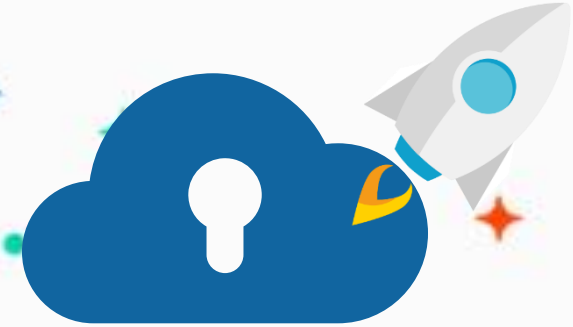

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Lesson12. Keeping Distance

LECTURER:

Lesson Objective

Learning Objectives

1. Learn about the collision avoidance robot.

2. Learn about the use of laser range sensors in collision avoidance.

Possible Difficulties

1.Making different anti-collision strategies based on self-made blocks.

2.How to use self-made blocks.



Background Information



Context Import



When an accident occurs in a mine, it is often difficult to search and rescue. This is because it is difficult to enter and exit the mine, and ambulance personnel cannot enter the dangerous area. Therefore, people have invented disaster relief robots specially used for complex terrain. They have strong mobility and flexibility, ensuring Bots respond quickly.

Context Import



The more functional a robot is, the more sophisticated it is internally, meaning they can malfunction due to frequent collisions. The researchers took this into account and developed an anti-collision function for the robot.

Context Import



The anti-collision function is very necessary because of the fine construction of modern robot mechanics that does not allow frequent collisions.

In fact, the anti-collision function is an offshoot of the obstacle avoidance function, which prevents collisions by avoiding obstacles or stopping in front of them thereby.



Knowledge Introduction

New Knowledge

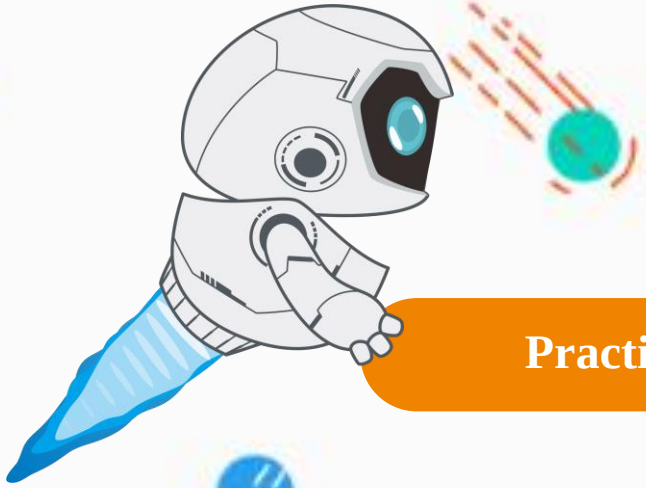


There are many ways to make a collision avoidance robot, and the key point is the sensor. The sensor is equivalent to its eyes, only to see first to avoid, the current common sensors for collision avoidance are: ultrasonic sensors, infrared sensors, laser sensors, vision sensors.

New Knowledge



In this lesson, we will use a laser ranging sensor to create an collision avoidance robot. The laser sensor can better measure the distance and thus ensure that the robot can make a corresponding action in front of the object.

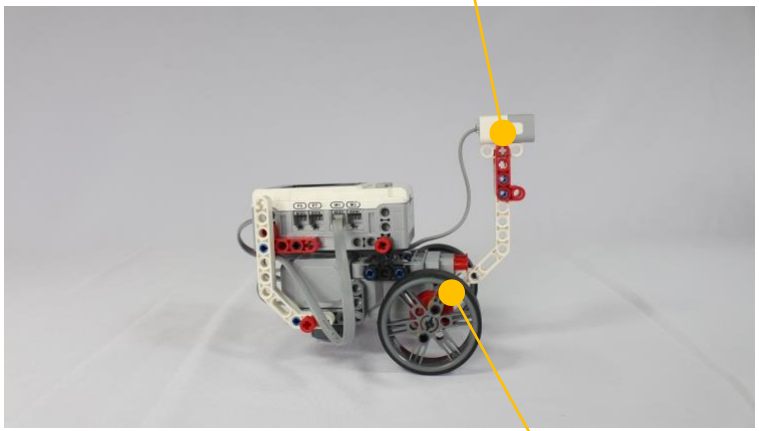


Practice



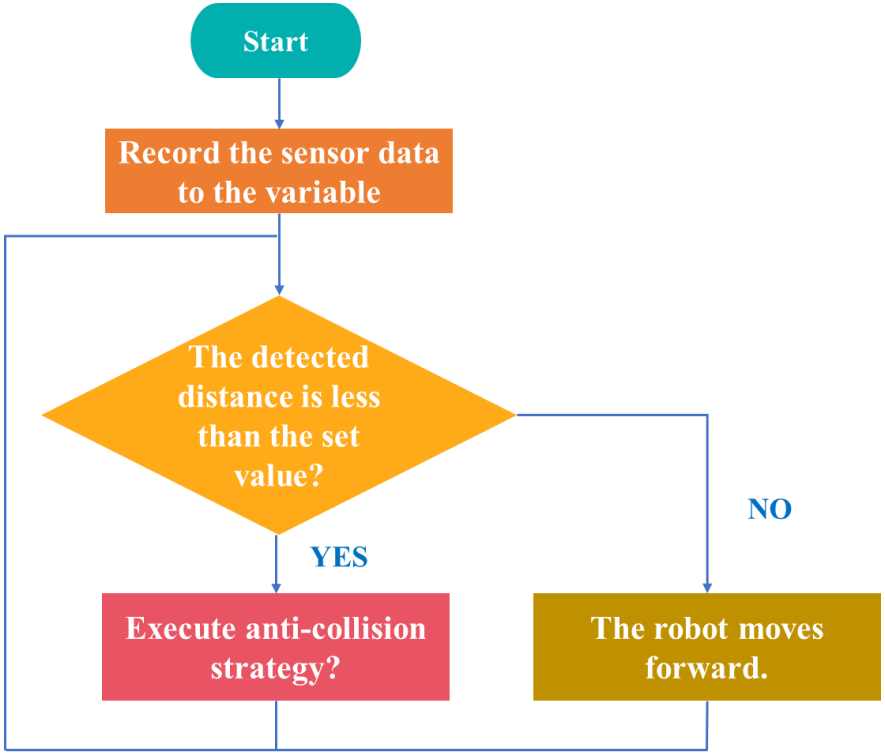


New Knowledge



In this lesson, we will use a laser sensor to create an collision avoidance robot. The laser sensor can better measure the distance and thus ensure that the robot can make a corresponding action in front of the object.

