




Omniwheels with track and gesture sensor



All 4 Omniwheels and the gesture sensor (colour recognition and gesture control), as well as the track sensor, are used in this model.

Actuators, sensors, and technical accessories installed in the model.

Mini Motor	Gears	Gesture sensor	Omniwheel	IR track sensor
				

An explanation of the components is provided on the introductory page.

The “Omniwheels with track and gesture sensor” model is divided into 4 programming tasks.

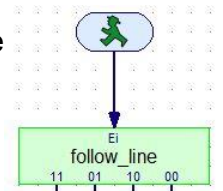
Task 1 Omniwheels_track_gesture_sensor_1.rpp	<u>Programming level 3</u> The model drives along the black line on the obstacle course.
Task 2 Omniwheels_track_gesture_sensor_2.rpp	<u>Programming level 3</u> The model should first search for the black line, and then follow it as in task 1. When it leaves the line, the model should search out the black guiding line again.
Task 3 Omniwheels_track_gesture_sensor_3.rpp	<u>Programming level 3</u> The model should be moved using gesture control. To do so, it must evaluate hand motions.
Task 4 Omniwheels_track_gesture_sensor_4.rpp	<u>Programming level 3</u> The model follows the black line as in the previous task. When it hits a colour field, the colour is identified and it triggers an action, e.g. blue – park.

Task 1

You are already familiar with the first task from the “Advanced 2-wheel robot” model. The only difference is that you are now working with four motors.

Before you start programming, also start the program “**Advanced_2-wheeled_robot_2.rpp**” so you can access the subroutine created and used there.

You can use the subroutine “follow_line” directly, since the function is the same for the new model as well.

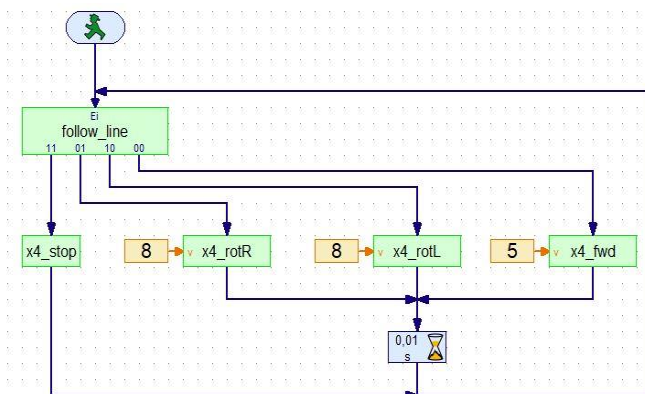


Begin with the program start, then insert the subroutine.

In addition, you will also need the following subroutines from the program “Omniwheels_Base_Model_2.rpp”

x4_stop	x4_rotR	x4_rotL	x4_fwd
---------	---------	---------	--------

You must ensure that all 4 motors are always addressed at the same time in the subroutine. Set the motor speed to full power, “8”.



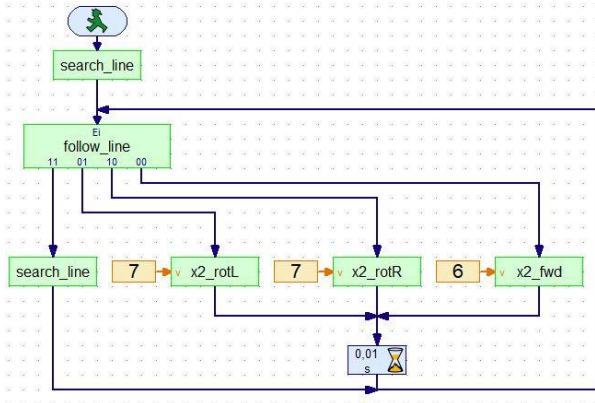
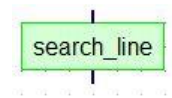
Add in the subroutines accordingly, and save the program under the name

“Omniwheels_track_gesture_sensor_1.rpp”

on your computer. Then, test the program. If everything works, you can program the 2nd task.

Task 2

The solution for this task is an extension of the first programming task. You must insert the subroutine “search_line” into the program from the program “Advanced_2-wheeled_robot_2.rpp”.



When this is complete, the task is solved.

