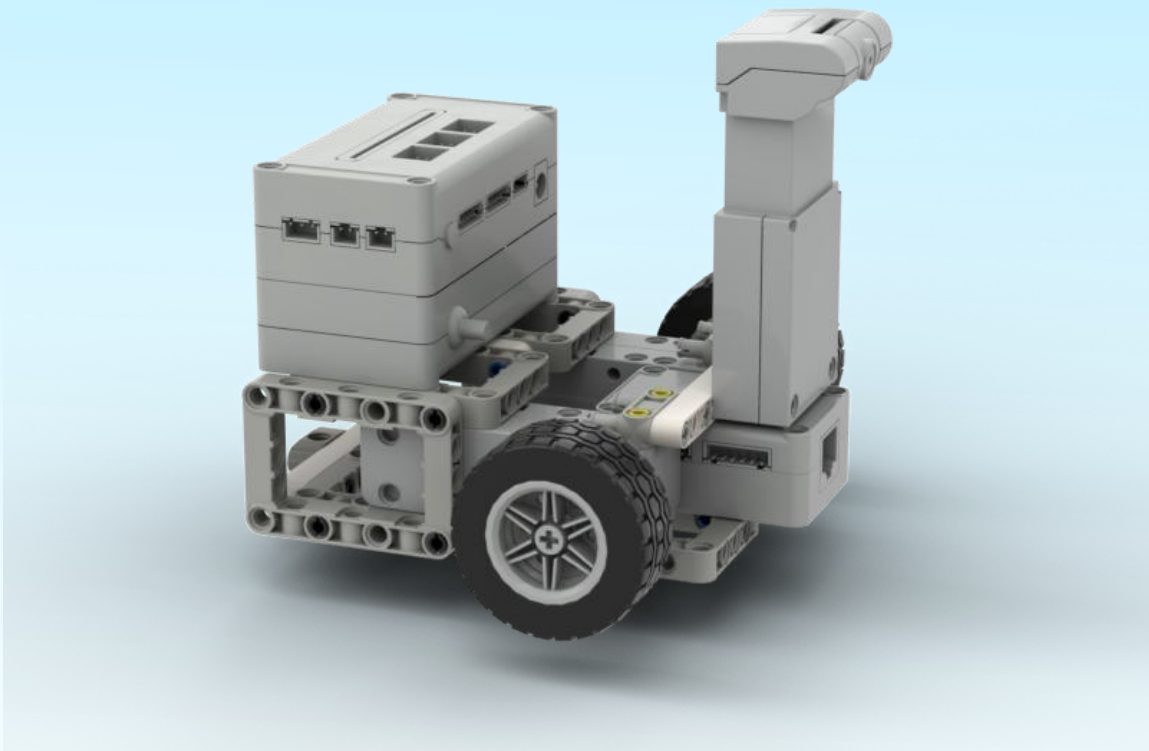


AI Programming Robot Course

Robot + AI Camera



Volume 10

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01 Eyes of Ronaldo

Knowledge points

Visual recognition

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Course tasks

Through the visual module, learn

coordinates and learn to let the car

recognize the location of objects

Course duration

60-90 minutes

Scenario introduction(10 min)

During his tour, Ronaldo saw people playing table tennis in the square of the Science and Technology Museum. Curious Ronaldo had never seen this sport before, and he thought it was very novel. How could a small table tennis racket hit the table tennis ball accurately and hit it back and forth? Ronaldo's big eyes seemed to have many questions. The children told Ronaldo that it was not the table tennis racket that saw the ball, but people's eyes that saw it and immediately judged the position of the ball, and then operated the racket to hit the ball.

Ronaldo was very envious when he heard this. Ronaldo also wanted to see the object, find the object, and know its specific location like our eyes. Can we help Ronaldo achieve this problem?

Analysis and production (25 minutes)

Building: Two-wheel drive car (refer to the building manual for detailed construction)



First challenge: Table tennis robot

Situation: Although Ronaldo does not have eyes like humans, it has a camera and can

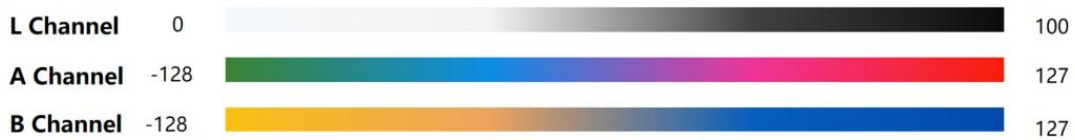
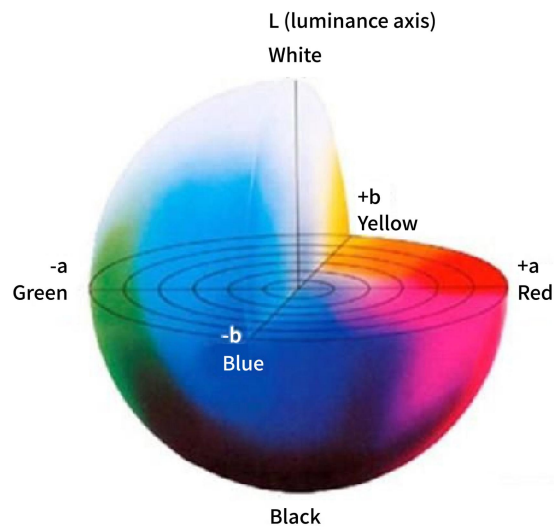
also use the camera to determine the position of objects. Let's try programming.



Task: Determine the position of the object through the camera.

Programming knowledge: AI Camera

For the program, everything is data. In order to identify the corresponding color, the color needs to be digitized. As long as the data that meets the standard is found, the color corresponding to the corresponding data can be determined. When programming the camera, the LAB mode is used. By splitting the target color into three LAB channel data, the color information is digitized. You only need to find the three accessible data ranges of the target color to achieve color search.



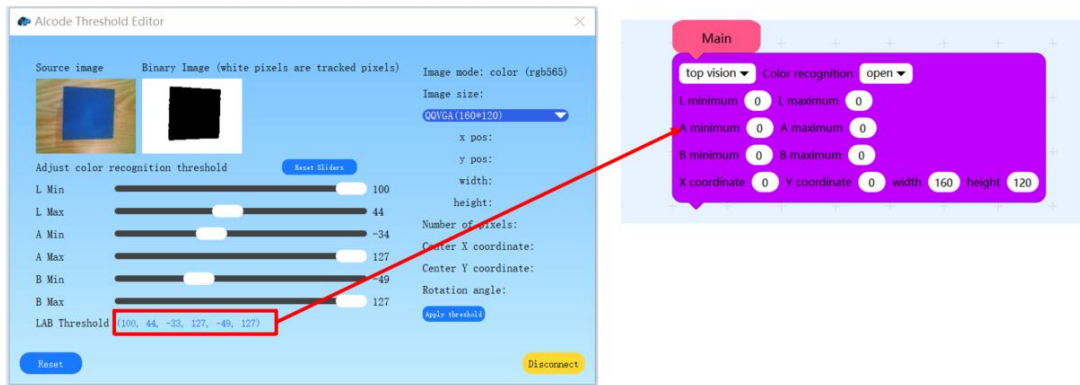
1. Color recognition

If you want to find the green object in the image, you need to find the description data of this object. According to the LAB channel information, the data used to describe "green" is defined by three-dimensional data. Select the color of the target object through the software box, and according to the display of the threshold editor, you can get the data of the target color.

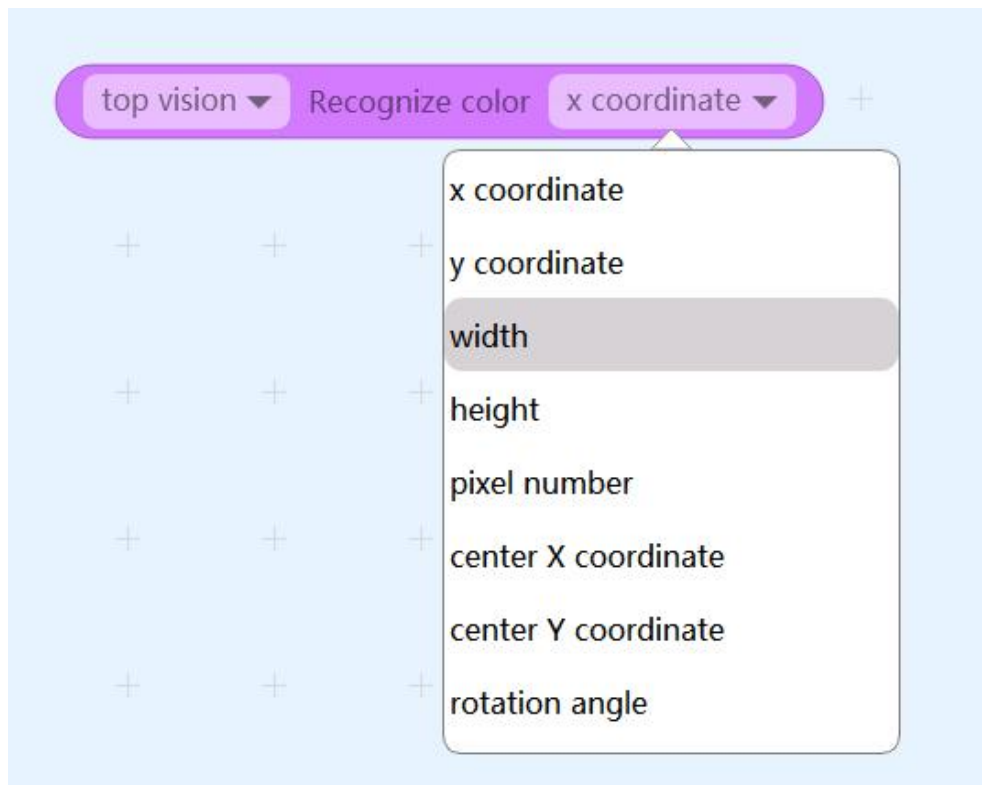
Color threshold tuple for selected targets →

(100, 44, -34, 127, -49, 127)

2. Fill in the threshold values into the 6 boxes

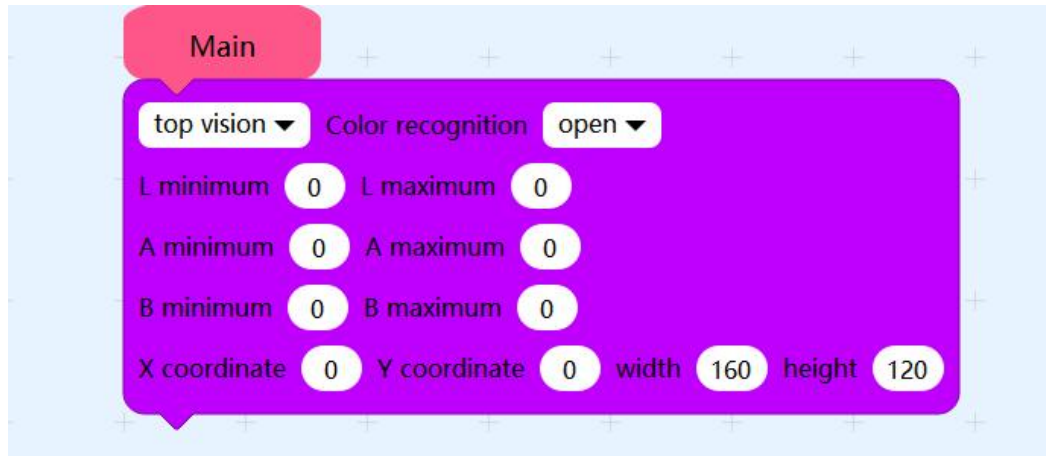


3. Get color information module

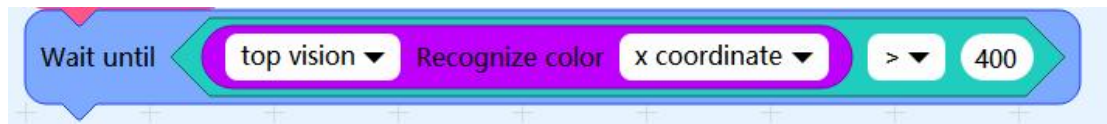


Program example:

Fill in the 6 boxes corresponding to the thresholds



Use conditional statements to determine whether a corresponding color block appears on the camera screen



Reflection & Optimization (15 minutes)

Second challenge: Identify color and move forward

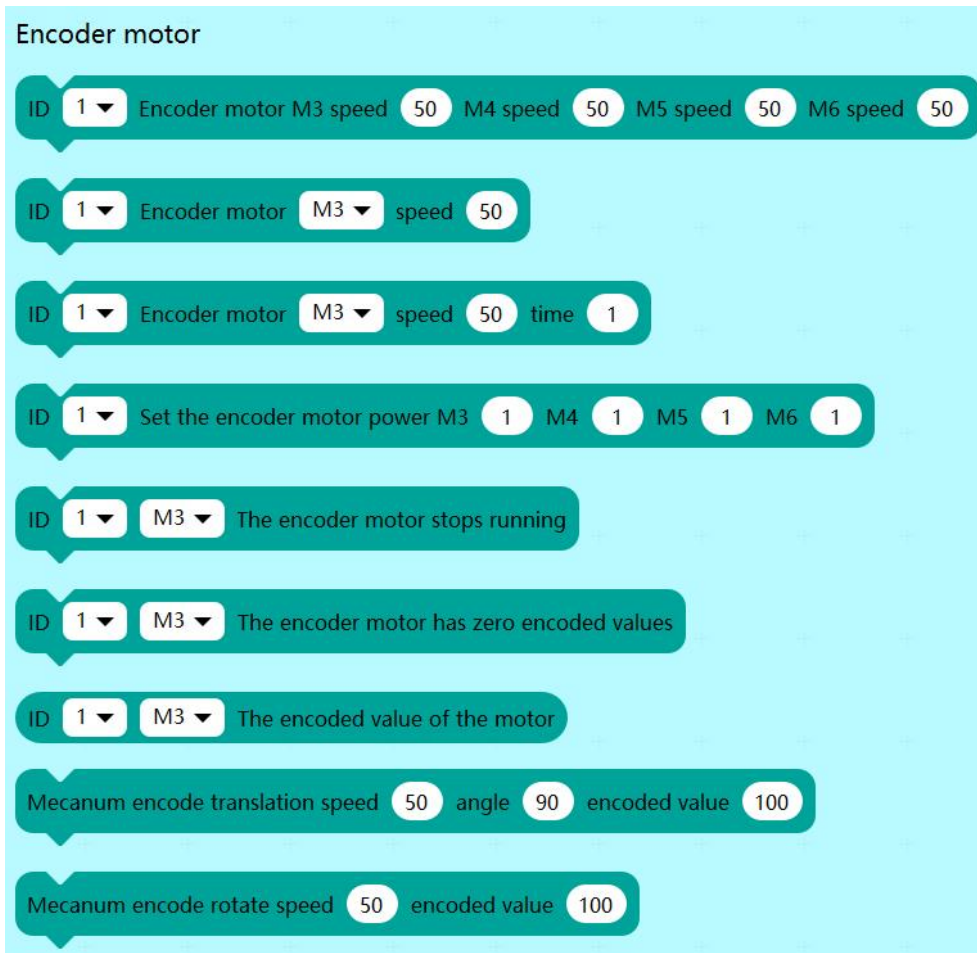
Situation: The teacher has prepared a program. Please follow the teacher to open it and download it into Ronaldo's brain. This program makes Ronaldo keep spinning and move forward when he recognizes a specified color..

Task: Program the car to rotate and move forward after recognizing the specified color.

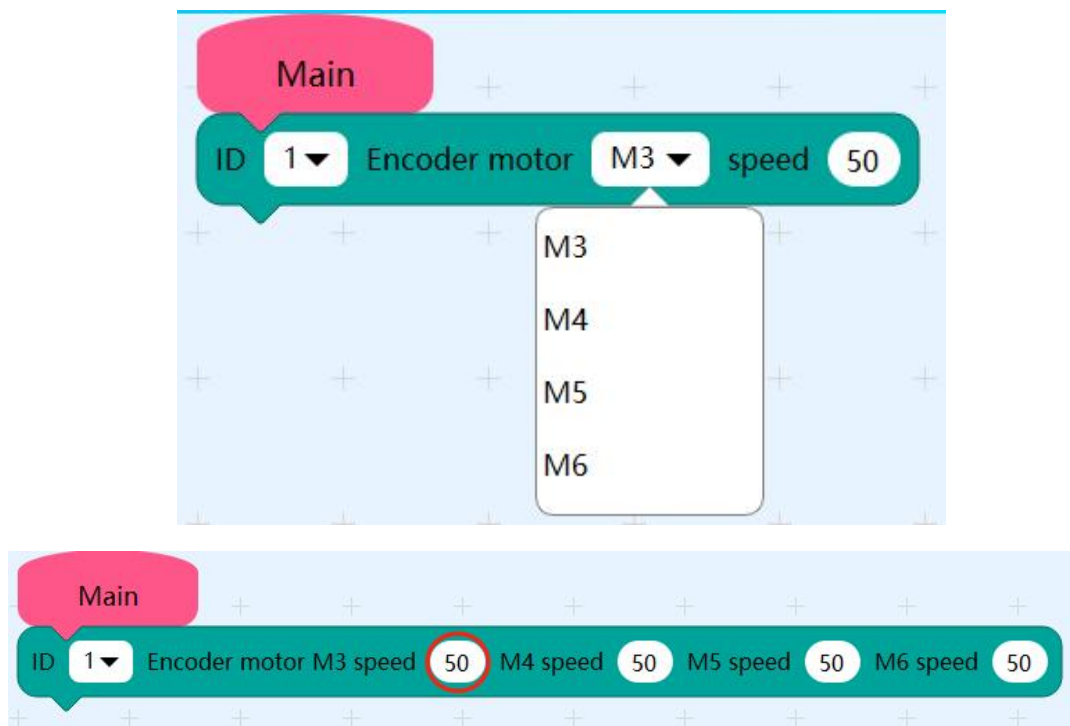
Programming knowledge: encoder motor

The ID number of the encoder motor is set to distinguish multiple expansion board modules. When there is only one expansion board, the default is ID1, and it must be consistent with the port number connected to the main controller.

The connection between the motor and the expansion board M3~M6 must also be consistent, so that the encoder motor can operate normally.

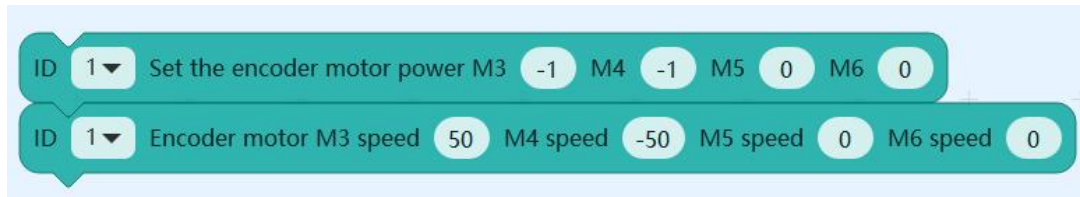


Program example:

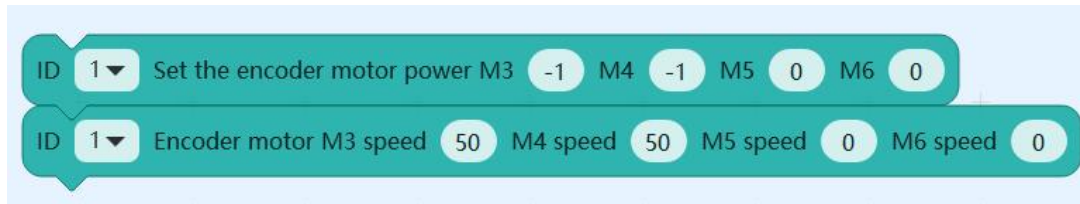


The speed range of the encoder motor is from -100 to 100.

Rotating car:

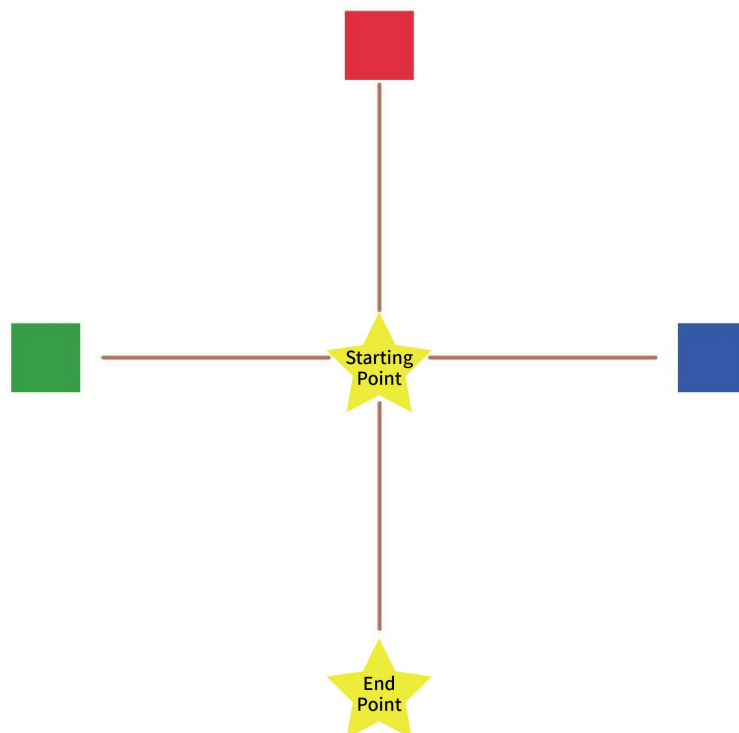


Car goes straight:



Extension (10 minutes)

The teacher has many blocks of different colors in his hand, and places them in different positions on the map. The children need to write a program so that our Ronaldo can recognize different colors and make different actions while moving forward. Let's try it together.



Student Worksheet

Name: _____

Class: _____

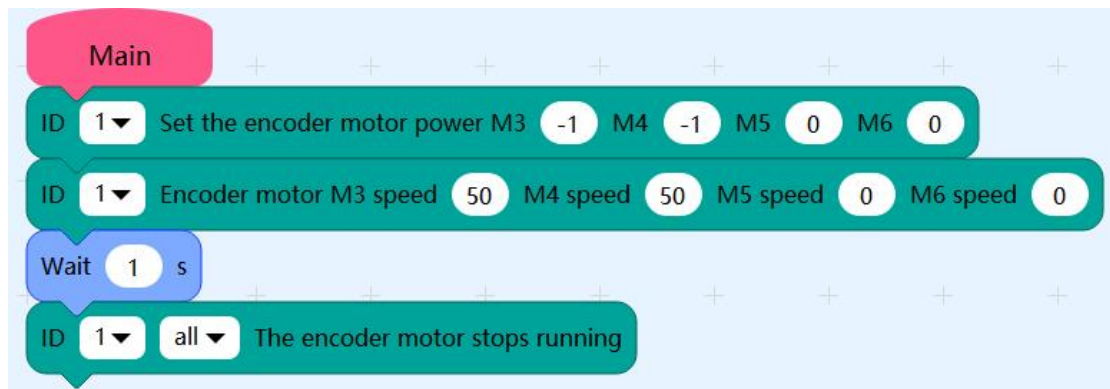
Scenario Introduction

Children, do you think today's class is interesting? The teacher has prepared some difficult questions for you.

Analysis and production

Building: Two-wheel drive car

First challenge:



Please tell me what kind of action the above program will make the two-wheel drive car do ()

- A. forward one second B. backward one second C. rotate one second

Reflection & Optimization

Second challenge

The image shows a Scratch script titled "Main" with the following blocks:

- Color recognition open** block: top vision, L minimum 42, L maximum 76, A minimum -76, A maximum -12, B minimum -128, B maximum 30, X coordinate 40, Y coordinate 62, width 95, height 120.
- Set the encoder motor power** block: ID 1, M3 -1, M4 -1, M5 0, M6 0.
- Encoder motor speed** block: ID 1, M3 speed 50, M4 speed -50, M5 speed 0, M6 speed 0.
- Wait until** block: top vision, Recognize color, x coordinate, >, 400.
- Set the encoder motor power** block: ID 1, M3 -1, M4 -1, M5 0, M6 0.
- Encoder motor speed** block: ID 1, M3 speed 50, M4 speed 50, M5 speed 0, M6 speed 0.

Please tell me when the car will move forward in the above program ()

- A. The number of pixels is greater than 400
- B. The number of pixels is less than 400
- C. The number of pixels is equal to 400

Extension

What other interesting things can we do with the camera's color recognition function?