

Restaurant

Deadline: 16.5.2021

Points: 25

Material requirements: PC or Laptop (no Tablet) with Browser (no Safari)



Topic description

Robots are often used for simple and repetitive tasks so that we humans can concentrate on more exciting and demanding activities. For example, robots are used in the library in Helsinki to move checked-out books back to the shelves. In this task, your robot will be asked to help out in a restaurant and bring food from the kitchen to the tables.

We wish you a lot of fun with this and the following tasks!

Task description

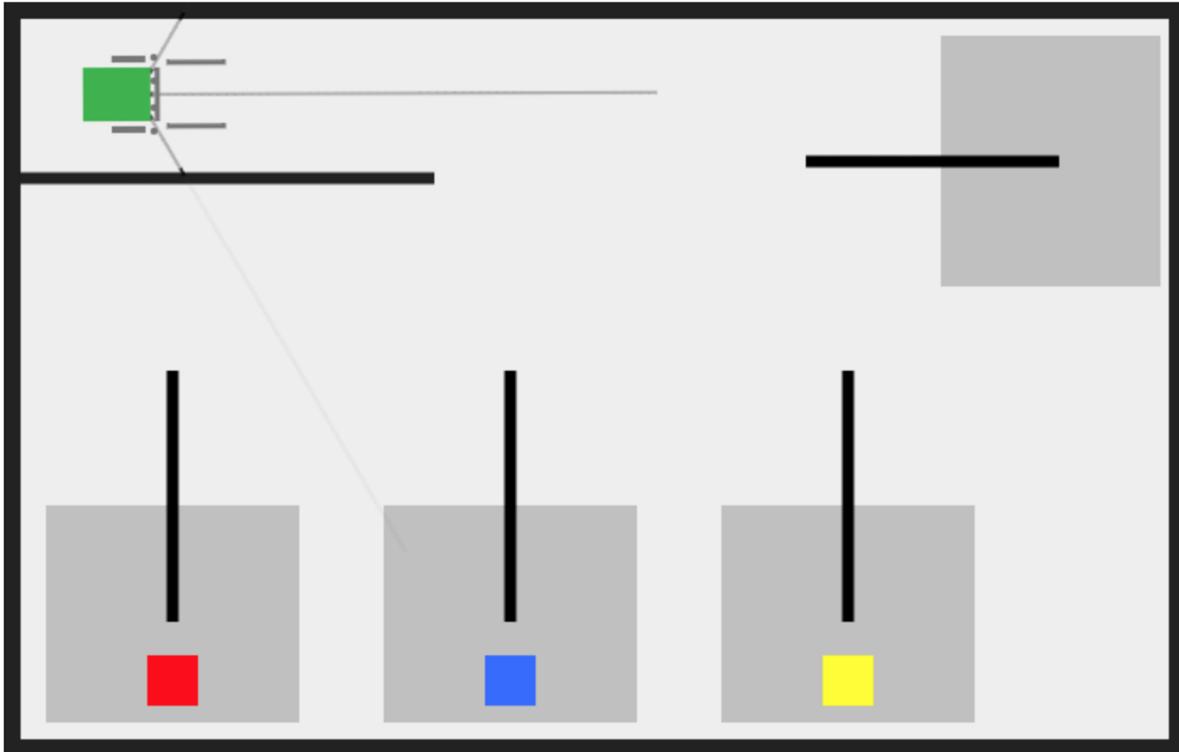
Visit our online simulation environment again (ide.pria.at) and create a new project with the "Restaurant HighSchool" task as a base. Open your project and the simulation task should look like this.

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The gray area at the top right is the kitchen pickup station. There are a total of three dishes to be served, and each dish should be taken to the correct table. To do this, the color of the table must match the color of the food. Your robot should now bring the dishes that appear in random order at the pick-up station from the kitchen to the corresponding table. The task is complete when all three dishes have been brought to the correct table.

Touch sensor

With the touch sensor (the gray rod on the front of the robot between the gripper arms; when the sensor touches, the yellow/orange lights up) you can detect when your robot bumps into something. This can be useful, for example, to detect when the robot has placed the food between the arms of the gripper. The touch sensor is a digital sensor and is connected to port 8. It can be read out with the following block in the category "Sensors":



Color sensor

In order to recognize which dish it is, there is a special sensor that outputs the color of the last dish touched. Attention: In order for this sensor to respond, the robot must actually have



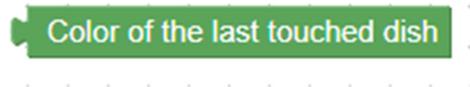
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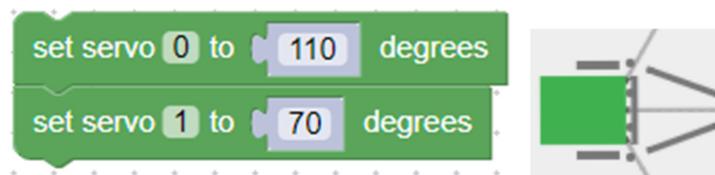
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touched the dish with the front touch sensor (the gray bar on the front of the robot; when the sensor touches, the yellow/orange lights up). You can find this sensor in the "Custom" category:



Gripper

The robot has a grappling arm mounted at the front, which can be controlled with two servos. Servo 0 moves the left arm, servo 1 the right. The position of the servo is specified in degrees, where the neutral position that the gripper has at the beginning corresponds to 90 degrees. If you decrease the position, the servo arm moves counterclockwise, if you increase it, it moves clockwise. Here is an example of how to close the gripper and what the robot will look like:



The blocks for controlling the servos can be found under "Servos".

Line sensor

For better orientation in the restaurant, there are black lines at each table as well as at the pickup station, which you can recognize with your robot using analog sensors.

The block with which you can read the values of the sensors can be found in the category "Sensors" -> "value of analog sensor". The line sensors are numbered from left to right starting with 0, i.e. with the sensor ports 0 to 3.



A high sensor value indicates a line, a low value means that there is no line under the sensor. With the block "Text" -> "print text ...", you can print the current sensor value in the console.





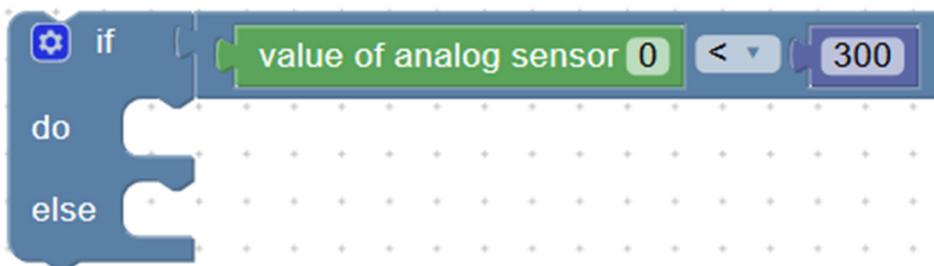
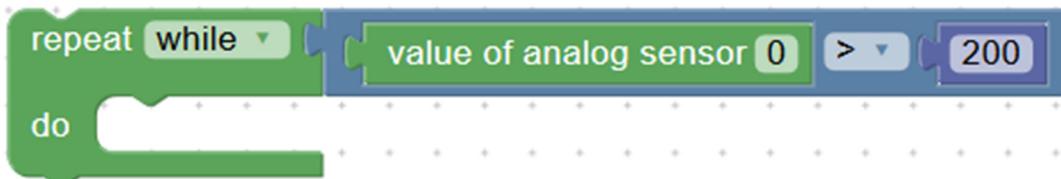
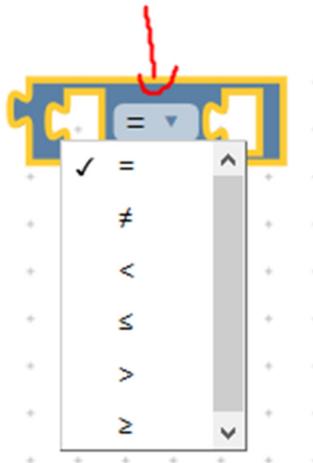
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With the comparison block under "Logic" you can define threshold values for the sensors. The result of the comparison block is a so-called truth value (true or false), which can be used as input for loop conditions. The type of comparison can be set in the comparison block, e.g. equal (=), greater than (>), less than (<), greater than or equal to (>=), less than or equal to (<=), unequal (!=)



When you have successfully completed the task, please submit a screen video of a successful attempt and your Blockly program file.

Tips:

- If your robot does not drive straight after turns, align yourself with the walls of the simulation environment every now and then by driving the robot against a wall, after which the robot should stand straight again.

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- Use functions and variables to keep the program organized. Useful functions can be e.g.: 90° rotation, drive straight line, open and close gripper arm.

Evaluation criteria

- Robot successfully brings dishes to the right tables
- Program quality
- Screen video and Blockly program file submitted
- Jury evaluation: The jury evaluates the quality and creativity of the submission.