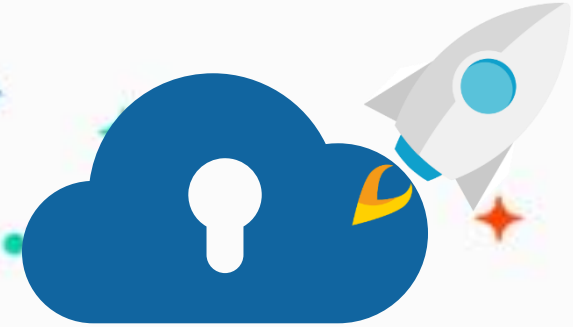

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Lesson 16. Super Scorpion

Lecturer:

Lesson Objective

Learning Objectives

1. Get to know scorpions and build a scorpion robot.
2. Use RoboCode to write a program to control the scorpion's random movement and attack.
3. Let the scorpion adjust its direction according to the location of the prey after discovering it.

Possible Difficulties

1. Build the connecting rod structure and tail structure
2. Application of AI module



Background

Background Knowledge | Scorpion



Scorpions are the collective name for species in the phylum Arachnida, order Scorpion, in the phylum Arachnida, and spiders also belong to the same class.

Their typical features include an elongated body, pincers, and a curved, segmented tail (posterior abdomen) with a stinger.

The earliest scorpions on land appeared in the Silurian Period (Silurian Period) about 430 million years ago.

All scorpions are poisonous, with varying degrees of toxicity.

Background Knowledge | Scorpion



1. Scorpions are diurnal and nocturnal animals. They like tides and are afraid of dryness, and like darkness and are afraid of strong light stimulation. They like to live in groups, like to be quiet and not active, and have the habit of knowing their nests and groups.
2. Scorpions have the habit of hibernating. They usually emerge from hibernation in mid-to-late April, that is, after the wake of hibernation, and slowly begin to hibernate in early November. They are active for about 6 months throughout the year.
3. Although scorpions are cold-blooded animals, they are still relatively cold- and heat-resistant. Scorpions can survive when the temperature of the external environment is between 40°C and minus 5°C.

Background Knowledge | Scorpion



4. The growth and reproduction of scorpions are also closely related to the humidity of the external environment.

5. Scorpions like darkness and are afraid of light, especially the stimulation of strong light, but they also need a certain amount of illumination.

6. Scorpions have a strong avoidance of various strong smells, such as paint, gasoline, kerosene, asphalt and various chemicals, pesticides, fertilizers, quicklime, etc.



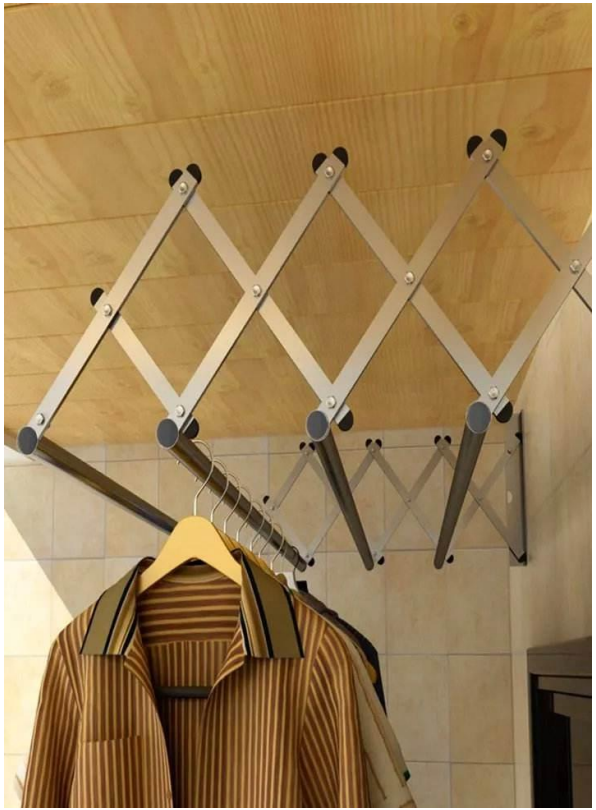
Introduction

Introduction | Link telescopic mechanism



There are many applications for linkage telescopic mechanisms, such as lifts, telescopic doors, etc. The wonderful function of this mechanism is that it can save space and can also realize the conversion from a short distance to a long distance.

Introduction | Application of Quadrilateral Linkage



Quadrilaterals do not have the stability of triangles and are easily deformed.

However, it is precisely because of the mobility of the quadrilateral due to its instability that when it is made into a stretched or folded structure, it is widely used in life, such as stretch doors.