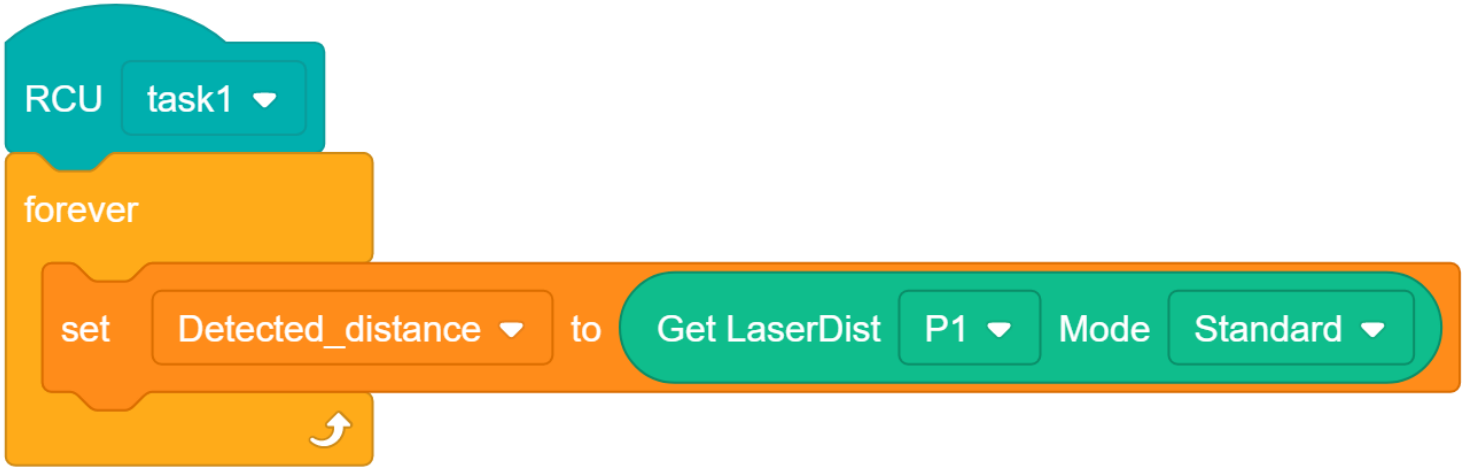
Practice | Programming



The robot can automatically perform collision avoidance when an obstacle is detected in front of it.

When the distance between the robot and the object is too small, an anti-collision strategy is implemented to allow the robot to evade. The avoidance can be done in a variety of ways.

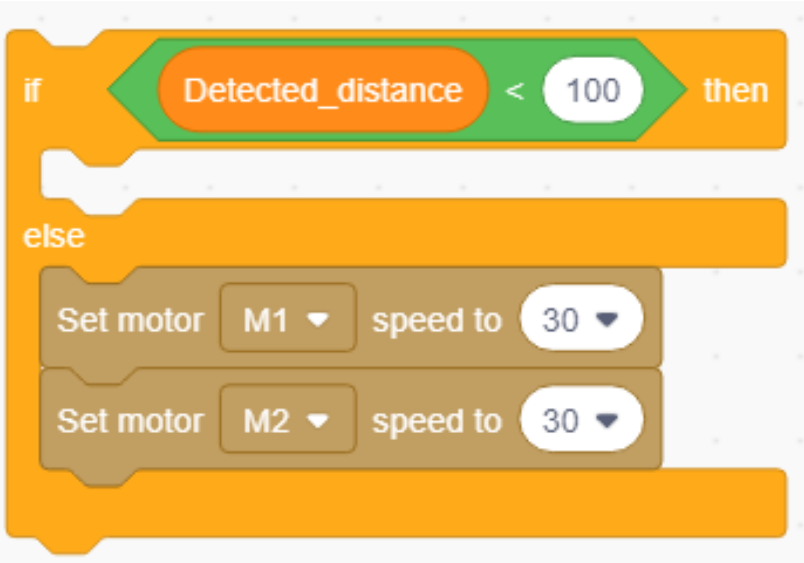
Practice | Programming



Read the data

Repeatedly store the data from the laser range sensor into the variable.

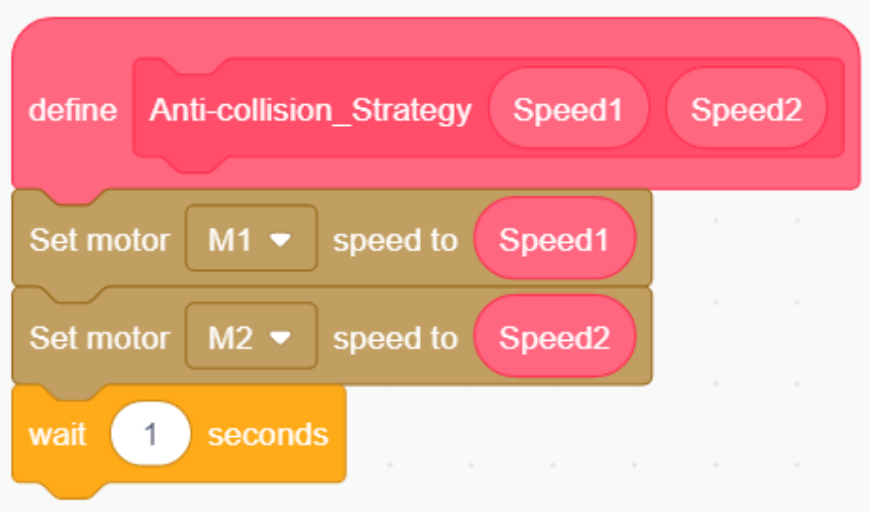
Practice | Programming



Judging Distance

When the distance between the front object and the robot is far, the robot goes straight ahead; when the distance is <100, the anti-collision program is executed only.

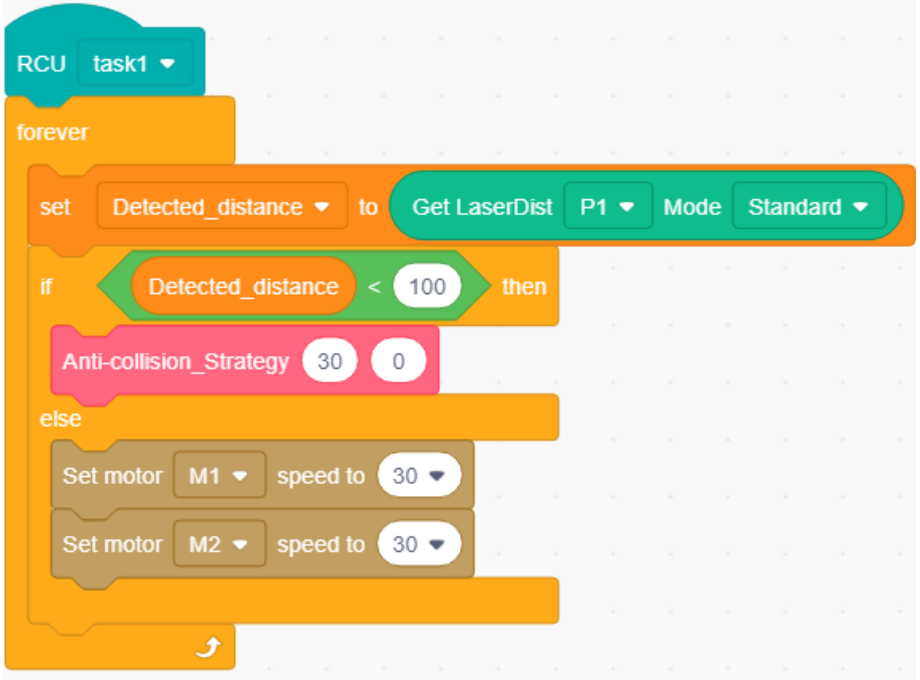
Practice | Programming



Anti-collision strategy

Use self-made blocks to make the function of anti-collision strategy, easy to adjust the parameters at any time to achieve different movement effects such as rotation in place, left turn and right turn.