Test out the program and save it under the name

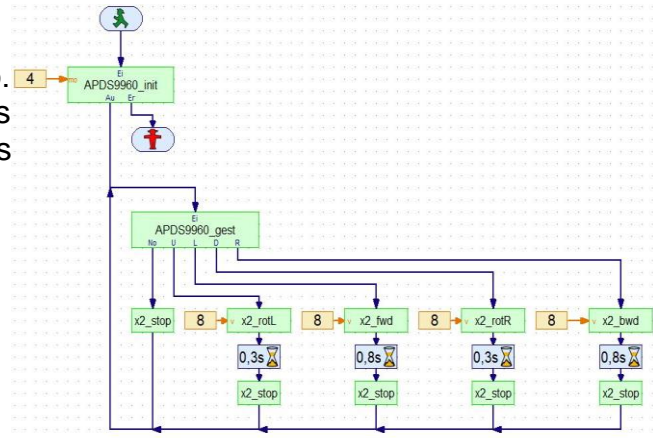
“Omniwheels_track_gesture_sensor_2.rpp”

on your computer.

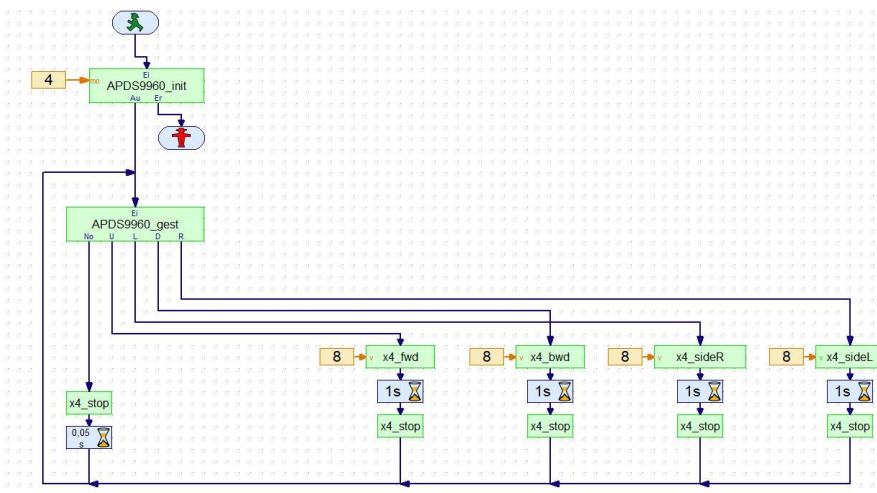
Task 3

Then, complete the 3rd task. In this task, you will control your model using the gesture control you are already familiar with.

You can use the program “Ball_robot_3.rpp” to do so. Call up the program and change the travel commands to 4 motors. Of course, you can use the subroutines you have already written in the previous task.



Altogether, this will result in the following program.



Test out the program and save it under the name

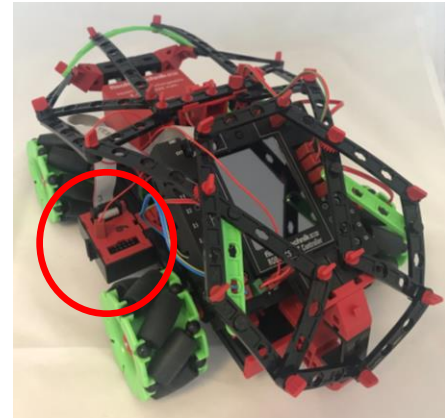
“Omniwheels_track_gesture_sensor_3.rpp”

on your computer.

Task 4

Now, you have reached the final task.

Important note: For the gesture sensor to detect the coloured surfaces, you must insert it into the side between the wheels with the opening facing down. It is important to mount the gesture sensor on the correct side. If you are looking at the model from the front, directly at the TXT Controller, you must attach the sensor on the left side (see figure).



The model will drive again along the black line of the obstacle course. It is best to place it on the track between the blue and yellow areas (direction: driving towards the blue area).

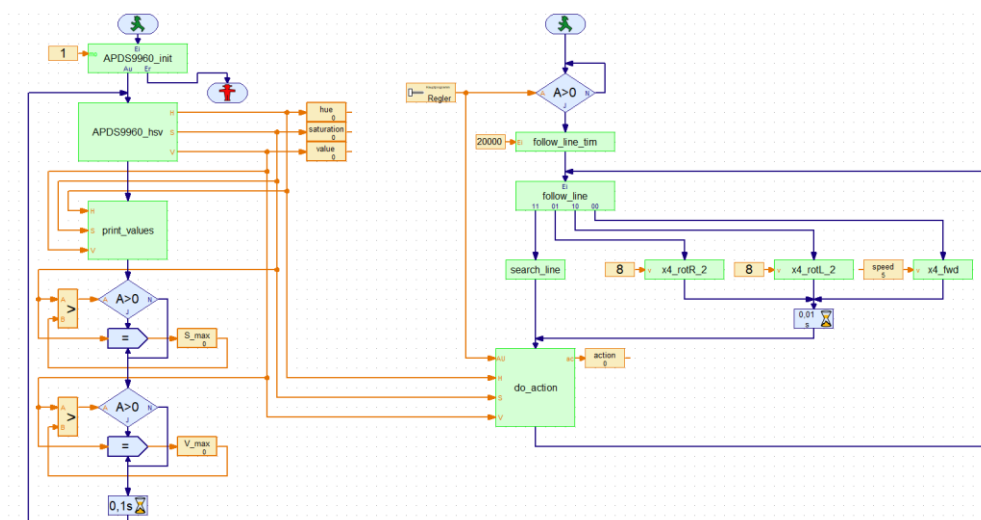
What happens when it reaches a coloured surface?

- When it reaches “yellow”, it will stop and wait.
- When it reaches “green”, it will accelerate.
- When it reaches “red”, it will move slowly.
- When it reaches “blue”, the parking function is called up

From the program library in the ROBO Pro folder, load the program

“Omniwheels_track_gesture_sensor_4.rpp”

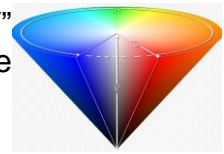
on your computer. The overall program will look as follows. You are probably already familiar with some parts of the program.



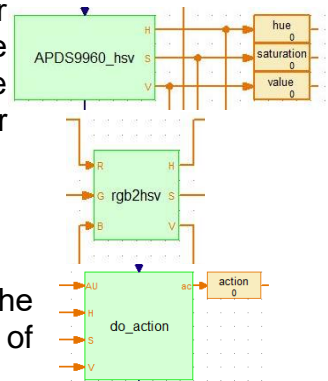
The right part of the program to the sub-menu “do_action” is controlling along the black line. This part of the program is started with its own program start command, and runs in an endless loop.

Next, look at the left part of the program. It starts with initialising the gesture sensor (mode 1).

After the command block, insert the subroutine "APDS9960_hsv". "HSV" stands for HSV colour space. To learn more about this, just check out the Wikipedia page "https://en.wikipedia.org/wiki/HSL_and_HSV".

