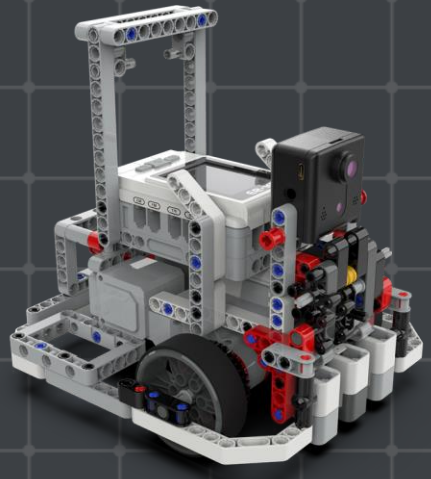


Lesson 24 | Goalkeeper |

Key points from this lesson:

1. Understand the principle of ball recognition

2. Learn to use the AI vision module to detect the coordinates of the ball

Possible difficulties from this lesson:

1. Build a robot model of a football goalkeeper

CONTENTS

1/ Introduction

2/ New Knowledge

3/ Practice

4/ Expansion

01 | Introduction

Introduction

In soccer, the goal of the players is to shoot the ball into the opponent's goal, which is how they win the game. Each team has a special player called a goalkeeper, who is responsible for protecting the goal from the opponent's goal. The goalkeeper stands in front of the goal and is the last line of defense for the team. Only the goalkeeper can catch the ball with his hands or throw it in the penalty area, and they play a very important role in the team's defense and launching counterattacks.



02 | New Knowledge

Ball recognition



In general, the AI vision module recognizes the position of the red ball by default. When a red ball enters the camera's recognition range, the camera will first determine whether the ball is red, and then capture the XY coordinates of the ball. In the AI vision module's ball recognition mode, the camera's recognition range will be narrowed to improve the ability to recognize the ball. The X coordinate (i.e., horizontal coordinate) range is 0-160, and the Y coordinate (i.e., vertical coordinate) range is 0-120. The coordinate origin is (0, 0). The text "Red Ball" will appear in the upper left corner, indicating that the camera recognizes the red ball.

Ball recognition



This block can read the data of the ball on the screen and recognizes the red ball by default. Turn the wheel upward to change the recognized color.

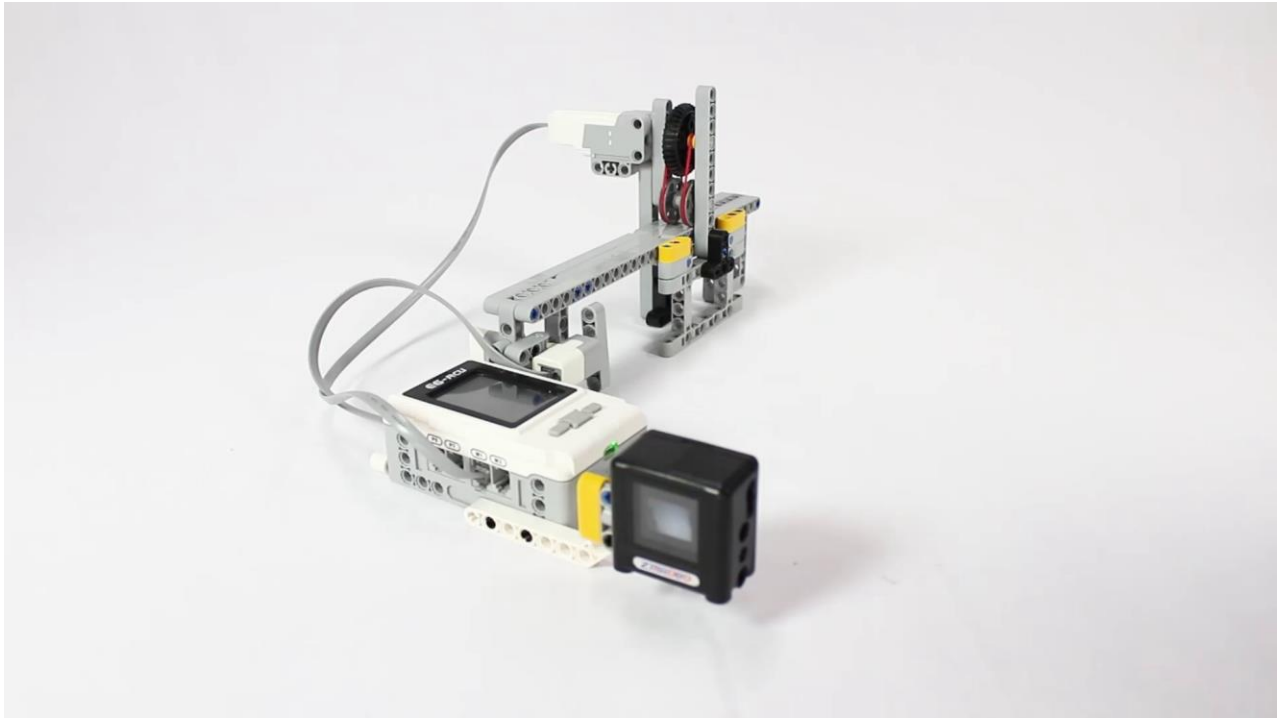
Description:

