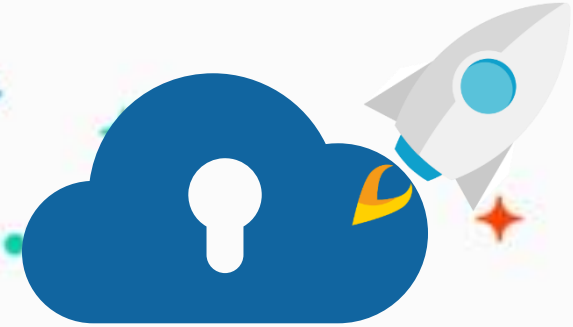

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Lesson 12. Red Light Warning Device

LECTURER:

Lesson Objective

Learning Objectives

1. Application of remainder operation.
2. Experience the comparison of non-blocking and blocking programs.

Possible Difficulties

1. Classify by performing a remainder operation on the control time.
2. Reduce the impact of waiting time on the program.



Background Information

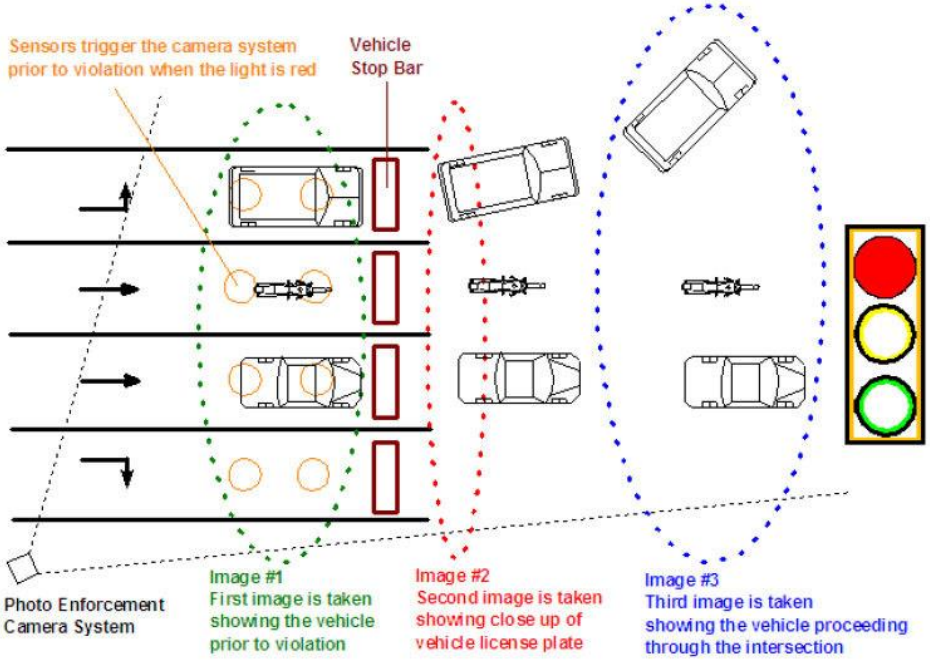


Background Information



Among the traffic accidents, the most dangerous or the most inconspicuous is the traffic accident caused by running a red light. This is because on the other side of the red light, they see a green light, which is subconsciously perceived as safe.

Background Information



Running a red light refers to the behavior of motor vehicles, non-motor vehicles, and pedestrians crossing the stop line and continuing to drive in violation of the traffic signal light instructions when the red light is on and prohibiting passage. Regardless of the reason, violations of red light violations will be punished according to law.

However, the video equipment at the intersection is also very cautious every time it collects illegal information about running a red light. If a car runs a red light, there will be three images to support it.

Background Information



In addition to penalties for cars running red lights, there are also penalties for pedestrians running red lights. my country's road traffic safety law stipulates that pedestrians, passengers, and non-motor vehicle drivers who violate road traffic safety laws and regulations on road traffic regulations shall be given a warning or a fine of not less than five yuan but not more than fifty yuan.



Knowledge Introduction

Knowledge Introduction



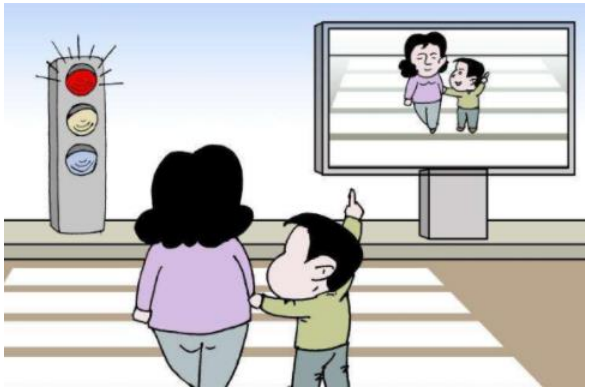
Compared with life, a mere 50 yuan fine is too little, so among the current punishments, education is more important, such as voluntarily assisting the traffic police to stand guard, helping to persuade others not to run red lights, and so on.

Knowledge Introduction



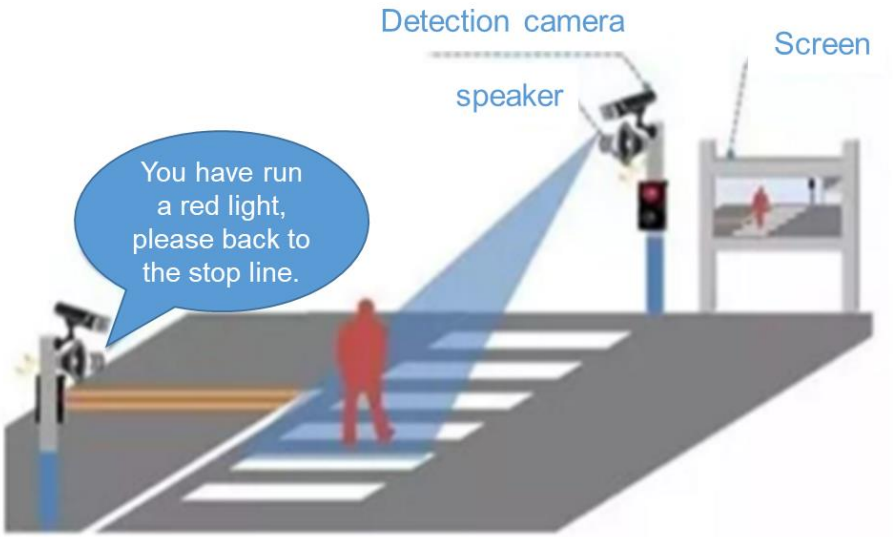
In order to make pedestrians more consciously abide by laws and regulations, some cities have begun to use a system to capture pedestrians running red lights. During red lights, roadside cameras will capture the faces of pedestrians running red lights and simultaneously expose them on the screen. At the same time, the tweeter at the intersection reminds "walk the zebra crossing and don't run the red light" at intervals.

Knowledge Introduction



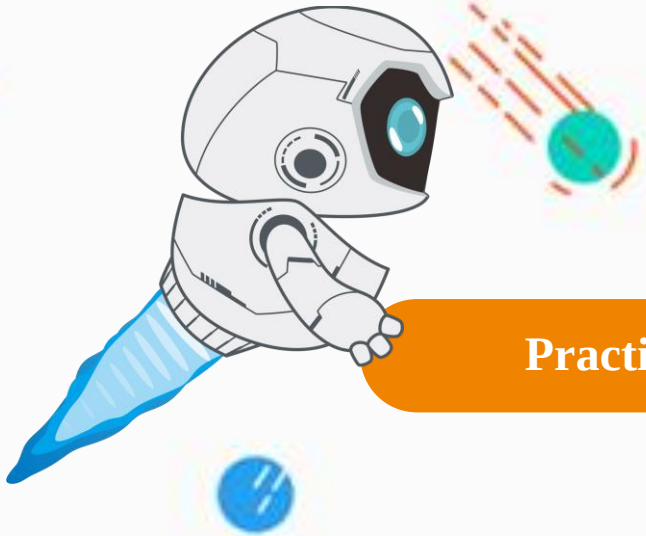
When a pedestrian runs a red light and crosses the road, the camera device of the system will automatically capture the face of the person. No matter what style of clothes pedestrians are wearing, whether they are riding bicycles or walking, they can be automatically identified. The system uses intelligent monitoring, analysis, and screening to capture pedestrians and non-motor vehicles running red lights under red light conditions, and through sound prompts, images are formed to be simultaneously exposed on the TV display screen and scrolled.

Knowledge Introduction



Running a red light is not only an uncivilized traffic behavior but also endangers the safety of life and property of all parties on the road. We must develop good traffic awareness and cross roads safely and respectfully.

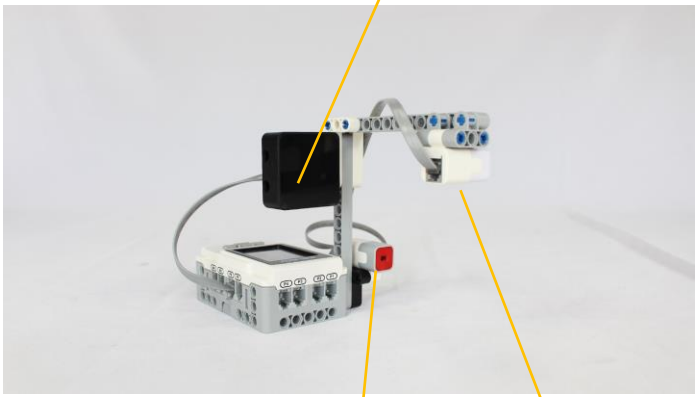
To prevent red light violations, we will make a **red light warning device**, which will alert drivers when they are approaching a red light.