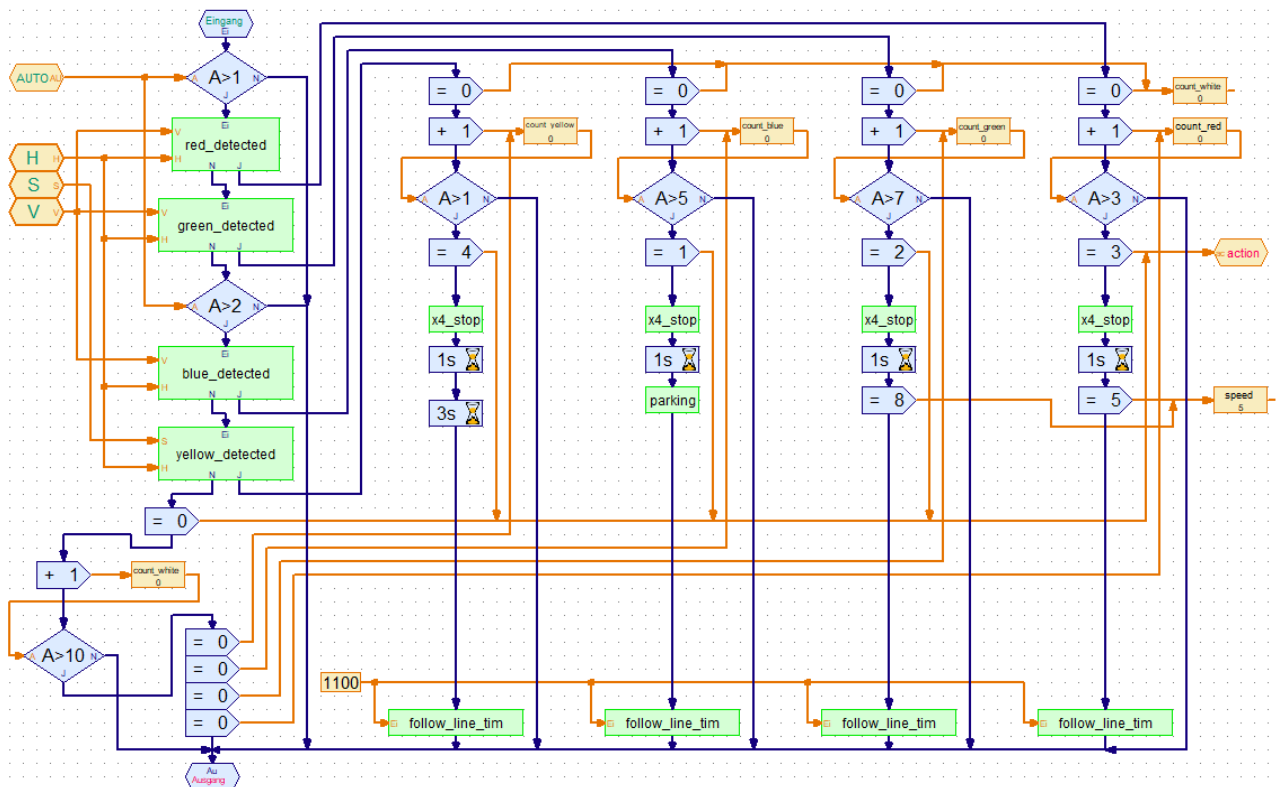


The program block uses mathematical functions to convert the read in RGB values "APDS9960_rgb" delivered by the gesture sensor and transfer these to the subroutine "rgb2hsv", which calculates the precise colour display. At the same time, the values are also in the variables "hue", "saturation" and "value". These are required for representation on the TXT display.



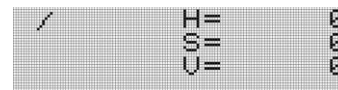
The subroutine "do_action" ensures that an action is executed after the colour is detected. This part of the program shows you the content of "do_action".

First, the individual identified colour values are queried in the subroutines, then if they match the relevant command sequence is executed. Then the program continues with "follow_line".

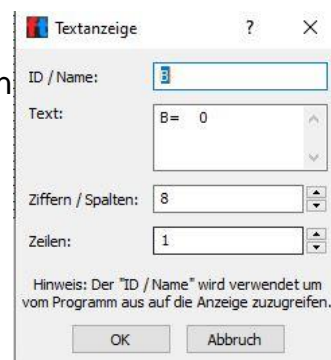


The following is an explanation of the subroutine “print_values”. It is used to display the calculated values for “hue”, “saturation” and “value” on the display of the TXT Controller.

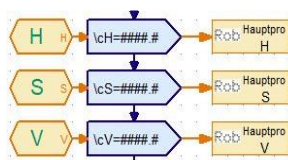
In the main program, switch to the “TXT/TX Display” tab. The following screen is displayed there. The four displays are each “Displays” from the “TX Controller Display” element group



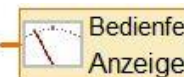
The elements are dragged to the empty screen. The content can be changed using the dialogue field (right mouse button).



The program shows how the values get to the display. First, they are assigned to a text field (“Element group” – “Program elements” – “Commands”).



Insert the command “Control panel display” from the “Inputs, outputs” element group at the orange output.



Select “TXT/TX Display” in the dialogue field. The defined entries will appear, and can be selected accordingly.



These briefly describe the most important parts of the program or subroutine.

Now, test out the program and save it under the name

“Omniwheels_track_gesture_sensor_4.rpp”

on your computer.