Parameter value: 1-2, that is, X coordinate and Y coordinate

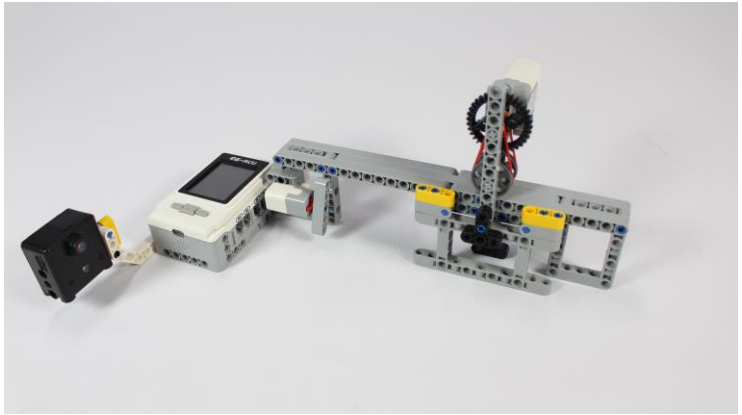
Return value: 0-240, corresponding to the 240*240 screen of the AI module, the middle coordinate is (120,120)

03 | Practice

Effect Demonstration



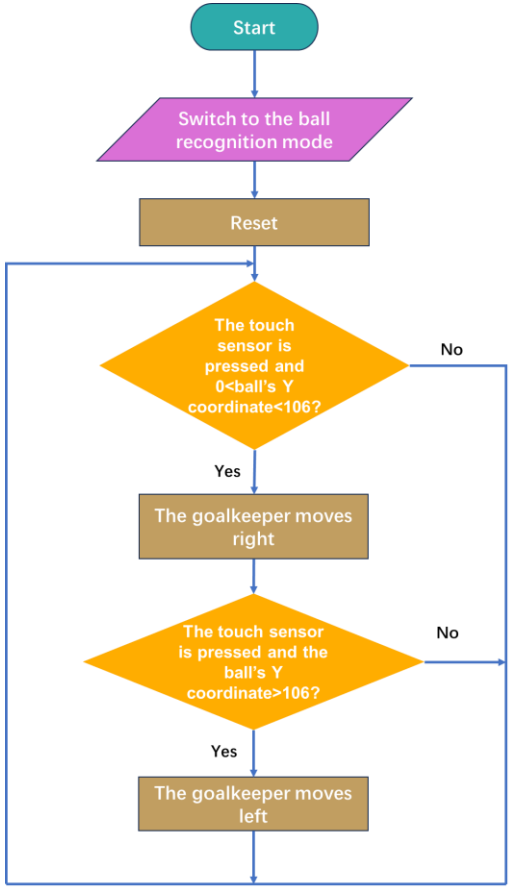
Design and assembly



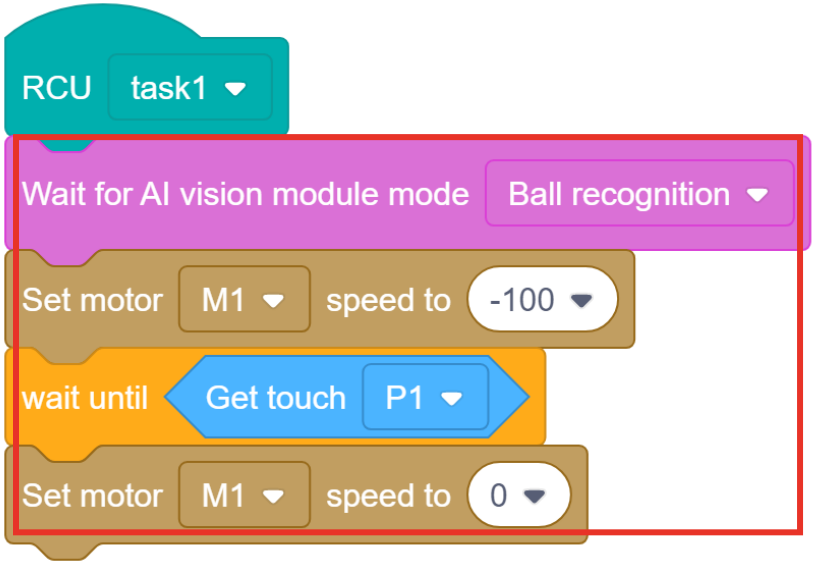
According to the building manual, build a soccer goalkeeper. We need a controller to control the motor rotation and call the AI vision module. Connect the AI vision module to the P8 port of the controller, and connect the motor to the M1 port.

In actual application, when the ball is in the middle of the goal, the camera detects the Y coordinate range of the ball to be around 106. In subsequent programming, we use 106 as the discrimination value. If the value exceeds this, the goalkeeper moves to the left, otherwise, he moves to the right.

