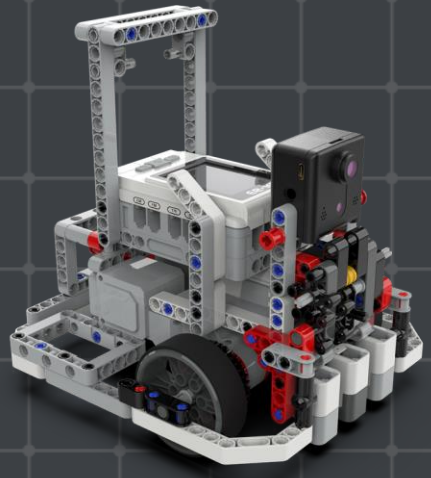


Lesson 2 | Firefly |

Key points from this lesson:

1. Understand the concept and function of variables

2. Learn to create variables and assign values to variables

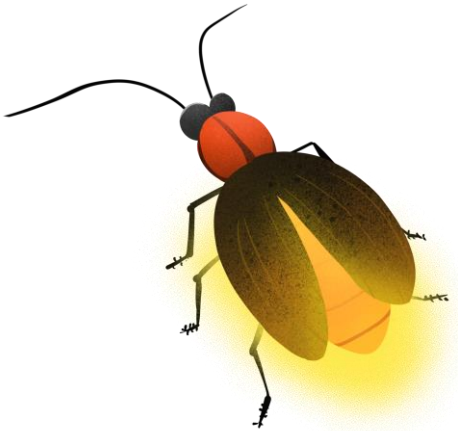
Possible difficulties from this lesson:

1. Understand the process of variable assignment and reading

Firefly

Fireflies are insects that emit yellow-green fluorescence. They usually live in wetlands, forests, and grasslands. In the summer, they may also appear in parks, meadows, and riverbanks.





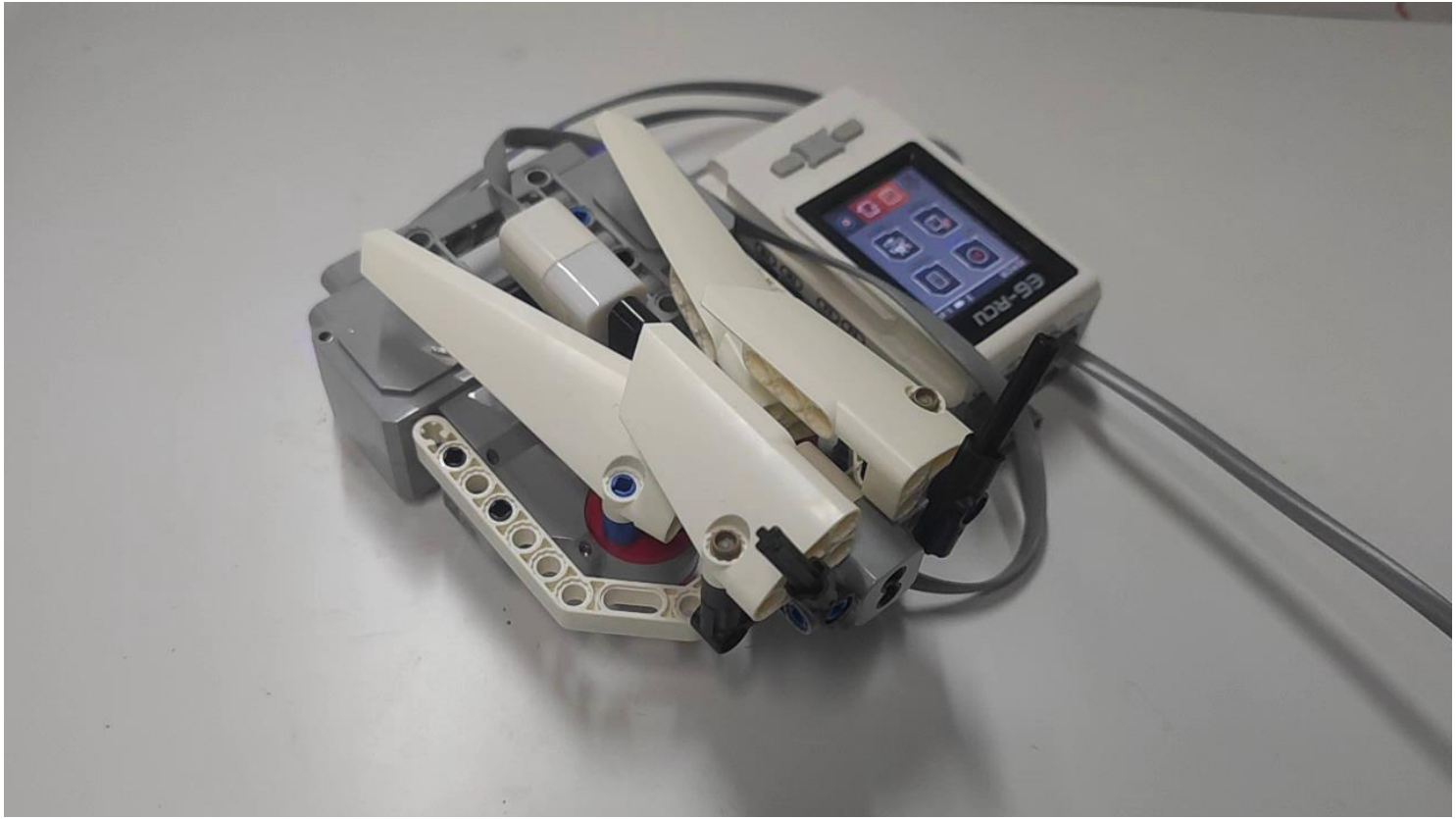
Why do fireflies glow?



The light emitted from the end of the firefly's abdomen can help fireflies attract mates, illuminate, mark territory, and drive away enemies.

In cities with severe light pollution, fireflies may be disturbed and unable to emit light normally.

Effect Demonstration



Project Tasks

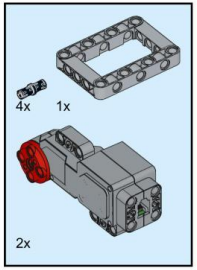
Design a firefly model and control it by using a photoelectric sensor.

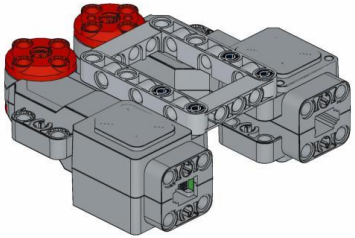
Requirements for robot functions:

1. After powering on, the Firefly Robot records the ambient light intensity at that time as the initial value, spreads its wings and emits light.
2. If the Firefly Robot is exposed to brighter light, it closes its wings and does not emit light.
3. The Firefly Robot will not spread its wings and emit light until it is no longer exposed to brighter light (the sensed light intensity is close to the initial value).

Build a robot

1





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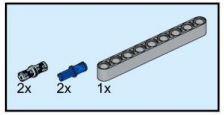
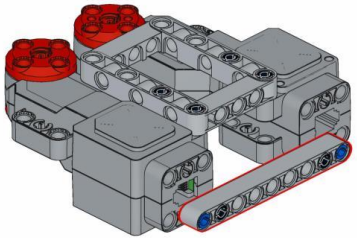
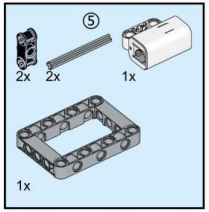
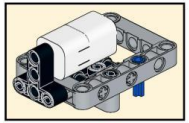


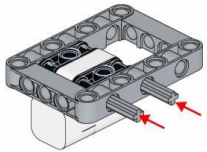


Build a robot

3







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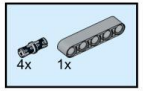
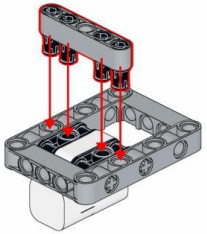


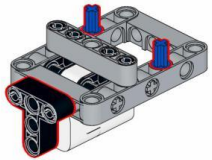


Install the color lamp

Build a robot

5





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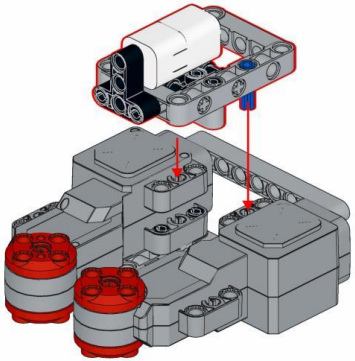
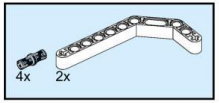
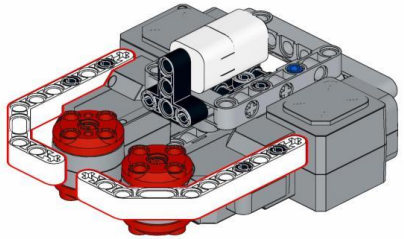


