Lesson 18. Tail-Wagging Stegosaurus

LECTURER:

Lesson Objective

Learning Objectives

1. Learn about Stegosaurus
2. Know how to play audio and continue running the program

Possible Difficulties

1. Construction of Stegosaurus’s tail
2. Ultrasonic control to play audio



Background Information



Background Information



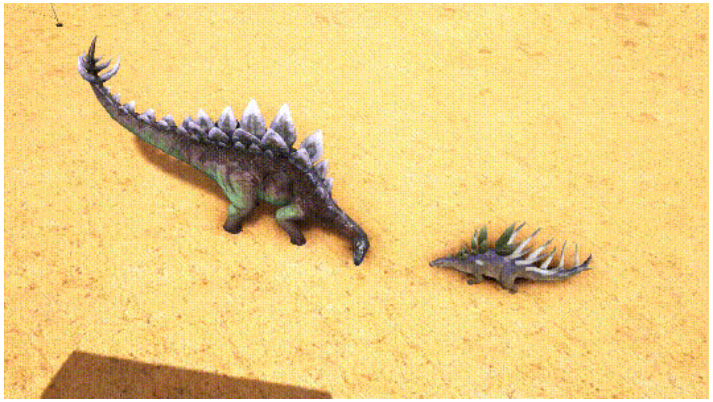
Stegosaurus was a huge herbivorous dinosaur that lived in the late Jurassic period. Stegosaurus is a herbivorous dinosaur. It does not hunt other animals for a living and can live in peace with other herbivores. It usually lives on the plains in the form of nomadic groups.

Background Information



Their biggest feature is the 17 laminas of different shapes on the back. Scientists have a lot of debates about the lamina of Stegosaurus, and there is no conclusion so far. It is more reasonable to say that the bone plate is used for heat dissipation or display (courtship or intimidation defense).

Background Information



Although Stegosaurus was a herbivore, it also had its own weapon—a spiked tail. Stegosaurus will attack by turning itself to wag its tail. Today, we're going to build a Stegosaurus robot that makes noises as it moves.

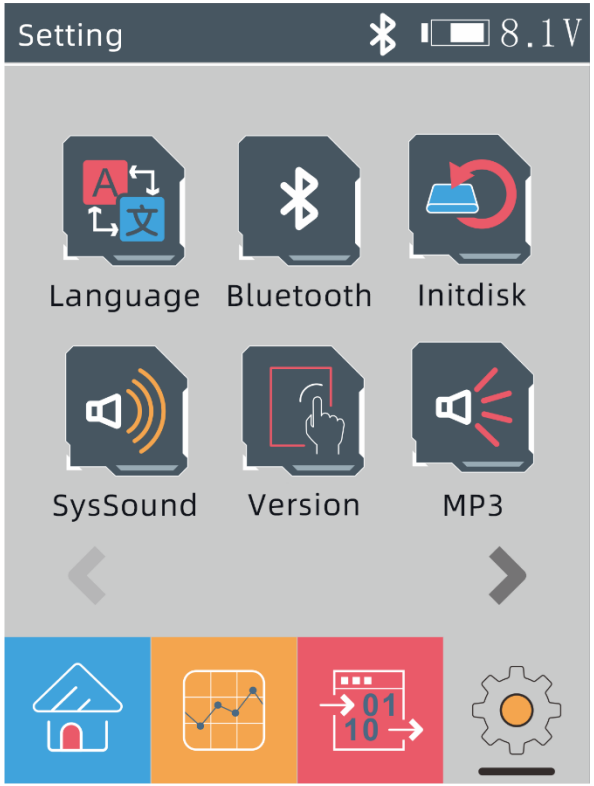


Knowledge Introduction

Programming Knowledge

The buzzer can't simulate the sound of dinosaurs very well, so we need to play an external audio file. Playing an audio file is a very simple function, but it becomes very complicated when it needs to be performed simultaneously with other functions. First, save the audio file to the controller, and pay attention to distinguishing between downloading audio and downloading programs.

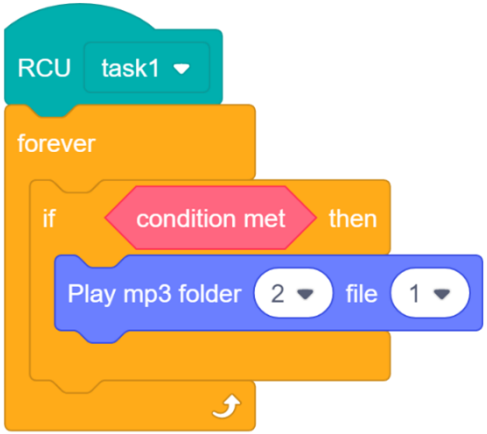
Programming Knowledge

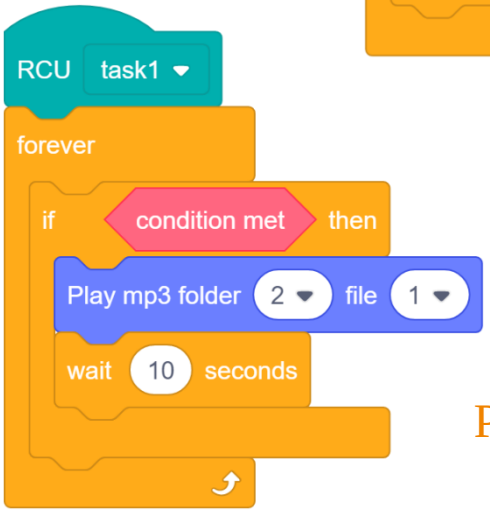


Select the MP3 option in the system settings on the controller, test whether it can play normally and adjust the volume of the sound.

Programming Knowledge

Keep repeating





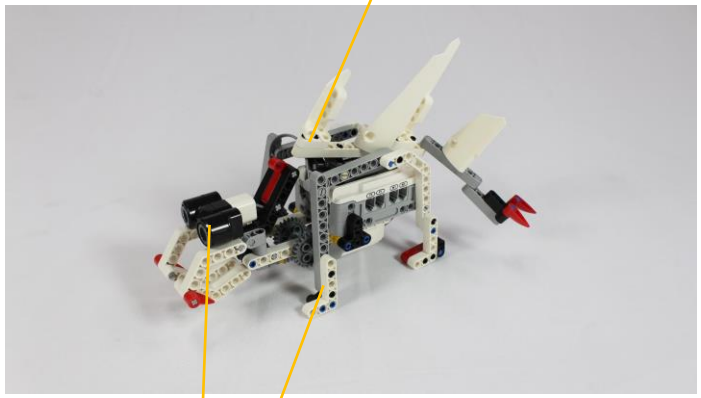
Process blocking

It is not so simple to let the program play audio at the right time. The main problem is that the audio cannot be played normally due to repeated playback of the audio when the condition is met. However, if the waiting seconds block is used, the program will become a blocking program and cannot run subsequent programs in time. Of course, these problems can be solved in this lesson.



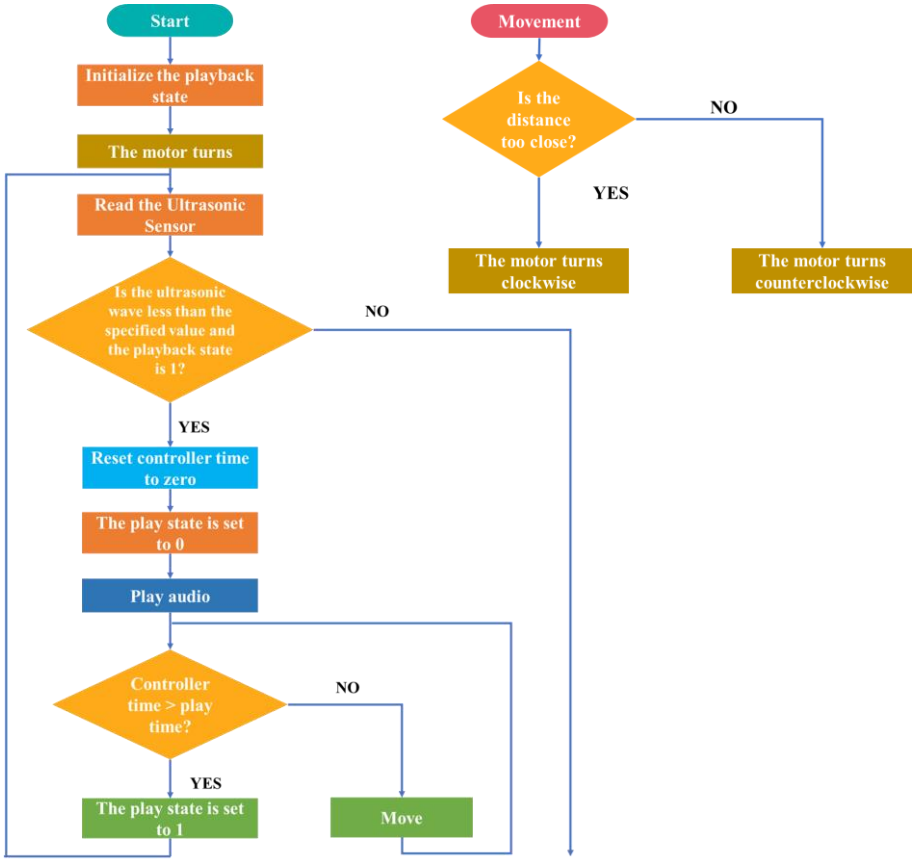
Practice

New Knowledge



According to the building manual, build a stegosaurus robot. During the movement, the stegosaurus robot will make a sound when it detects obstacles.

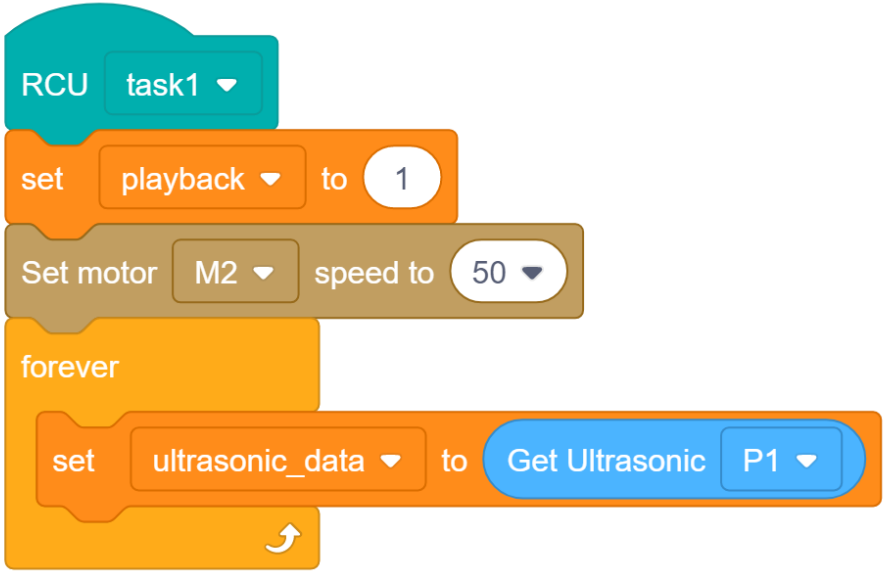
Practice | Flow Chart



Stegosaurus will keep moving forward until it detects an obstacle in front of it, and will move backward if it is too close to the object.

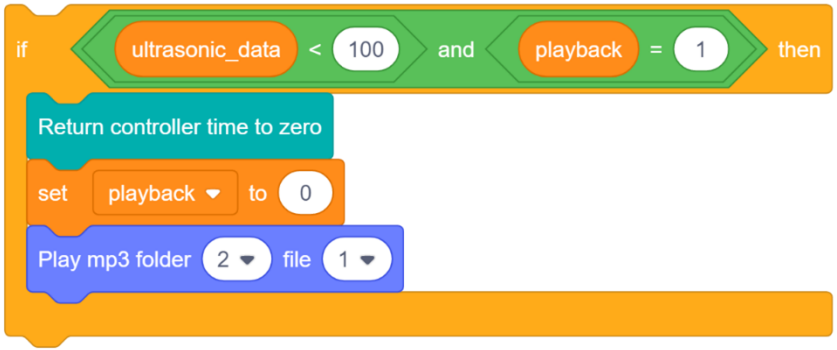
After the conditions for playing the audio are met (the distance is short enough, the playback status is 1), change the playback conditions (the playback status is switched to 0), so that the audio is no longer played repeatedly;

When playing audio, nest a sub-function to realize the function of changing the moving direction or executing other codes.



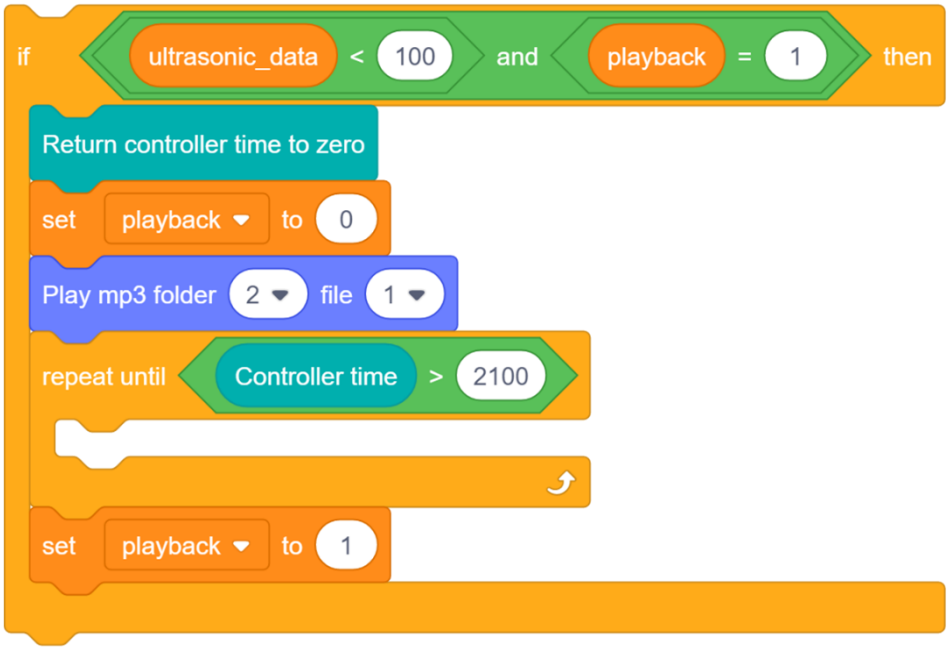
Program initialization

Setting the playback status to 1 means that playback is allowed, the motor rotates forward, and the robot moves forward. At the same time, read the ultrasonic data into the variable.



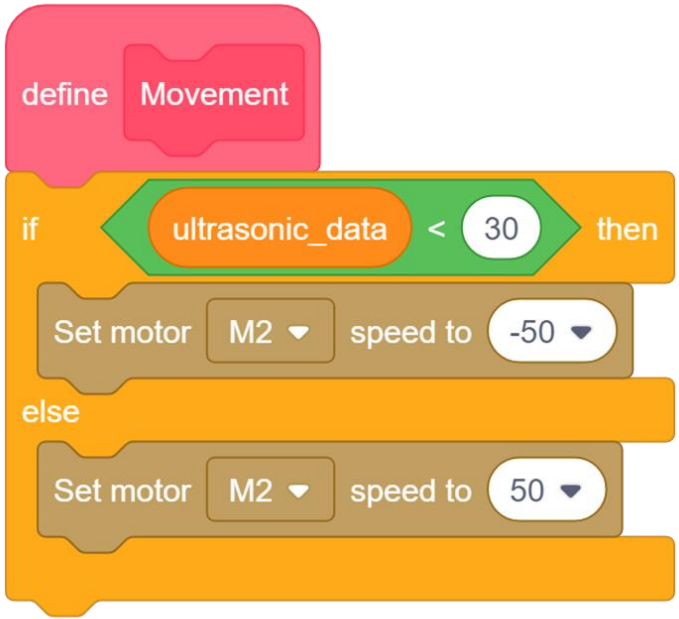
Judgment of playing audio files

To play audio, two conditions need to be met, one is that the distance is within 100, and the other is that the playback status is 1, and the playback status is switched to 0 before playback, which means that the sound cannot be played repeatedly.



Judgment to end playing audio

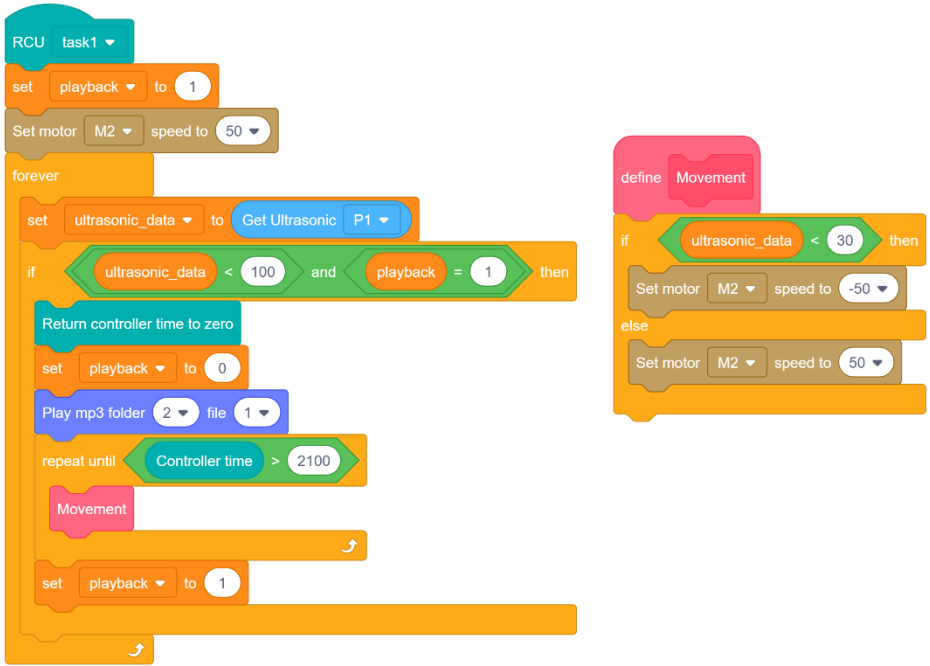
The audio time is 2 seconds, so after two seconds, the state toggles to 1. To avoid incomplete audio playback, the time can be slightly longer than the audio time.



Define the Movement function

The Movement function is used to switch forward or backward within playback time and move backward when the distance is too short.

Practice | Programming

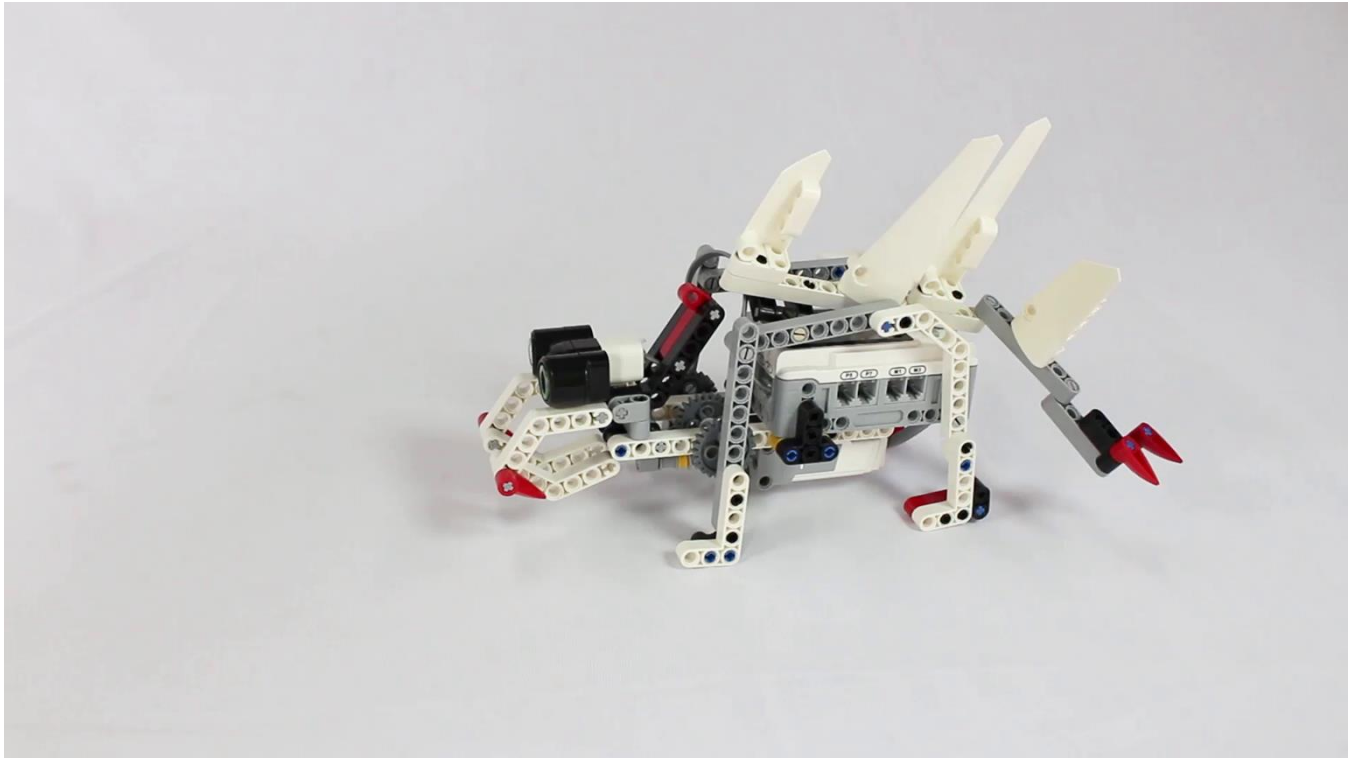


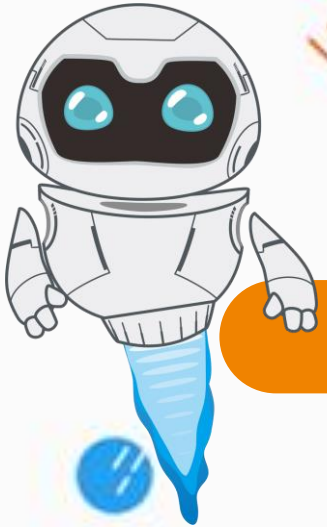
Integrate the program

Integrate the program according to the flowchart.

The movement function is executed during the playback time so that the movement direction can be switched without affecting the audio playback. Of course, you can also choose to read the ultrasonic data again to change the direction in a more timely manner. This method can be used without affecting the operation of the main program, but the main program needs to be written as a function for calling.

Practice | Programming





Results



Program Optimization

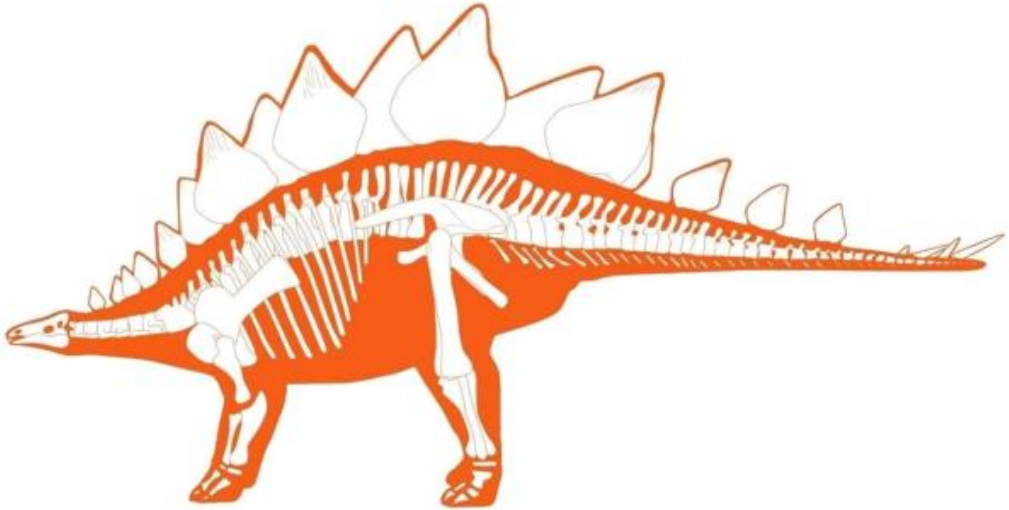
In this lesson, we implemented the Stegosaurus robot to move and wag its tail. When the distance is too close, the Stegosaurus will make a sound.

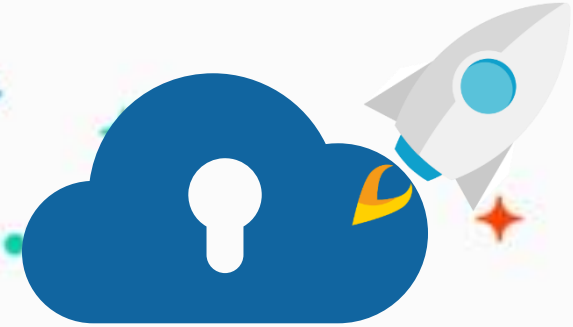
Modify the program so that Stegosaurus can move forward or backward in time.

Requirements: Adjust the ultrasonic judgment value and value acquisition time, so that the robot can change direction reasonably and timely.

Further Reading

Due to the small head shape of Stegosaurus, scientists generally believe that they did not have a well-developed brain, and the brain volume may be smaller than that of a puppy, which also means that they are very bulky and slow. However, another study shows that Stegosaurus may have a second brain, one on the head and the other on the buttocks, and the two brains need to be used together to protect themselves.





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Thanks!

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