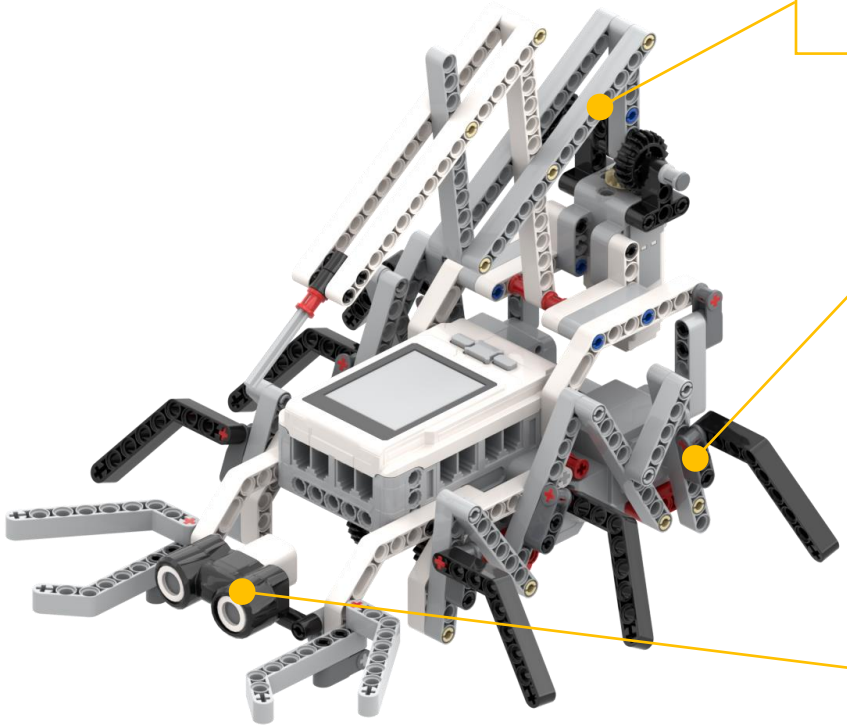


Practice



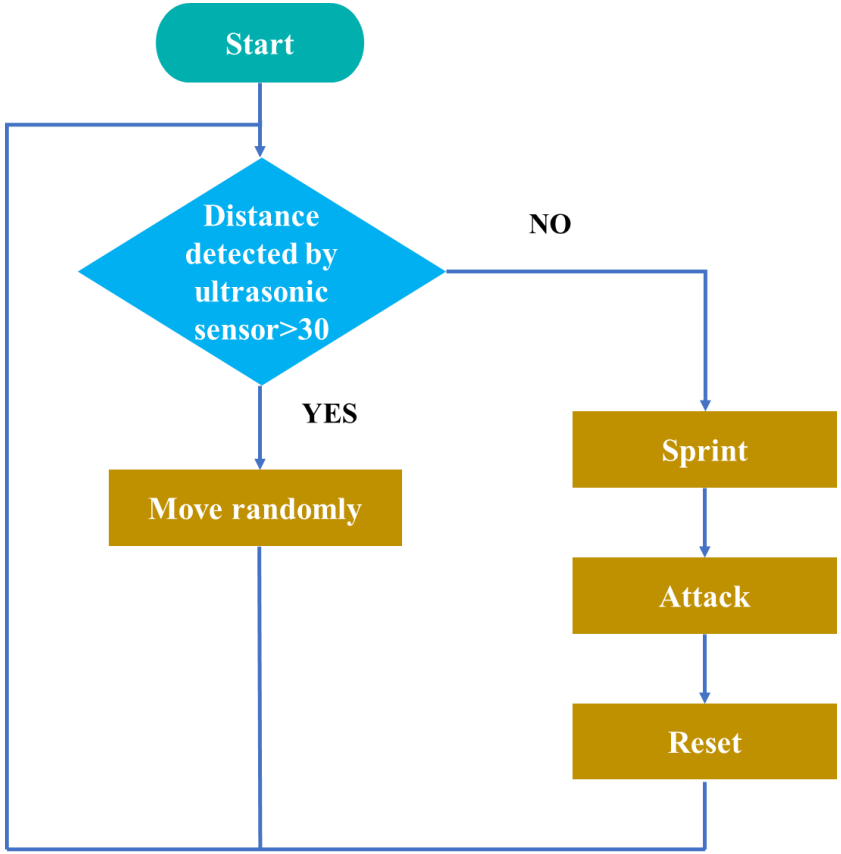


Practice | Robot Building



Build the scorpion robot according to the building manual and choose the port yourself.

Practice | Flowchart



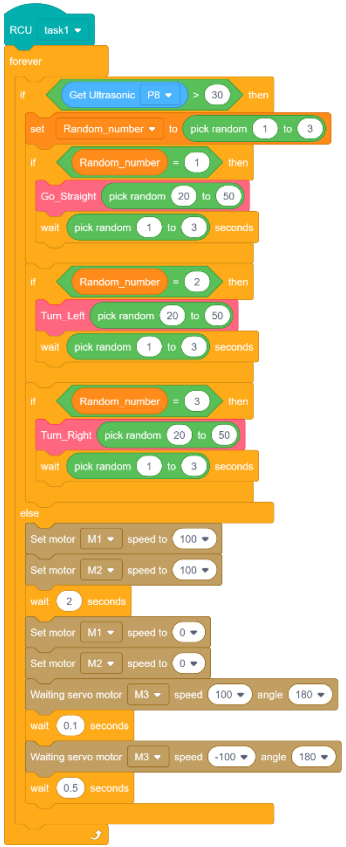
The program flow of Scorpion robot:

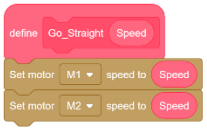
① If there are no obstacles in front, the scorpion will move randomly.

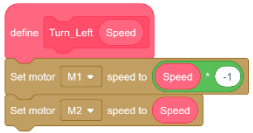
② If there is an obstacle in front of you, the scorpion will sprint and attack with its tail, and then reset.

③ Repeat this cycle.

Practice | Programming









The program flow of Scorpion robot:

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③ Repeat this cycle.



Exploration



Exploration | Discussion

Please tell me what problems you found while building the robot and programming.

Not precise enough when looking for prey?

More movement?

Not enough action?

Add more effects?

Exploration | Discussion

So, how to solve these problems and make improvements?

Exploration | AI Vision Module



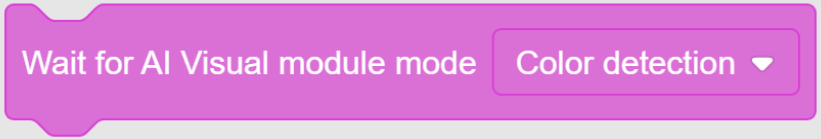
The AI vision module has rich functions, which greatly expands the practicality of the robot.

The AI vision module must be connected to the P8 interface.

The functions are as follows:

Color detection, QR code recognition, ball recognition, road recognition, face detection, image classification, tag code recognition, color recognition learning, face recognition learning, gesture recognition, image classification learning, traffic sign recognition.

Exploration



Function: Wait for the AI module to switch to the specified recognition mode (the AII module needs to be connected to the controller serial port P8)



Function: Get the number of recognized color blocks



Function: Read the data of the ball in the screen, and identify the red ball by default.

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



Optimization

Optimization | Analysis



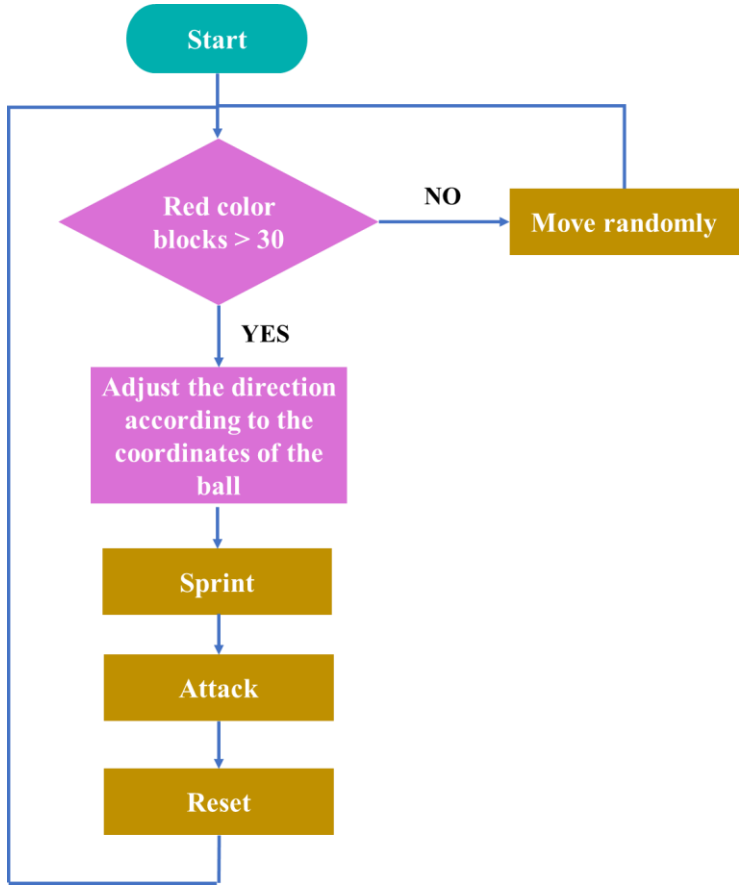
Test, observe and think

1. Which places need reinforcement?

2. How to replace the AI vision module?

Please modify your robot to make the model more interesting and play freely based on this.