Build a robot

7





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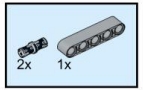
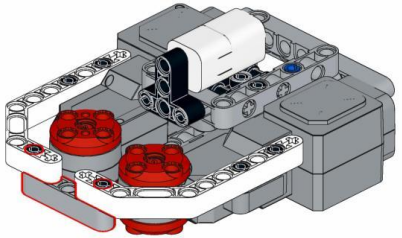
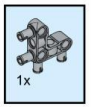
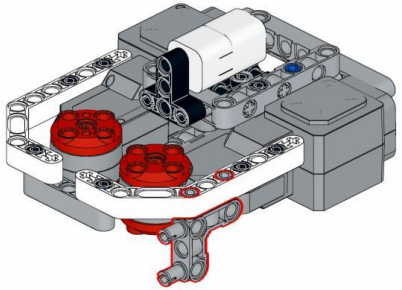




Build a robot

9





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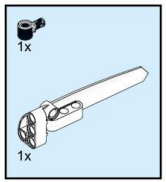
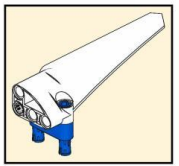
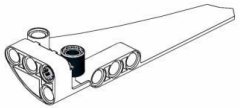
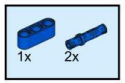


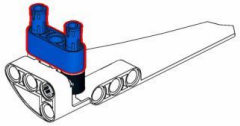




Build a robot

11





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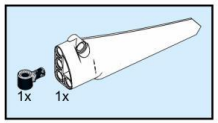
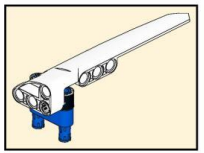
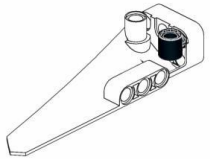
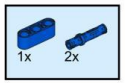


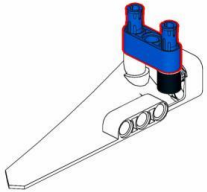




Build a robot

13





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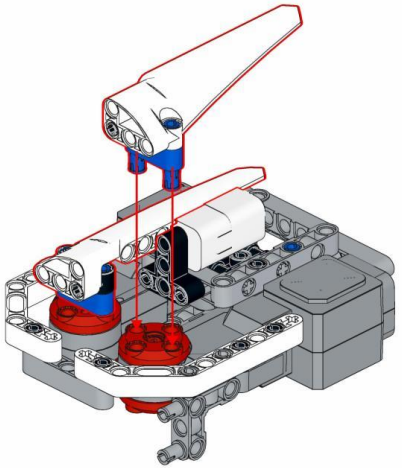
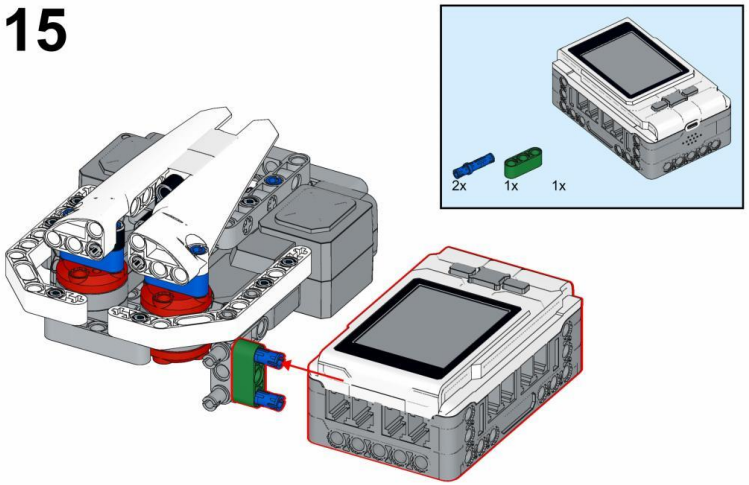


Install the wings

Build a robot

15



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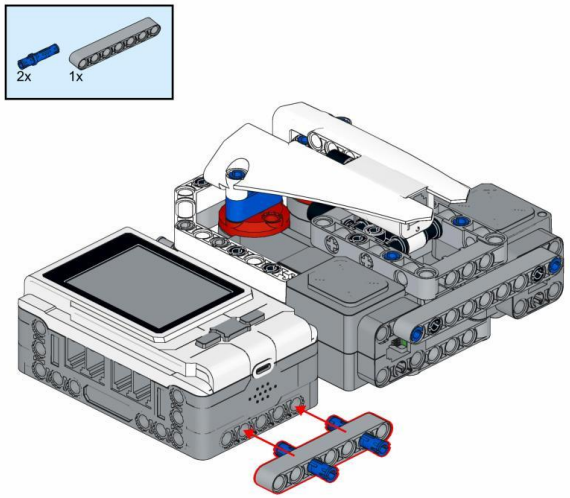
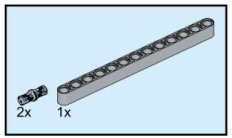
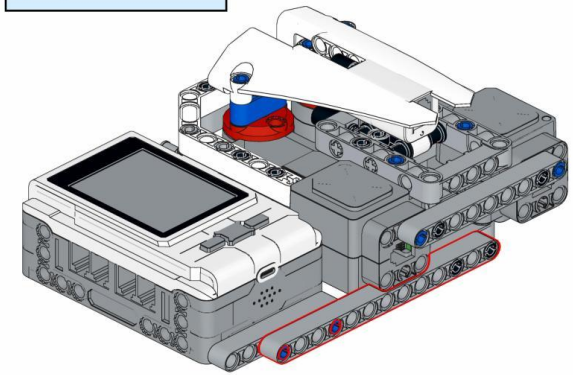


Install the controller

Build a robot

17





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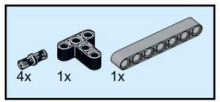
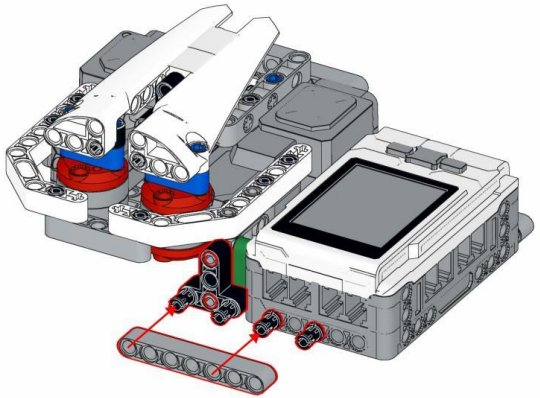
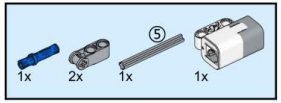


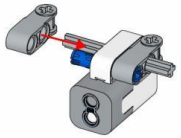


Build a robot

19







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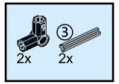
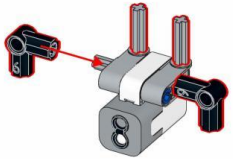
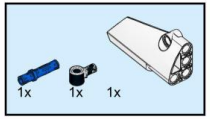


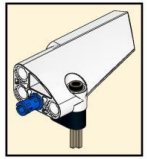


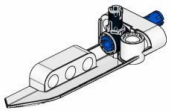
Build the head assembly (photoelectric sensor)

Build a robot

21







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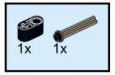
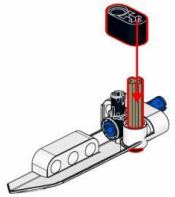
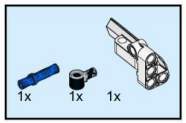
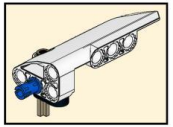




Build a robot

23







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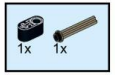
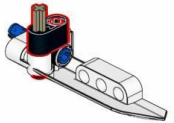
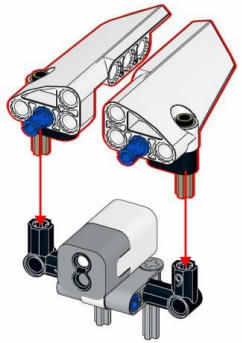




Build a robot

25



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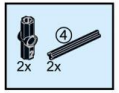
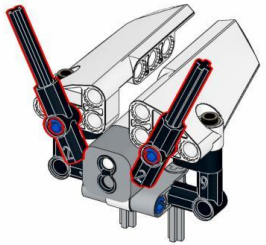
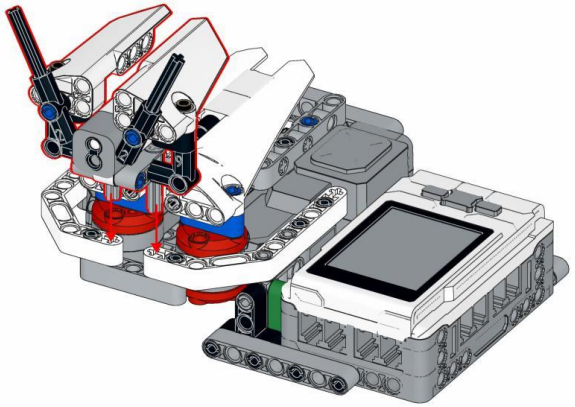




Build a robot

27



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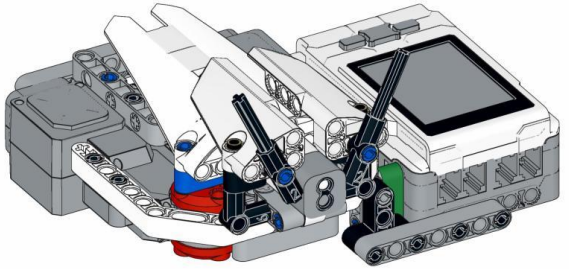
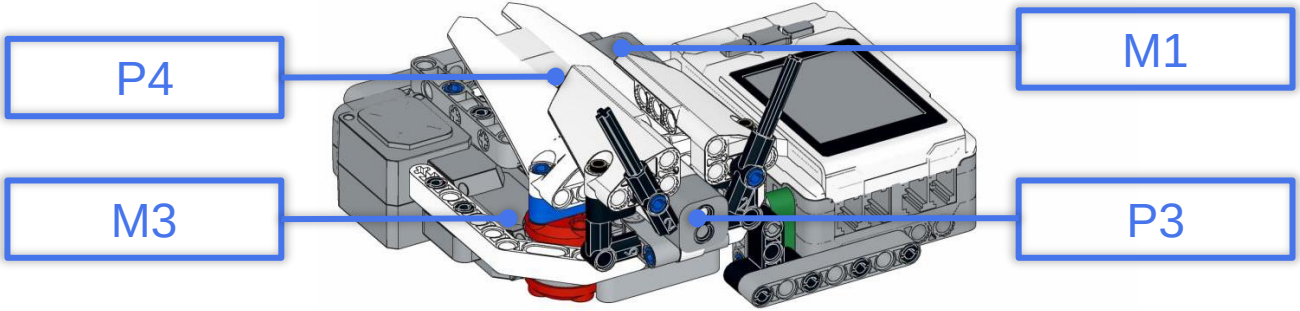


Hardware Connection

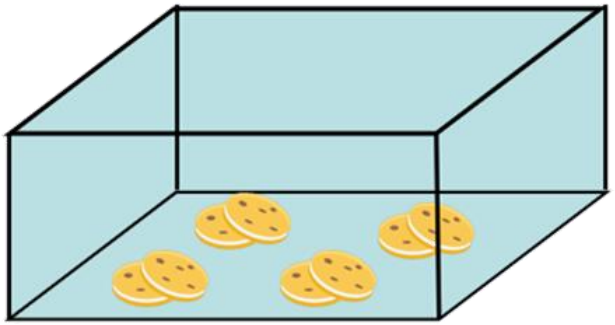


“

How do we achieve the required functions?

”

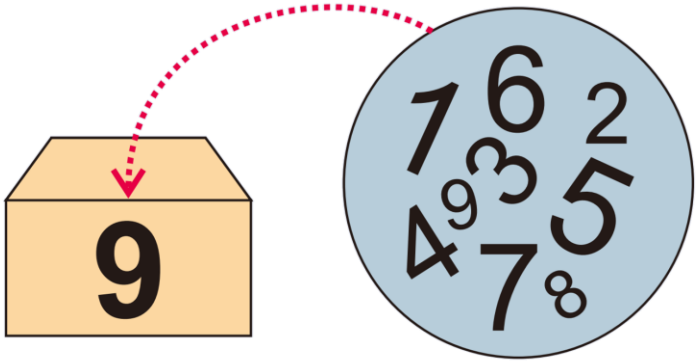
Variable



If there are some cookies in a box, and you take out some of them, the number of cookies in the box will change.

We call this "changing quantity" a "variable", which is a number that has no fixed value and can change. We can also imagine a "variable" as a box containing "cookies".

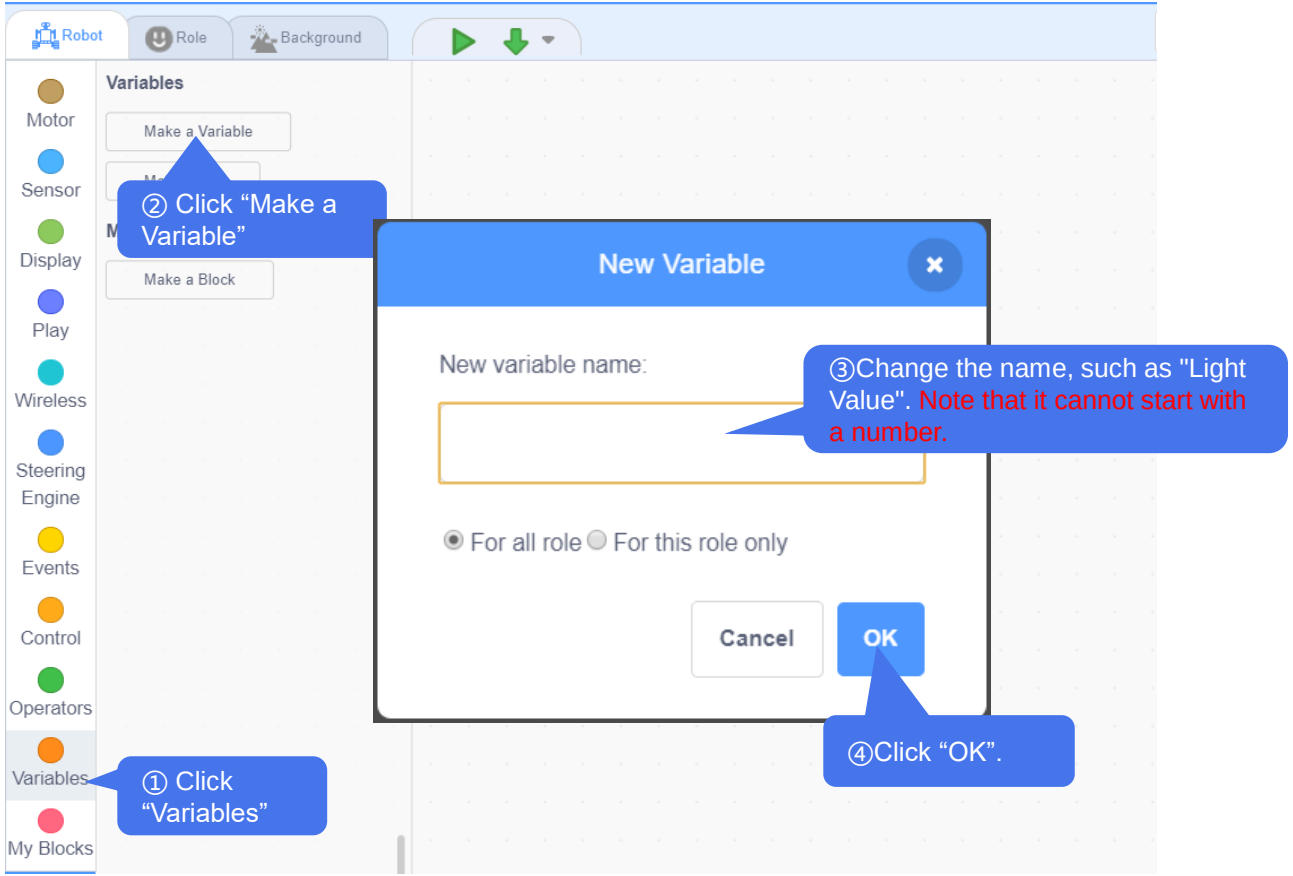
The role of variables



Variables can be used to store data, and the data in them can be changed.

However, only one data can be stored at a time, and the data stored later will overwrite the data stored earlier.

Create a variable



Coding block - set (variable) to ( )

This block assigns a value to the specified variable, which can be a fixed value or a sensor data.



This can be used to enter a numeric value or a character.

This allows you to select other variables, modify variable names, and delete variables.

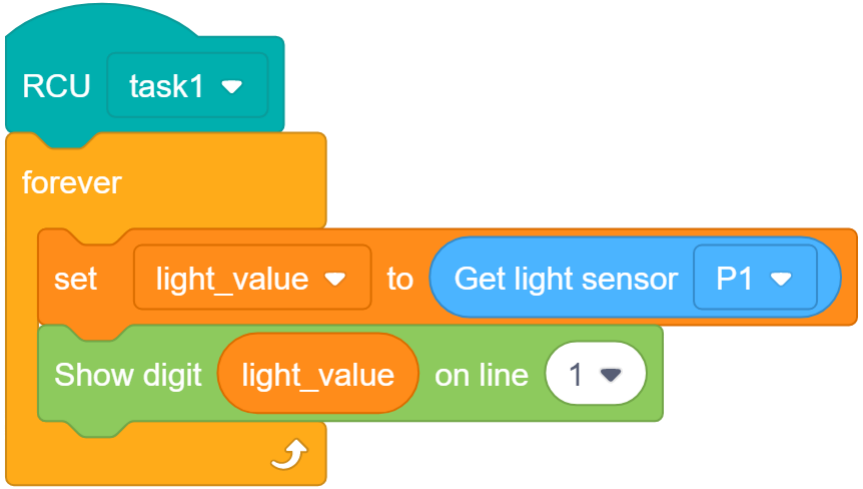
Coding block - variable



The set data is stored in it

Read the data in the variable, and the initial value is 0.

Examples of using variables

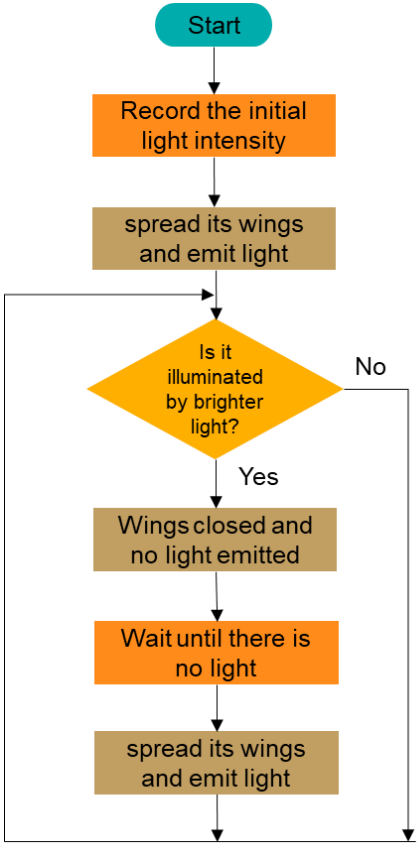


Set the variable “light value" to the value of photoelectric sensor P3 (i.e., store the value of photoelectric sensor P3 in the variable) and display it on the screen.

Download the program and run the test

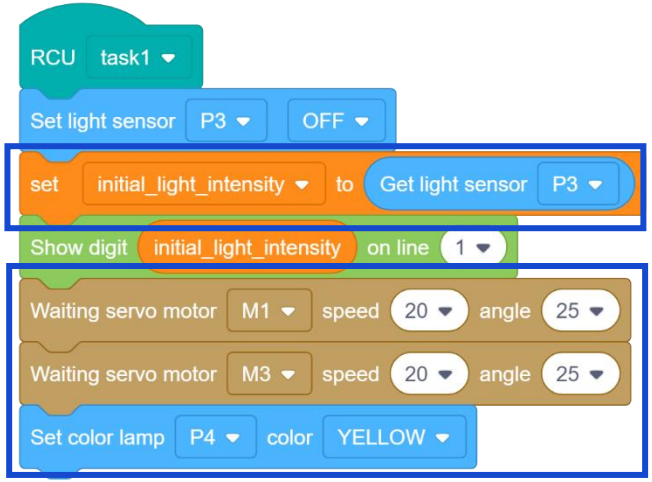


Program Flow Chart



1. The program starts, the initial light intensity is recorded, and the firefly robot spreads its wings and emits light.
2. If it is illuminated by brighter light, the firefly robot closes its wings and does not emit light.
3. The firefly robot will wait until there is no light, that is, until it is not exposed to brighter light, and then it will spread its wings and glow.

1. Initially record the light intensity after spreading the wings



First, turn off the light of the photoelectric sensor, use the variable "initial light intensity" to store the value of the photoelectric sensor at that time and display it on the screen (for easy viewing of the value).

Then the firefly robot closes its wings and does not emit light to reset, then opens its wings and emits light.

2. Close the wings when exposed to bright light



In the loop, use the variable "current light intensity" to store and display the value of the photoelectric sensor.

If the value of "current light intensity" differs greatly from the value of "initial light intensity" (the difference threshold can be adjusted by yourself), the wings will be closed and no light will be emitted.

3. Wait until it is not exposed to light and then spread its wings

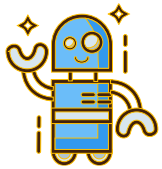


Wait until the light intensity value detected is close to the "initial light intensity" value, then spread the wings and emit light.

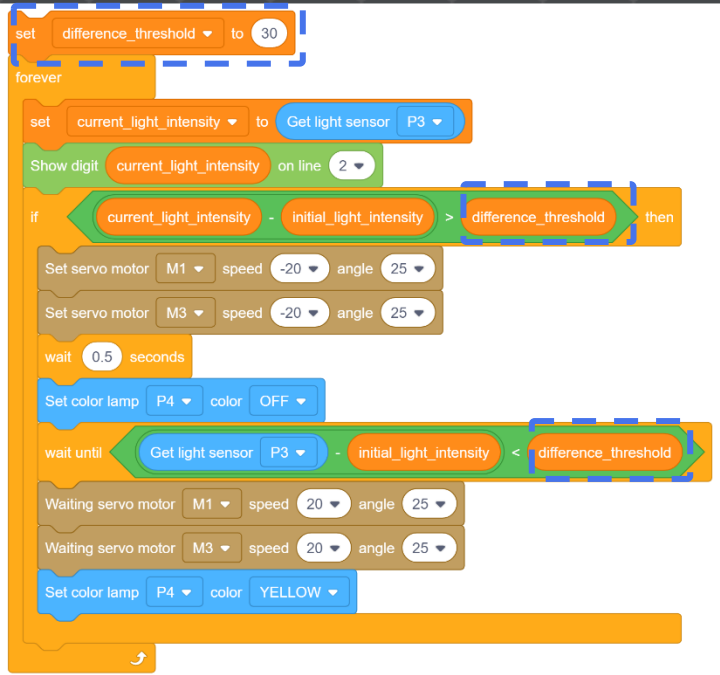
Because the current light intensity needs to be continuously detected (updated in real time), the value in the variable "current light intensity" cannot be used for judgment.

Expansion Tasks

Use variables to store the difference threshold



Expansion Program



Use variables to store the difference threshold for easy modification and debugging.

Quiz

Single-choice question

Which of the following descriptions about variables is incorrect? ( )

A. It is a number that has no fixed value and can be changed

B. It can only store one data

C. The name can be modified

D. The data stored later will not overwrite the data stored previously

Answer: D

Further Reading



The light emitted by fireflies is converted from the energy produced by chemical reactions in the body. Almost 100% of the energy is used for light emission, and only a small part of the energy is converted into heat energy. Therefore, the light emitted by fireflies is called "cold light". Different types of fireflies emit different colors and brightness.

Male fireflies use the flashes they emit to lure female fireflies. Each type of firefly has its own flash pattern.

Further Reading



The light emitted by fireflies can be used to warn other insects, indicating that they have a defense mechanism. It can also be used to attract food, such as mollusks such as snails.

In some cultures, fireflies are regarded as a symbol of hope because their flashing light in the dark brings hope and light to people.

Fireflies are distributed all over the world, and their traces can be found from tropical rainforests to cold zones.

Thanks!