Project tasks



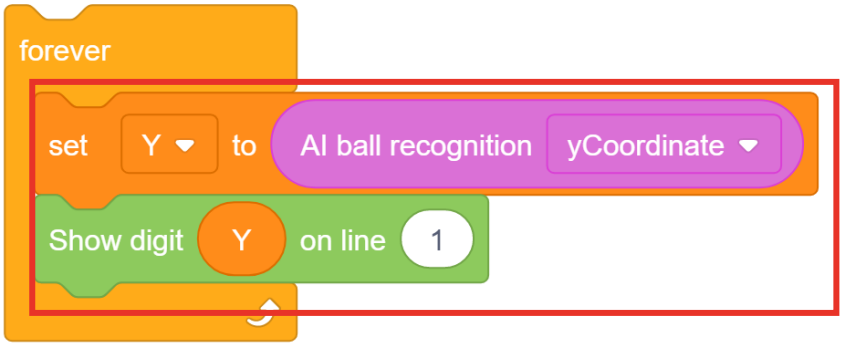
Programming



1. Initialization settings.

Set the AI vision module to enter the ball recognition mode and return the goalkeeper to the original position.

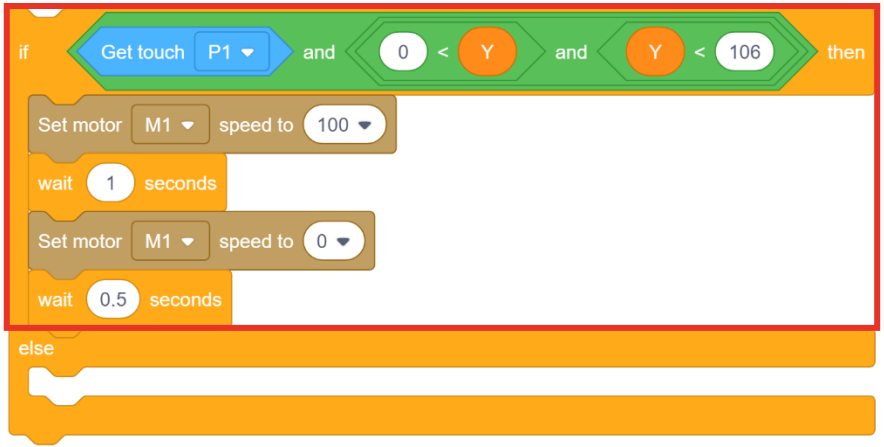
Programming



2. Get and check the Y coordinate of "Ball Recognition".

Create a new variable "Y" and set it to the Y coordinate of AI ball recognition, and display the value of "Y" on the first line of the screen.

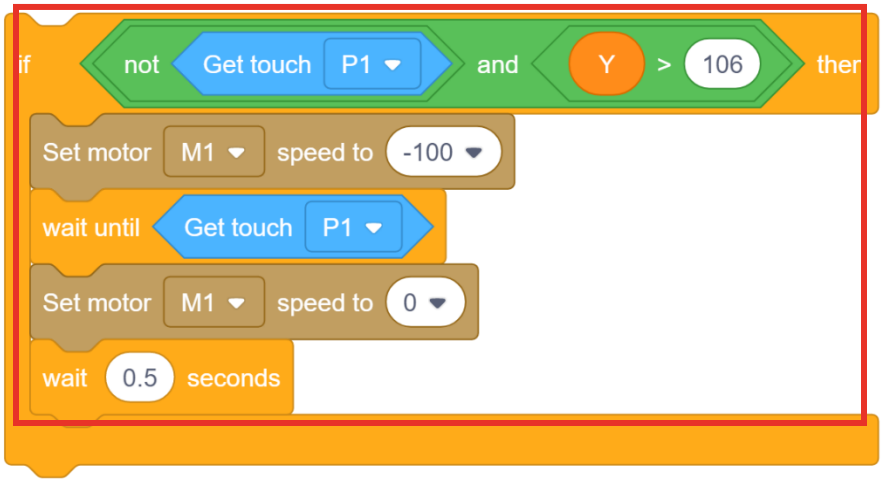
Programming



3. The goalkeeper moves to the right.

When the touch is pressed and 0<"Y"<106, the goalkeeper moves to the right.

Programming



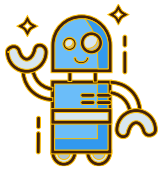
4. The goalkeeper moves to the left.

When the touch is not pressed and "Y">106, the goalkeeper moves to the left.

04 | Expansion

Expansion task

Add one more touch sensor, and set the goalkeeper to move to the left when the second touch sensor is pressed and Y>106. When the goalkeeper moves to the right, it stops when it touches the second touch sensor.



Further Reading

Ball-touching rules: Goalkeepers cannot catch the ball with their hands outside the penalty area. And the goalkeeper can catch the ball with his hands, whether his body is inside or outside the penalty area, as long as the ball is within the penalty area. Even if the ball is in the air, as long as it is within the penalty area, it is fine. But even if you are in the penalty area, you cannot reach out to touch the ball in the air but still outside the penalty area, otherwise it will be a foul. And when the goalkeeper's body is completely out of the baseline, as long as the ball is still within the line, it is normal to catch it with his hands.

Thanks!