Optimization | Analysis

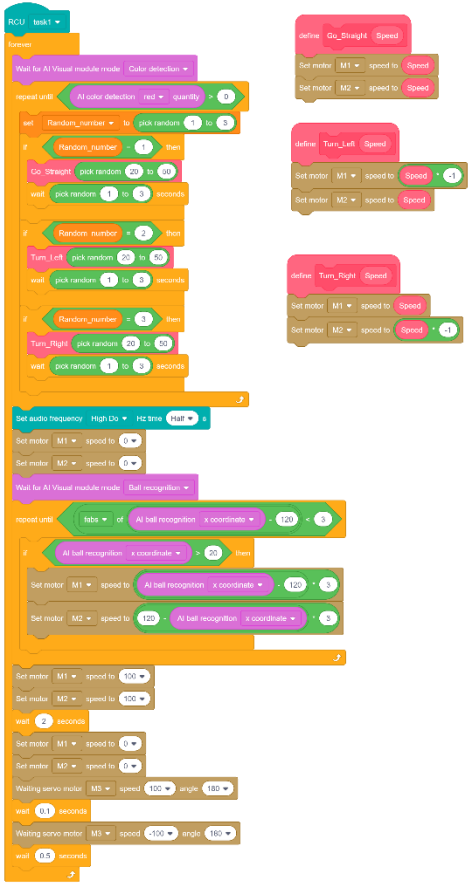


Test, observe and think

1. How to set up the location of prey?
2. How do scorpions adjust their direction after finding prey?

Please design movements for the robot and complete the programming, and then play freely based on this.

Optimization | Analysis

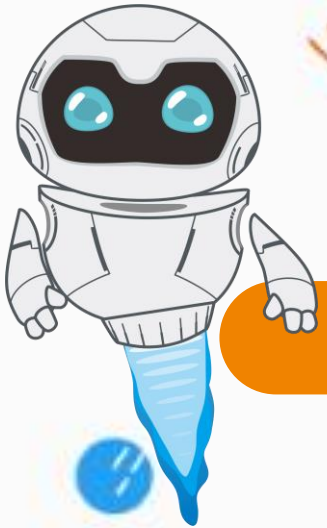


Test, observe and think

1. How to set up the location of prey?

2. How to make scorpions adjust their direction after finding prey?

Please design movements for the robot and complete the programming, and then play freely based on this.



Result



Result | Display Your Robots

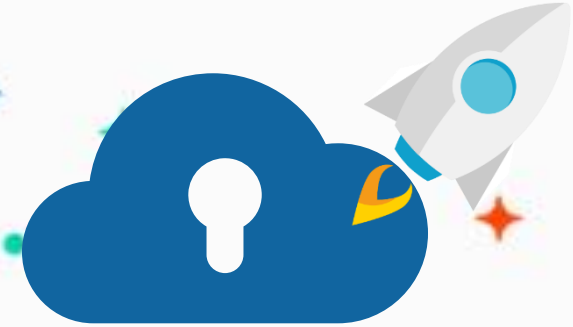
Please introduce your robots.

- Start with an interesting, powerful, and informative introduction to yourself
- Describe the building steps and program implementation process (problems encountered and solutions)
- Run the program to display your robot
- Explain the highlights of the work (add explanations for creative effects)

Further Reading：Transformers-Scorponok



Scorponok appeared on the space station in the form of a scorpion as a machine monster used by the Quintessons, responsible for destroying the invaders. His powerful body made Optimus Prime and Megatron, who were trapped by the Quintessons, helpless against him. It transforms so the pliers can fire. Its home planet was once a Cybertron colony. It is a mechanical race of Cybertron. It was instigated by Quintessons to kill each other due to the civil war. It is already the last member of the Scorponok race. Scorponok almost forced both sides into a desperate situation at the same time. He once forced Optimus Prime into a desperate situation twice, but was saved by Megatron's fire both times. In the end, he was defeated by the two major factions who joined forces.



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Thanks!

LECTURER: