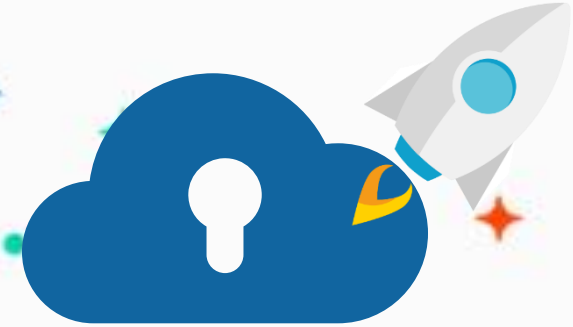

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# Lesson 10. Guide Dogs

Lecturer:

# Lesson Objective

## Learning Objectives

1. Get to know guide dogs and build a guide dog robot.
2. Use RoboCode to write a program to control the guide dog to compare the distance in different directions.
3. Allow the guide dog to choose a suitable path to turn.

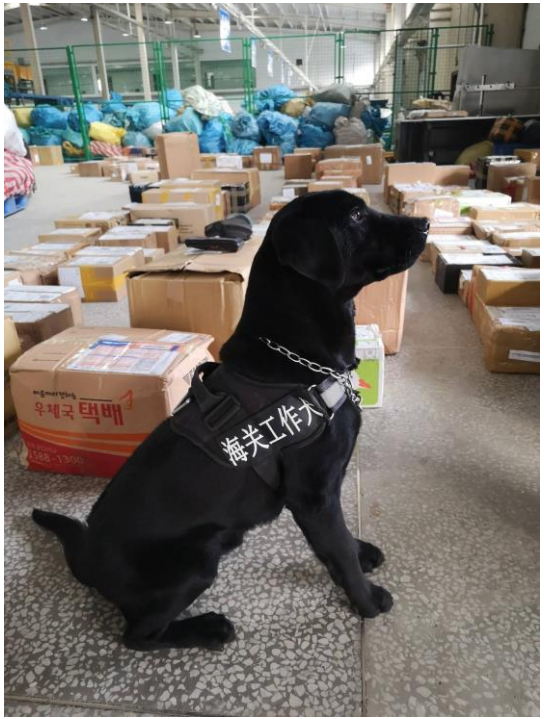
## Possible Difficulties

1. Use variables to store the data of the ultrasonic sensor.
2. Comparison of variables and turning based on the results.



# Background

# Background Knowledge | Working dogs




A Customs Working Dog

The history of human domestication of dogs can be traced back to 10,000 years ago, and people have long discovered that dogs help humans in many ways.

Working dogs have had an immeasurable impact on humans over time. They are guards and sentries, they can pull sleds, and shepherd sheep, and they can also be helpers in human wars.

As history has developed, the role of working dogs has become wider and wider. They are not only guard dogs, used to protect the lives and property of their owners, but they can also become military dogs, police dogs, guide dogs, drug detection dogs, explosive detection dogs, sled dogs, rescue dogs, etc.

# Background Knowledge | Guide Dogs



Guide dogs are strictly trained dogs and are a type of working dog. After training, guide dogs can help blind people go to schools, shops, laundries, street gardens, etc. They are accustomed to being restrained by collars, guide leashes, and other accessories. They know many passwords and can lead blind people to walk safely. When they encounter obstacles and need to turn, they will guide their owners to stop to avoid danger.



# Introduction

# Introduction | Dog-shaped Robot




Dog-shaped robots, also known as robot dogs, belong to the category of civilian robots. The characteristic of the dog-shaped robot is that it has the appearance of a dog and is about the size of a puppy. It is a high-tech product from the inside to the outside. It can imitate the movements of a dog, recognize the voice and appearance of its owner, respond to simple words, and have expressions of joy, anger, sorrow, and joy.

Dog-shaped robots were the earliest entertainment robots and have become one of the ways for robots to enter ordinary households.

Household robots began to appear, and the “AIBO" robot electronic dog launched by Sony began to enter people's field of vision. This electronic dog is about the size of a puppy and is a high-tech product from the inside out. It can recognize the voice and appearance of its owner, respond to simple words, and have expressions of joy, anger, sorrow, and joy.

# Introduction | Big Dog Robot




Big Dog robot is named because it looks like a mechanical dog. It is specially designed and researched by Boston Dynamics for the US Army.

It can not only climb mountains and ford water but also carry heavier loads. This mechanical dog may run faster than humans. There is a computer installed inside the "Big Dog" robot, which can adjust its traveling posture according to changes in the environment. "Big Dog" can either travel along preset simple routes on its own or be controlled remotely. The Big Dog robot is called "the most advanced robot in the world that can adapt to rough terrain."

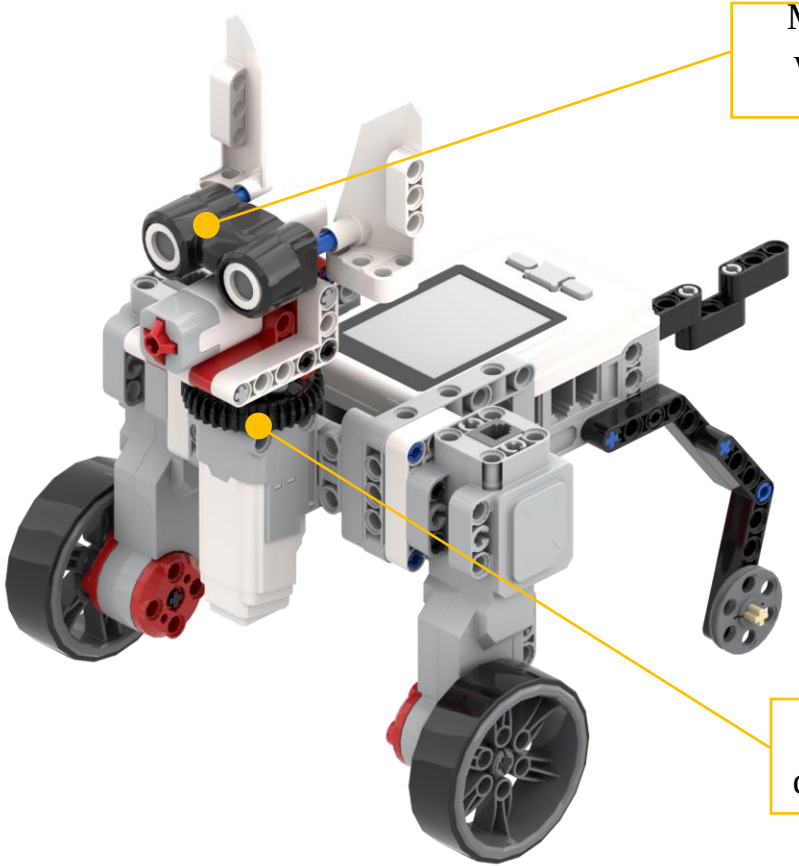


# Practice



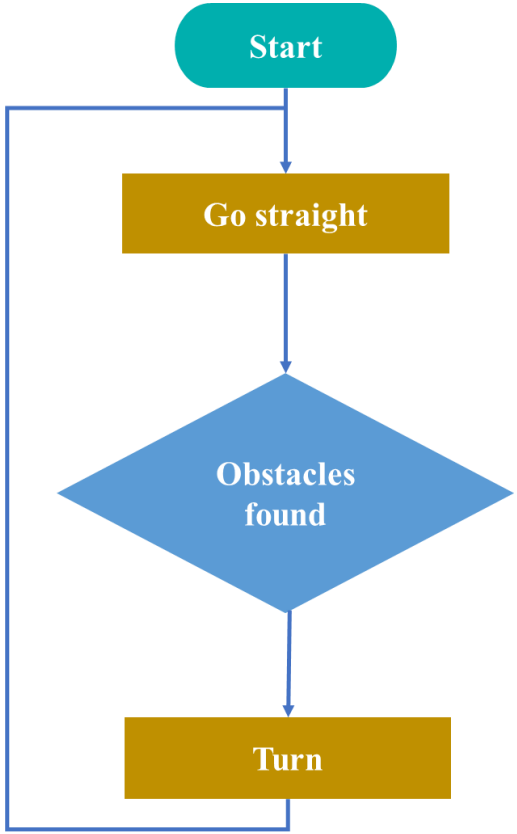


# Practice | Robot Building




Build the guide dog robot according to the building manual, and select the connection ports to connect the ultrasonic sensor, medium motor, and large motor.

# Practice | Flowchart



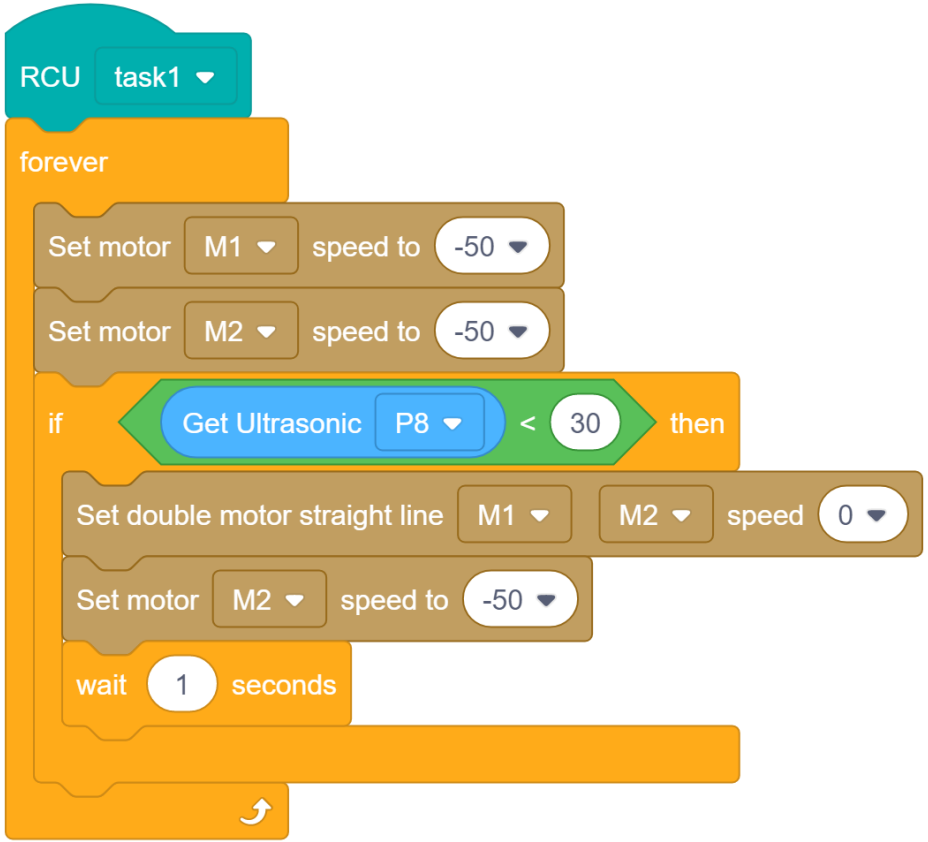

The program of the guide dog robot:

①Go straight

② Turn when obstacles are recognized

③ Repeat this cycle

# Practice | Programming




The program of the guide dog robot:

①Go straight

② Turn when obstacles are recognized

③ Repeat this cycle



# Exploration



# Exploration | Discussion

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

Does it seem unintelligent to turn in only one direction?

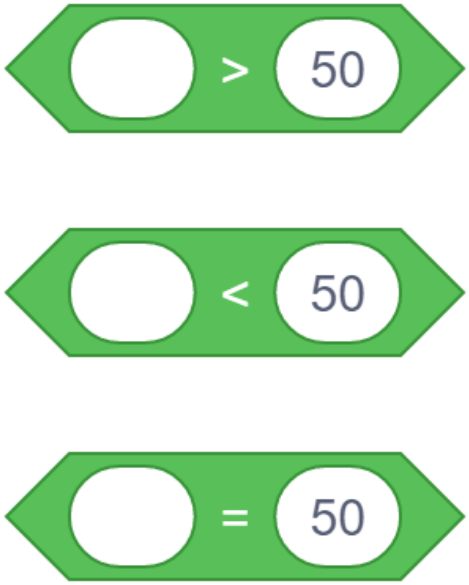
Can guide dogs find a more suitable direction?

Which method is used to allow guide dogs to analyze distances in different directions?

# Exploration | Discussion

So, how to solve these problems and make improvements?

# Exploration | Operator-module



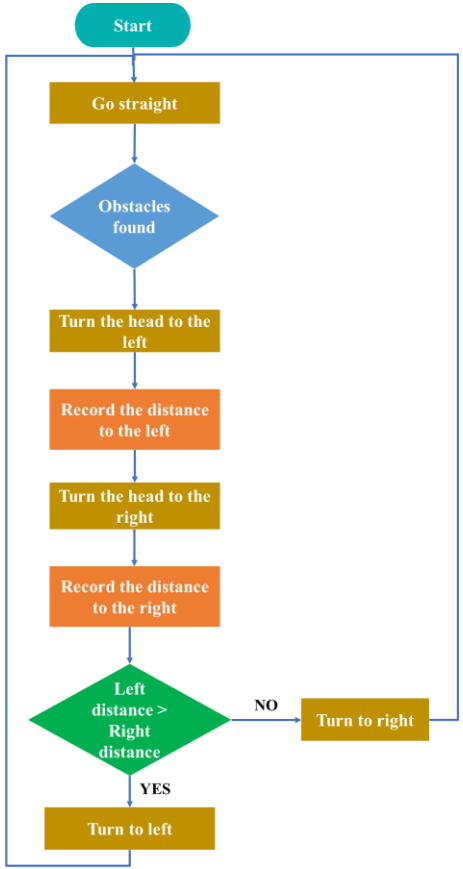

If the value of the specified parameter is greater than/less than/equal to the specified value, the reporting condition is true.

Using the operator-module, the data can be compared and a yes or no judgment can be output.



# Optimization

# Optimization | Analysis




## Test, observe and think

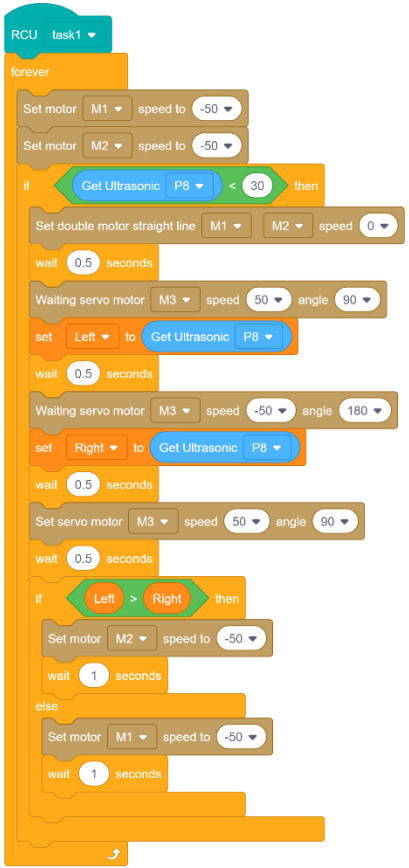
1. How should a guide dog's head be rotated?

2. What is the appropriate rotation angle for the middle motor?

3. How to compare the distance between the two sides?

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

# Optimization | Analysis




## Test, observe and think

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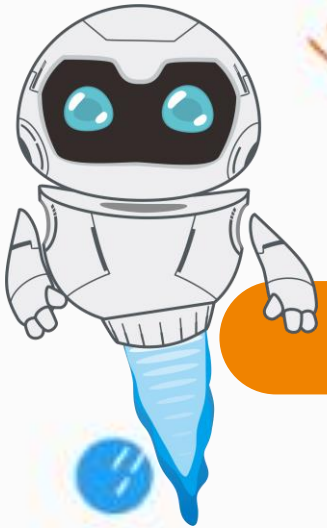


# Result



# Result | Robot Games

Let’s take on an obstacle challenge!

# Result | Display Your Robots

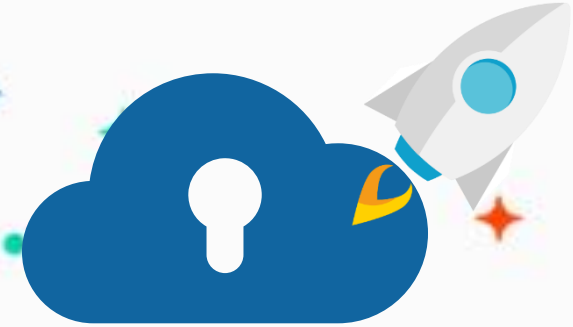
Please introduce your robots.

- 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)

# Result | Further Reading: The First Household Robot Dog




AIBO is an electronic robot pet first launched by SONY in 1999. The emergence of AIBO not only represents the birth of a robot pet, but more importantly, AIBO cooperates with artificial intelligence technology and develops in the direction of providing life entertainment. SONY also put a lot of effort into naming AIBO. The name AIBO (pronounced eye-bo, translated as "Aibo" by Hong Kong and Taiwan media) has several meanings: AIBO is the pronunciation of "companion" in Japanese, and it also The English pronunciation is the same as Eye-Robot (a robot with eyes). The two letters A and I in AIBO are the abbreviations of Artificial Intelligence (artificial intelligence).



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# Thanks!

LECTURER: