Flipping an object with two robots

Technical instructions

NIRYO

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Upload and launch the program on the Arduino board

Once the program is written you can upload it to your Arduino board. To do so, you first need to tell to your Arduino environment on which type of board you will upload the program. Click on Tools, then Board and search for the right board "Arduino/Genuino Mega or Mega 2560". Then you need to specify on which Port your board is connected. Click on Tool, then on Port, and click on the one where there is the name of the board – for example, COM3 (Arduino/Genuino Mega or Mega 2560). You can finally click on the upload button (the one with arrow).

Launch the program on the Niyro Studio

When the program is upload on its board, you need to launch and upload programs on Niryo Studio and on the robot.

Launch Niryo Studio, connect to the robot, click on this icon then click on the two arrows icon to upload your code, searche for the right program and upload it. Then click on the green arrow to start the program on the robot.

Basic explanation of the programs

Arduino

We define all the pins, for the two robots, for the leds, and for the push button. Then we enter into the setup() function.

setup()

We define all the pins as Input or Output, and we then execute the initialiseRobot1() and initialiseRobot2() functions.

initialiseRobot1()

This function puts all the robot 1 pins at state Low.

initialiseRobot2()

This function puts all the robot 2 pins at state Low.

Once all setup done, we enter the loop() function.

loop()

We make the two leds blink once. Then we wait until the push button is pressed. When it is, we enter the move1() function.

move1()

We first look at the state of pins 1C for each robot, we execute the rest of the program only if both 1C pins are at state Low. These pins stand for the state of the robots, if they are Lox, it means that the robots are not doing anything and so they are ready to receive commands.

We begin by turn on the led corresponding to robot 1, and we make sure that the led corresponding to robot 2 is turned off. We then put the pin 1A of robot 1 at state High, so that the robot does its first move. We then wait until it is finished. To know that, we look at the state of pin 1C and wait for it to be High. When it is, the robot 1 has finished its first move. We then put back the state of pin 1A to state Low, to stop sending the command.

Then it is time for the robot 2 to move. For that, we turn on the corresponding led and turn off the one corresponding to robot 1. Then we put the pin 1A of the robot 2 to state High, so that the robot 2 does its move. We wait until it has finished, as the first robot, we wait for the pin 1C state to be High. Then we put back the pin 1A to state High, to stop sending the command.

We then execute the second part of the robot 1 move, we first turn on the right led and we put the state of pin 1B to state High, we wait for the robot 1 to finish its move, the same way as before, and put back the state of pin 1B to Low.

Finally, we execute the second and last part of the robot 2 move by turning on the robot 2 led, putting the state of pin 1B to High. We wait for the end of the move and put back the pin 1B to state Low.

When all the moves are done, we go back to the starting point of the loop and wait until the push button is pressed again.

Robots

Robot 1

We first define the robot pins as Input (pin 1A and pin 1B) or Output (pin 1C), then we move to the starting position, and we enter the loop.

We put the pin 1C of the robot at state Low, this define if the robot is doing something or not. Then, we check the state of pins 1A and 1B.

If the state of pin 1A is High and the state of pin 1B is Low, we execute the first part of the move, we move to the object, we open the gripper, we take the object, we move the half way to the second robot and put the pin 1C to state High to know that the move is finished.

If the state of pin 1A is Low and the state of pin 1B is High, we execute the second part of the move. We open the gripper, we wait a little, we move to the starting position and put the state of pin 1C to state High to know that the move is finished.

Robot 2

The structure of the program for the second robot is quite the same as the one for the first robot.

We first define the robot pins as Input (pin 1A and pin 1B) or Output (pin 1C), then we move to the starting position, and we enter the loop.

We put the pin 1C of the robot at state Low, this define if the robot is doing something or not. Then, we check the state of pins 1A and 1B.

If the state of pin 1A is High and the state of pin 1B is Low, we execute the first part of the move, we move to the object, we open the gripper, we take the object and put the pin 1C to state High to know that the move is finished.

If the state of pin 1A is Low and the state of pin 1B is High, we execute the second part of the move. We flip the object, put it in front of the second robot, we go back to the starting position and put the state of pin 1C to state High to know that the move is finished.