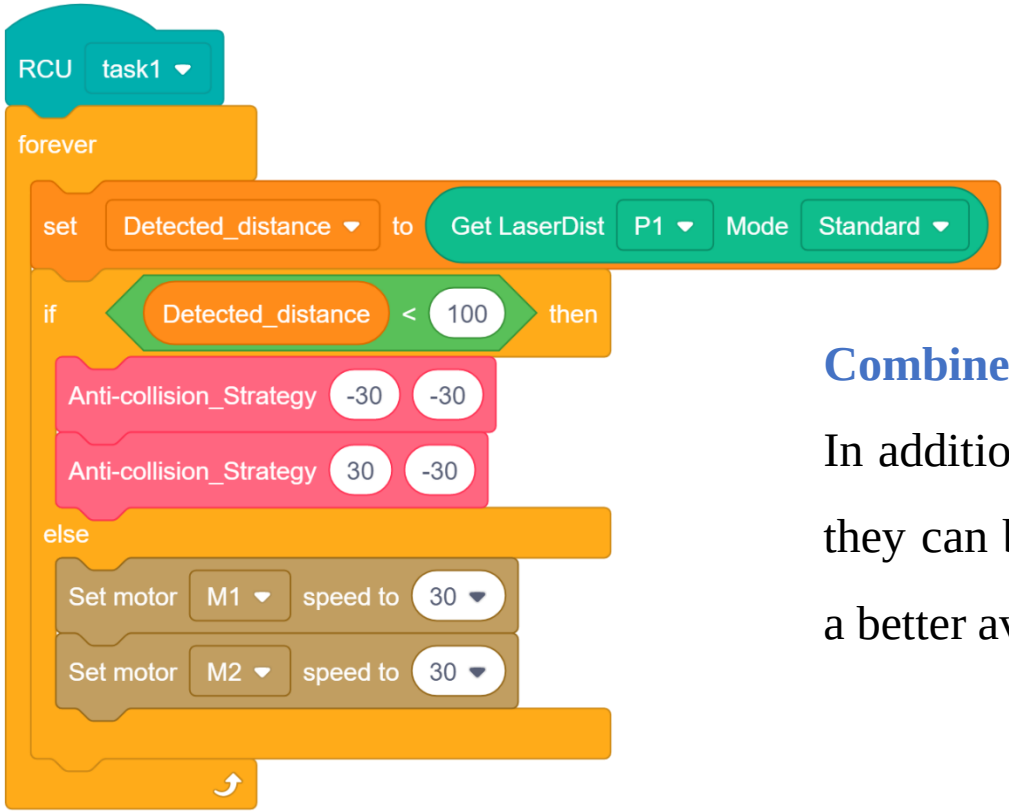
Practice | Programming



Turning Strategy

Strategies for collision avoidance can be varied. Turning is a common form of turning, where the robot can perform a turning function when there is a speed difference between the wheels.

