

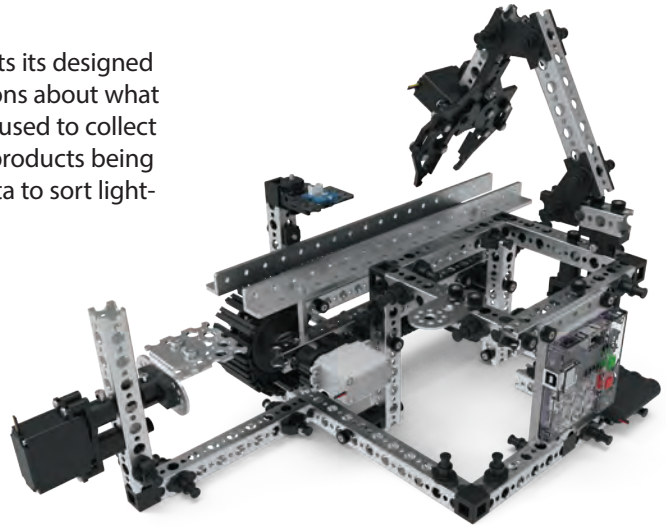
Activity 5 – Check It Out

Overview

Quality control is the process of determining if the product meets its designed specifications. Manufacturing robots often need to make decisions about what processes to apply to a product to maintain quality. Sensors are used to collect data that help the robot position, inspect, modify, and sort the products being made. In this activity, you create a separator that uses sensor data to sort light- and dark-colored blocks.

Materials Needed

- TETRIX PRIME building system
- TETRIX MAX pieces
- Assembled system
- Engineering logbooks
- Wood blocks
- Black tape
- “Check It Out” student page



Vocabulary

- function
- Line Finder Sensor
- reflected light

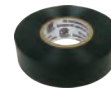
Procedure

Days 1-3

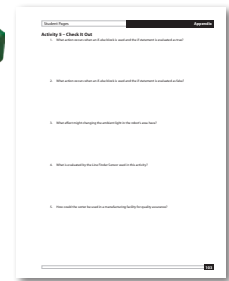
1. Get into your teams.
2. Review the activity vocabulary.
3. Follow the assembly instructions located in this student guide to build the sorting system.
 - You will be using pieces from the PRIME building system as well as pieces from the MAX building system.
 - You will build onto the existing pick-and-place assembly.
4. After you have completed your assembly, connect the wires to the PULSE controller. Plug the wire from the Line Finder Sensor into DC Motor Port 2 and the wire from the servo on the separator into Servo Port 3 on the PULSE controller. You will need to use the Servo Extension Cable (39081) to plug the sorter servo into PULSE.
5. Place strips of black tape on some of the wood blocks.



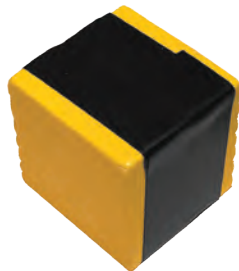
Wood blocks



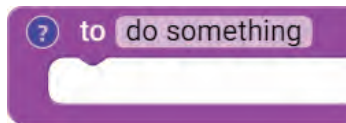
Black tape



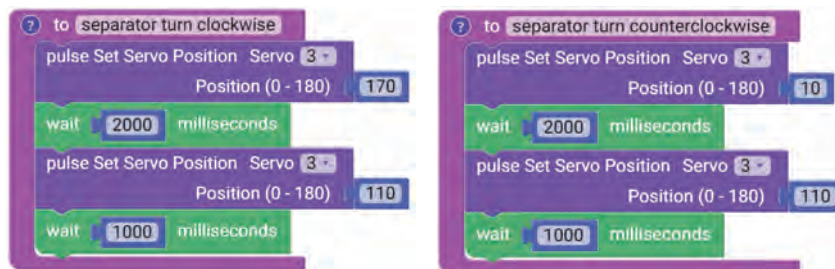
“Check It Out” student page



6. Open the *TETRIX Ardublockly* software. You will program the robotic arm to move the separator piece to force objects into different paths.
 - Program 1: Create a program to move the separator clockwise, pause, and then return to the neutral position.
 - Program 2: Create a program to move the separator counterclockwise, pause, and then return to the neutral position.
 - Program 3: Create a program using functions that show the clockwise and counterclockwise movement of the separator continuing forever.
 - Program 4: Use your functions for the separator to create a program with the Line Finder Sensor that detects whether an object has a dark or light surface and separates it accordingly. Don't forget to program actions of the conveyor belt movement as well.
 - Make sure the conveyor belt pauses long enough for the sensor to read the block.
7. Create your programs following these tips:
 - In the Arduino palettes, you can use functions to place a series of steps under one function block and name it. When you have a large program within multiple tasks, writing a function for each task makes programming easier.

