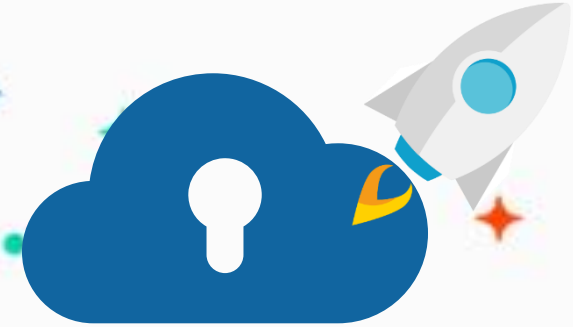

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Lesson 2. Smart guiding car

LECTURER: XXX

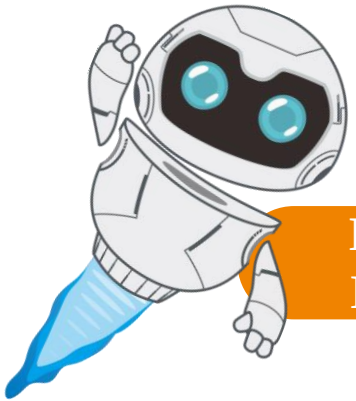
Lesson Objective

Learning Objectives

1. Know about the guiding car.
2. Understand how the attitude sensor is used to locate the direction.

Possible Difficulties

1. The direction "south" is not the same direction as the actual south.
2. The guiding car robot has requirements for the initial position.



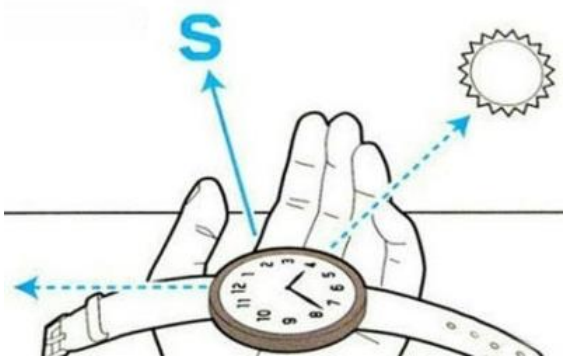
Background Information

Context Import



Have you ever tried to get lost? Whether it is on the main road or in an amusement park, it is easy to get lost if you walk indiscriminately. The so-called getting lost actually means that people lose their sense of direction and cannot tell which direction they are in, so they cannot move in the opposite direction. It turned out to be a familiar location.

Context Import





In outdoor places, we can use compass, navigation system, watch and other tools to determine the direction. At the same time, the sun above the head or the stars at night are also very good references. For example, the often-heard Polaris and Southern Cross are good choices. In this lesson, we need to know a kind of magical tool, it is called the guiding car.

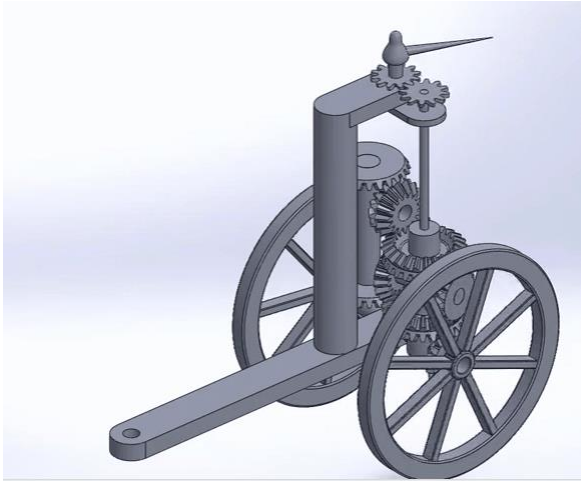
Context Import



The compass car, also known as the Sinan cart, is a device used to indicate directions in ancient China.

The compass car is a simple mechanical device that uses gear transmission to indicate the direction. The finger of the puppet figure on the guiding car will always point in the direction of departure.

Context Import



How the guide car works

Manpower is used to drive the compass car to walk, thereby driving the gears in the car to rotate, so as to transmit the differential motion of the two wheels during steering, and then drive the pointing puppet figure on the car to have the same angle as the opposite direction of the car's steering direction, so that the car's puppet figure points the way. No matter which direction the car turns, the hand of the puppet figure will always points to the initial direction when the guide car starts.



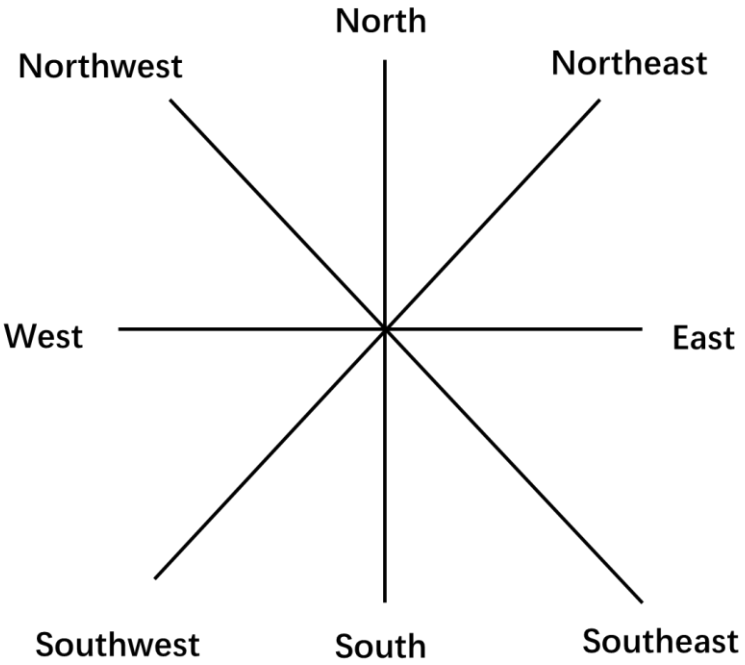
Knowledge Introduction

New Knowledge



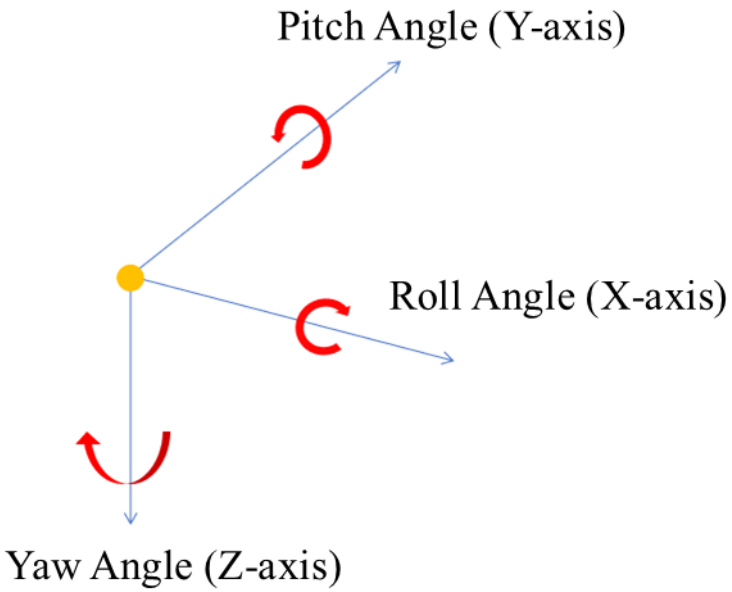
In modern times, we have more advanced technology. There is no need to use such a complicated mechanical structure to realize the guide. Commonly, we can use a compass or navigation. Of course, it is more accurate to use attitude recognition to specify the corresponding direction.

New Knowledge

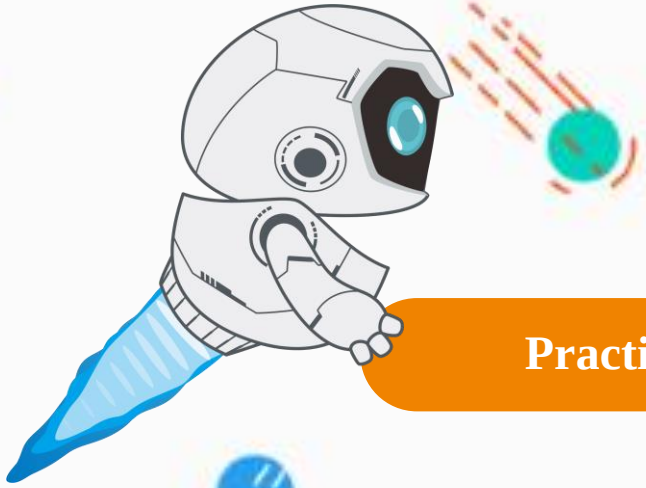


The Z value in gesture recognition can be regarded as the left and right direction in a simple way. As long as the direction value is set in advance, the robot can also realize the function of the guiding car.