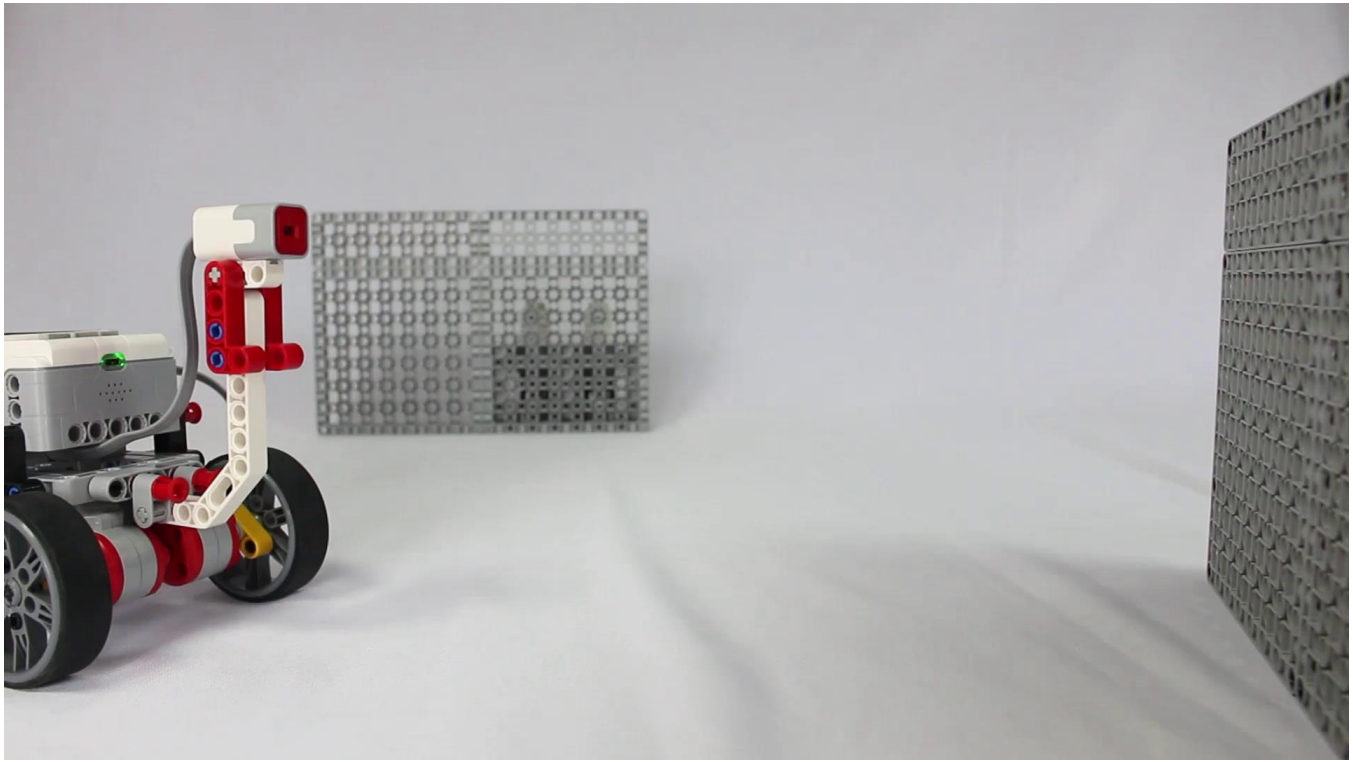
Practice | Programming

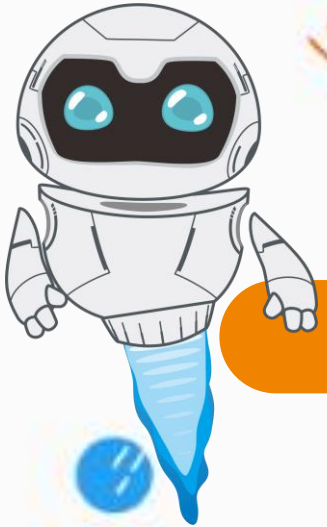


Combined Strategies

In addition to a single turn or backwards, they can be used in combination to make a better avoidance.

Practice | Programming





Results

Program Optimization

This lesson implements the robot's anti-collision and avoidance functions. When an object is too close to the robot, the anti-collision function is executed to avoid the obstacle and move forward.

Next, modify the program so that the robot returns to its original route after turning to avoid the obstacle.

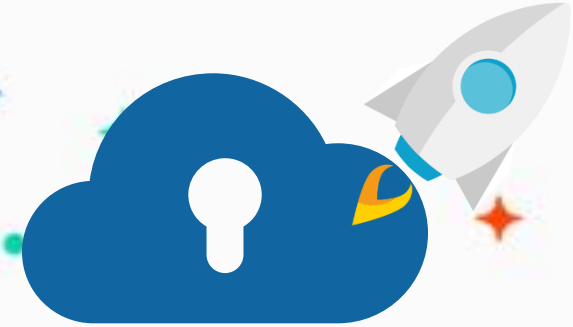
Requirement: After avoiding the obstacle, the robot can adjust its own angle to return to its original route.

Further Reading



Currently, the most common civilian products, the best obstacle avoidance function is none other than the sweeping robot, due to the special nature of the sweeping robot work environment, it needs to constantly detect the existence of obstacles in all directions, and then plan their own travel route.

Sweeping robot also from a single sensor slowly developed to now multi-sensor coordination work, can correctly avoid a variety of obstacles, and finally complete the task of cleaning.



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Thanks!

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