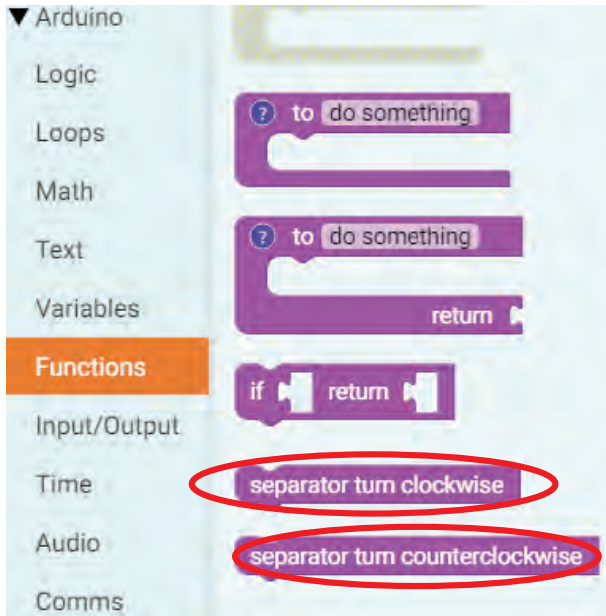


- Use this function block to create two new functions for your programs showing the clockwise and counterclockwise movement of the separator.

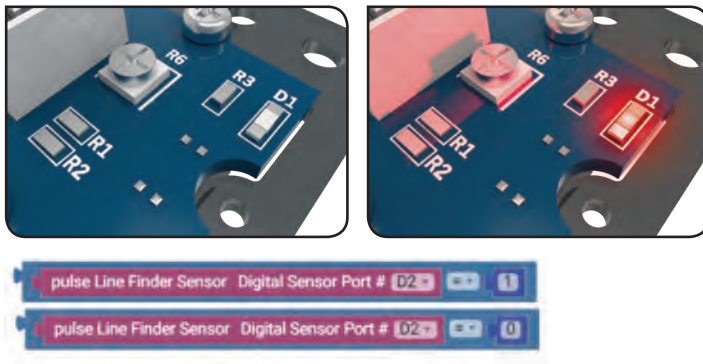


Activity 5 – Check It Out

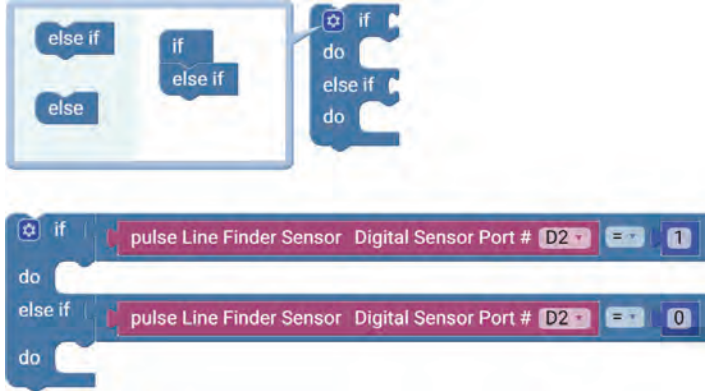
- When you create a new function, a new function block is created in the Functions palette. Use this block to call your function from the main loop section of your program.



- The comparison block to use with the Line Finder Sensor is under the Logic palette. The Line Finder Sensor can read a value of 1 (dark surface) or 0 (light surface). You will see a red LED light up on the sensor when it detects a light surface.



- When using the Line Finder Sensor, you will use an if-do block located under the Logic palette. Specifically, you will need the if-do/else if-do block.
 - You can change the block from the standard if-do block by clicking the blue gear and dragging over the else if block.



8. Connect the PULSE controller to your computer using the USB cable. Make sure the controller is turned on.
9. Click the Upload Sketch to the Arduino button to load your program on the PULSE controller.
10. When you see a green LED, you can unplug the cable from the controller.
11. Test and rewrite your program if necessary to successfully complete each programming task.
12. Complete the “Check It Out” student page.
13. You will use the same assembly for the challenge. Ask your teacher whether you should store your assembly or take it apart.

Extension Activities

- Program the robotic arm to pick up and move the wood block to the conveyor belt before executing Program 4.
- Change the behavior and speed of the conveyor belt and its movement to the separator.