New Knowledge

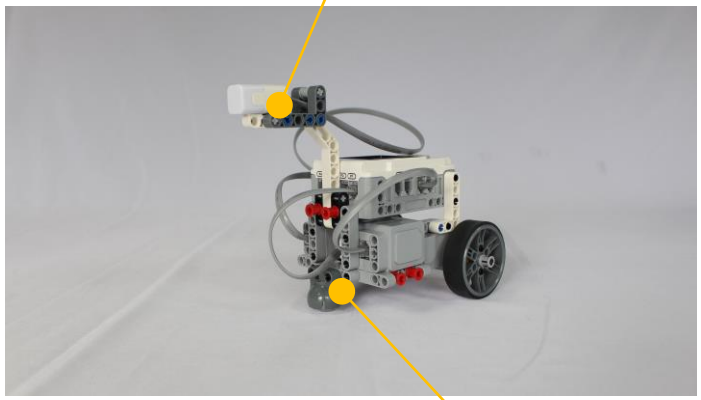


There are two key steps in using gesture recognition to make a guiding car. One is to specify the direction "south". The south here is not the actual south or south, but the direction value we artificially set. The second is to determine the current position of the car body through the yaw angle (Z). Constantly compare the direction when moving, and when the yaw angle (Z) matches the set angle value, a corresponding prompt will be given.



