition of the script, the decorator sets up the scenery. The scenery consists of a rock, a basket, a robot and an apple tree. The decorator has to set the location of each object as well as to place apples (ripe, young and bad) on the tree.

The script is presented to the dispatcher, the processor and carrier, who have to synchronize their actions in accordance to the script.

There are cards and signals available for the dispatcher to use:

Card 1: is the apple ripe?

Card 2: is the apple young?

Card 3: is the apple bad?

Card 4: has the tree apples?

Card 5: is a rock ahead?

Signal 1: 'carrier come here'

Signal 2: 'I am waiting for the carrier'

The cards can be used for raising queries. The signals are used for calling the carrier. The carrier can transfer the card/query to the processor, who given the location of the dispatcher and the scenery can address a positive or a negative answer ('yes' or 'no').

There are cards available for the processor to use:

Card 1: YES

Card 2: NO

Card 3: Problem with this operation (in case a problem with the cards occurs).

While the processor is working on the result the carrier holds a card that says : 'I am wait-ing for the processor'.

Signal 1: I am waiting for the processor

Let's put the game into order...

First, the teacher gives the scenario to the two programmers. The programmers collaboratively compose the script. They are encouraged by the teacher to think aloud. The com-position of the scenario can take place in the computer or in a thick paper with paper– data cards for tests, code and actions.

The script then becomes known to the dispatcher, carrier, processor and decorator. The decorator sets the scenery. The dispatcher operates in accordance of the script. If there is need for an operation (i.e the test of a condition), the carrier is called to transfer the query to the processor. Then the dispatcher does nothing holding the card that says 'I am waiting for the carrier '

The carrier delivers the card with the query to the processor. While the carrier waits for the result, he/she holds the card that says 'I am waiting for the processor'. Once the result is ready, the processor delivers it (in the form of a card) to the carrier, who delivers it to the dispatcher. The dispatcher throws the 'waiting card' away and does the next action. The game goes on in this way…

Possible scenarios:

Scenario 1:

Make the robot move to the right end of the landscape. The robot can not move if there is an obstacle ahead.

Scenario 2:

Make the robot approach the apple tree and pick up an apple. Take into account that the robot cannot walk if a rock is ahead.

Scenario 3:

Make the robot approach the apple tree. The robot can use its antennas and can tell whether the apple (above its head) is ripe. The robot picks up an apple only if the apple is ripe.

Scenario 4:

Make the robot approach the apple tree. Using its antennas the robot can tell if an apple is ripe or not.

If the apple is ripe the robot grabs the apple

if it is not ripe the robot does nothing leaving the apple on the tree.

Scenario 5:

Make the robot approach the apple tree and grab an apple. Given the type of the apple the robot has to carry out specific actions:

- if the apple has worms the robot does nothing

- if the apple is not ripe (in other words it is too young) again performs no activity

- if the apple is ripe the robot grabs the apple.

Scenario 6:

Make the robot approach the apple tree. The robot uses its antennas to tell whether an apple is ripe.

As long as the robot identifies a ripe apple, it grabs it and places it in the basket.

Role of the teacher:

The teacher organizes the game and acts as a facilitator and observer.

General info:

For this game we need: ripe, young, bad apples, a tree, a basket and a rock/obstacle. Teacher can help students create these objects and think in innovative ways of producing this scenery.

Material that you may need: crayons, pencils, scissors, glue, thick paper. Paper clip.

ACTIVITY 4: Explain and take

All the actions, tests and codes that are supported by the cMinds tutorial area are graphically presented in paper cards. In an advanced level small scale scripts can also depicted in the paper – cards.

These cards are placed up side down on the floor. The students only see the paper side, not the graphical depiction.

Students are divided in 4 groups. Each member of the group picks a card and has to address an explanation of the depicted action, test, code. If the explanation is correct the group gets the card and one point. If the explanation is incorrect the card is left on the floor again. The group with the more points wins.

The teacher acts as observer. Interestingly, teacher is given the opportunity to identify students' difficulties and to gain their learning history.

Teacher can set his/her rules in the game if he/she thinks that the new rules help students' learning.

For example:

If the explanation is wrong the other members of the group can intervene to help the member address the correct answer. They have limited time though and they have to explain very careful.

If the explanation is correct the group of the students can pick a second card.

When a group wins, it can create new cards for the next race. The cards can present small scripts, like this one:

The teacher can raise questions if he/she feels that an explanation is not 100% clear.

Material needed: pencils, crayons, thick paper.

The teacher is encouraged either to prepare these cards for students or to work with the kids towards their creation.

The graphical icons from the demonstrator can be also printed out and used.

Activity 5: Bringing the gap (computer- based)

The teacher presents to the students an initial and a final state. Students are encouraged to address the appropriate block of commands in order to reach the final state. Teacher can address questions to students in order to encourage reflection. i.e

What do you think we can do first?

What do you think we can do next?

What we have achieved so far?

What are you trying to do?

What does this command actually do?

Why did you change your mind? (in case the student changes his/her initial idea)

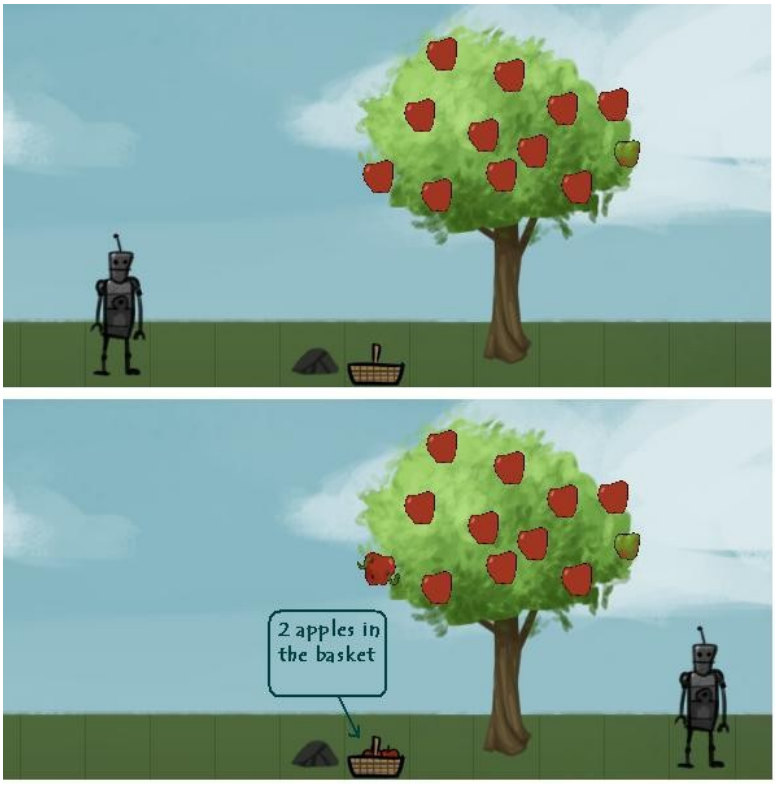
In your opinion what does cause trouble?

What about using this command? (a hint towards the correct solution)

Can we achieve the same result in a more elegant way?

Can you tell us how you manage to reach the final state?

Example of initial and final state (with hints when necessary):



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.