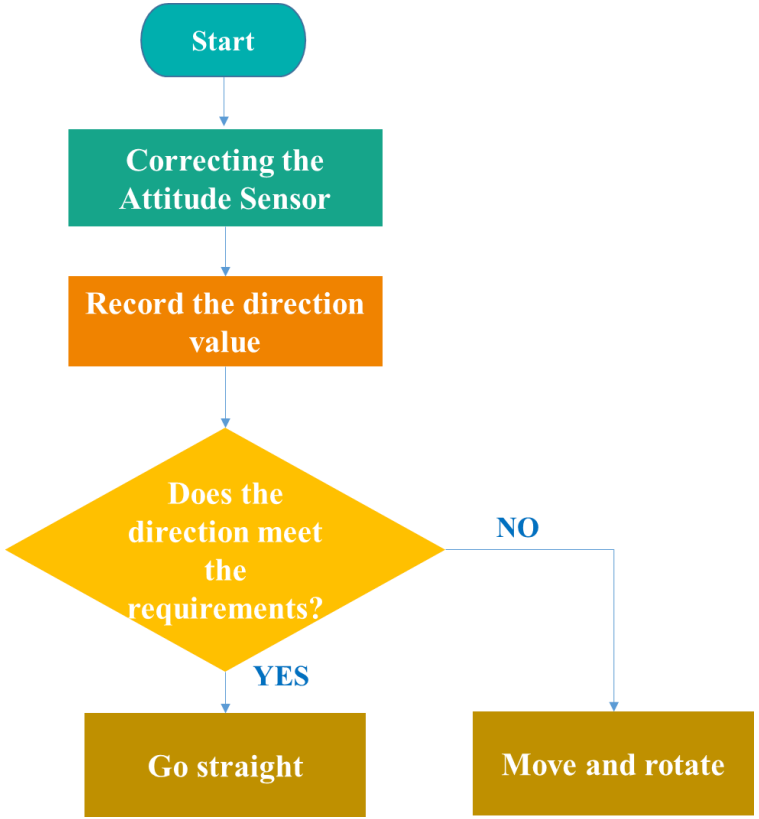
Practice

New Knowledge



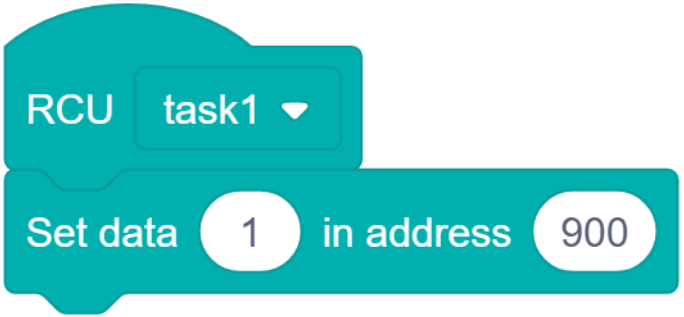
Build a guiding car robot according to the building manual, and gradually correct and turn to the set angle during the moving process.

Practice | Flow Chart



After the guiding car has set the angle it needs to face, it will gradually turn during the movement until Z turns to the set angle, and then go straight.

The left and right rotation mainly affects the yaw angle (Z).

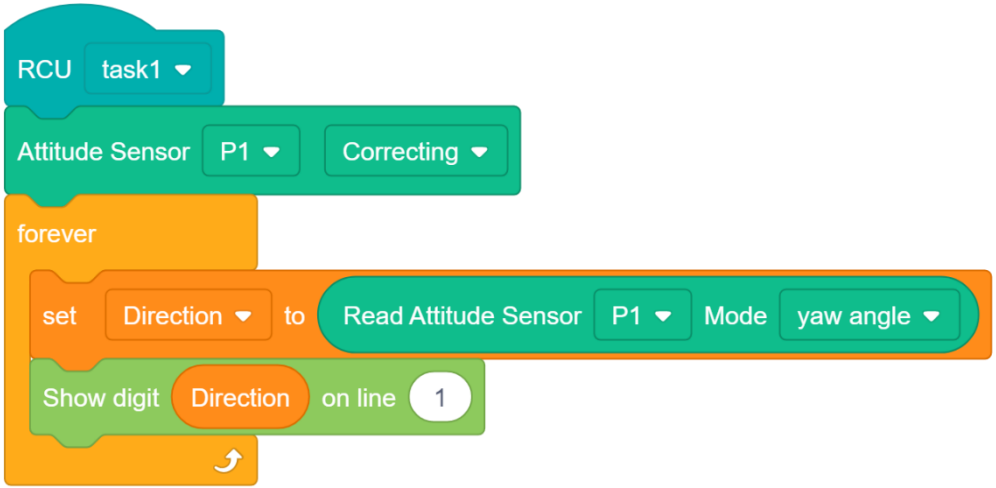


Initial setting

Set the direction value and store the value inside the controller.

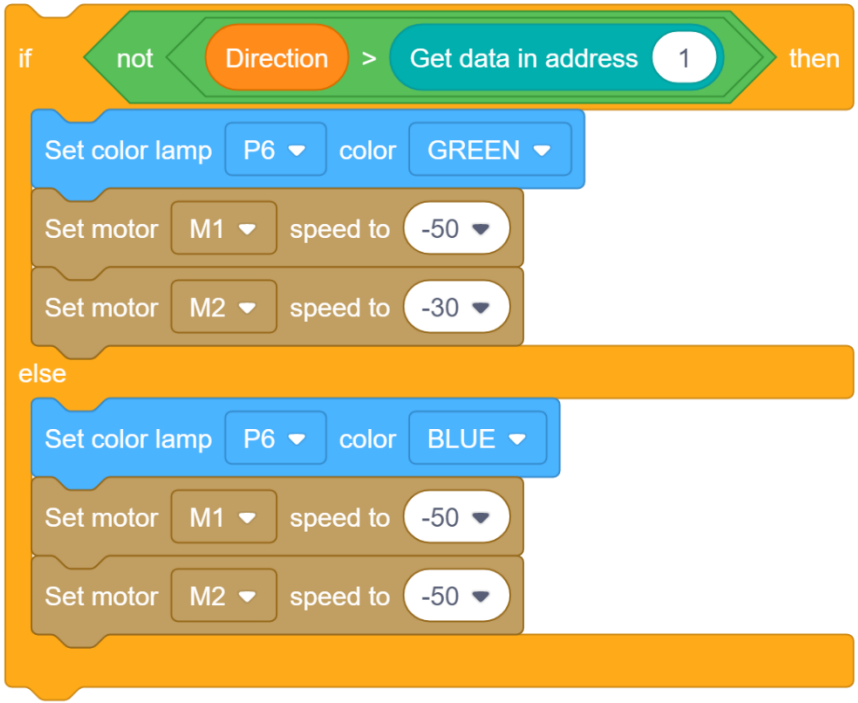
After running the program once, you can delete the program.

Practice | Programming



Reading data

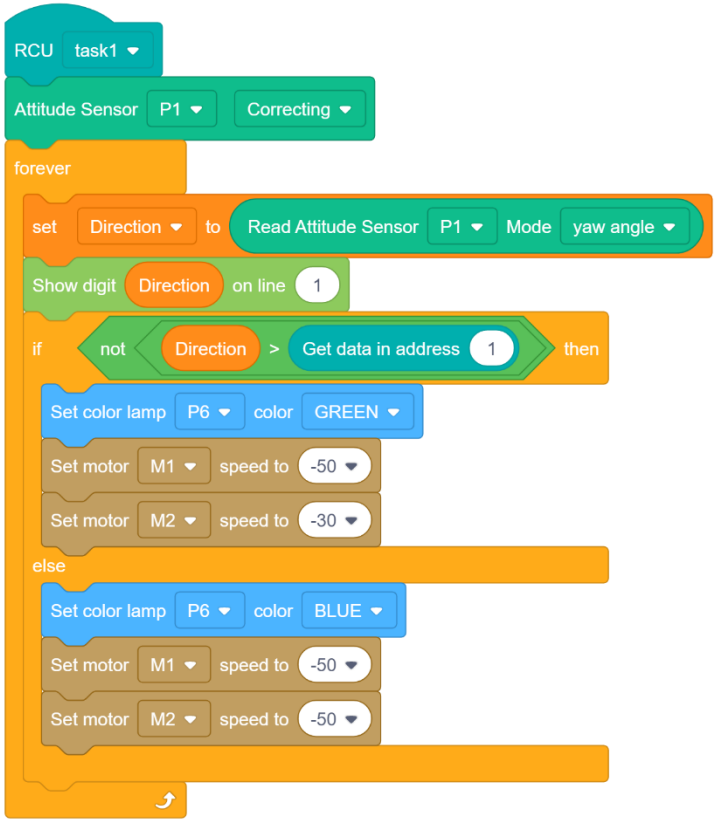
After correcting the attitude sensor, the sensor value is stored into the variable and displayed to the first line.



Direction judgment

The direction does not meet the condition, i.e., it is not pointing in the correct direction, and the robot rotates as it moves. When pointing in the correct direction, the robot moves forward. When the robot rotates, the green light is on; when the robot goes straight, the blue light is on.

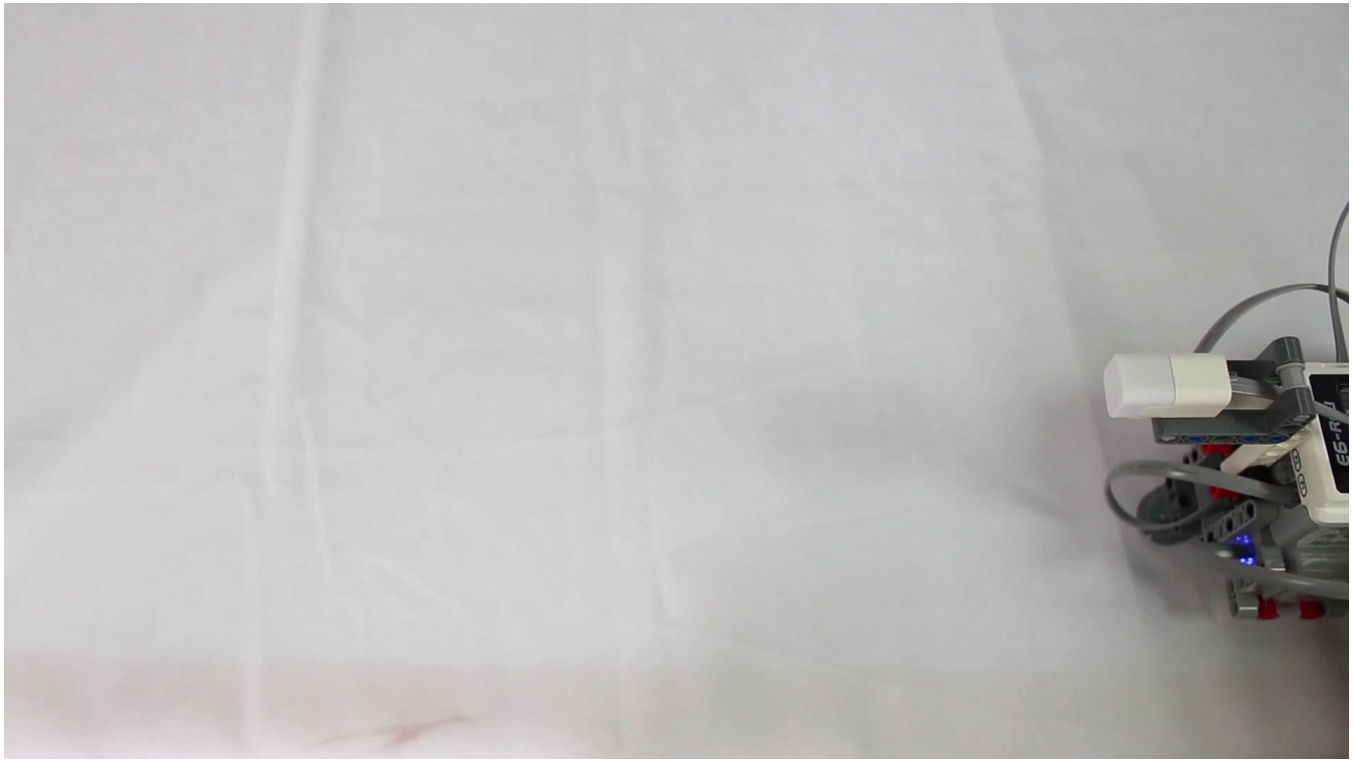
Practice | Programming

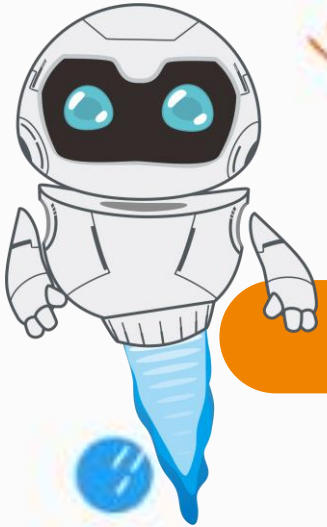


Integrate the programs

Combine the programs of each segment according to the flow chart.

Practice | Programming





Results

Program Optimization

This lesson implements the function of moving in the specified direction, and the robot can gradually turn to the direction of the set value.

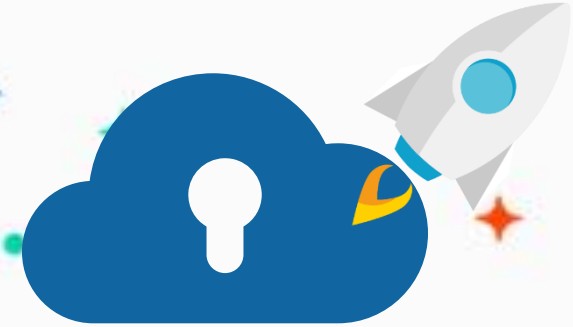
Next, modify the program so that the robot can move out of the square.

Requirement: Make the robot move out of the square based on the basic principle of moving the guide car at an angle.

Further Reading

Electronic compass, also called digital compass, has been widely used as navigation instrument or attitude sensor in modern technology. Compared with the traditional pointer type and balance frame structure compass, the electronic compass has low energy consumption, small volume, light weight, high accuracy and can be miniaturized. The output signal can be digitally displayed through processing and can be used not only for pointing, but also the digital signal can be directly sent to the automatic rudder to control the ship's maneuvering.





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Thanks!

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