Practice

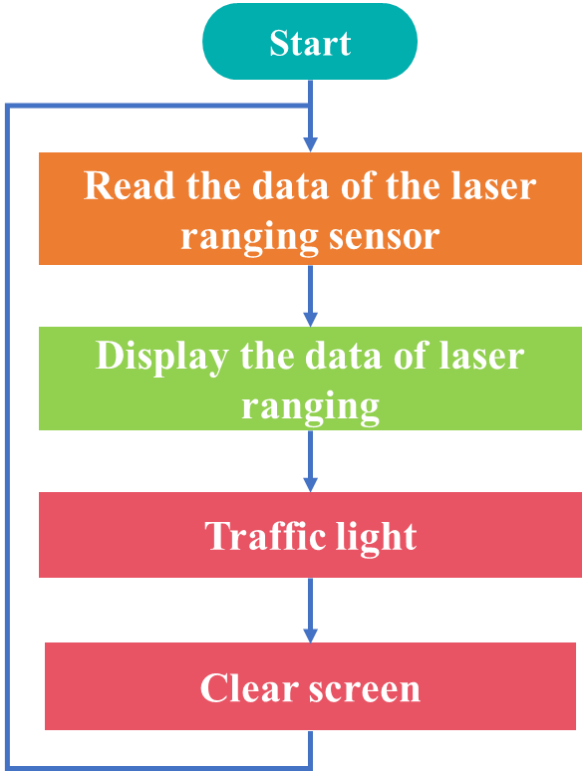


New Knowledge



According to the building manual, build a warning device for running a red light, and monitor whether there are pedestrians running a red light on the road at all times during the red light period.

Practice | Flow Chart

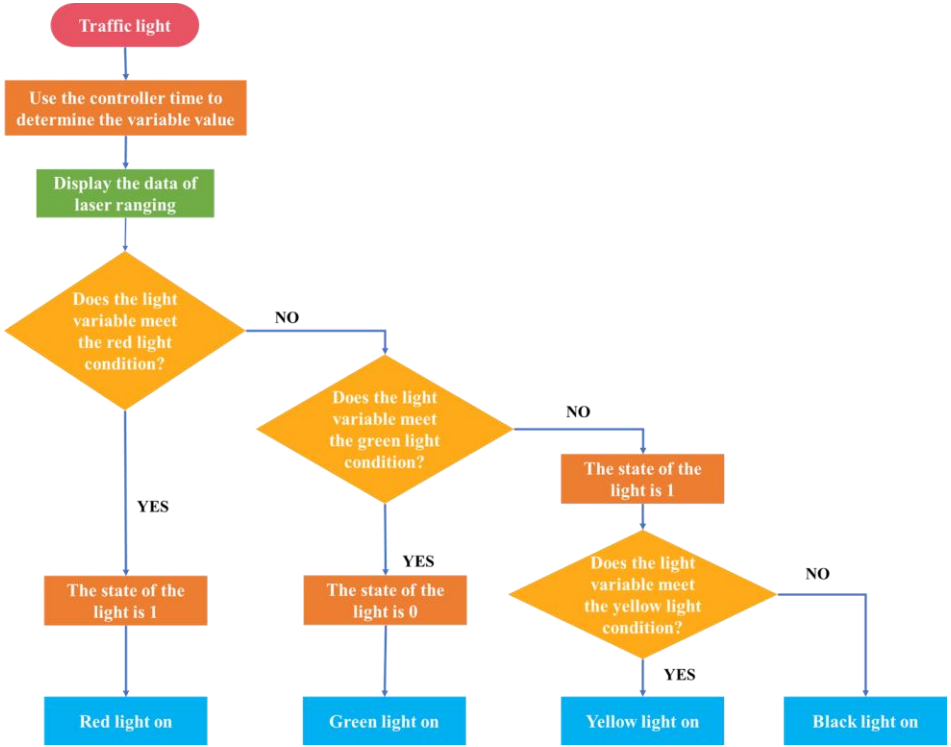


The flow of the main program is shown on the left.

The sensor will continuously read the ranging data, and the data will be used to remind the function to judge.

The lighting signal of the traffic light cannot affect the reading of sensor data, otherwise it will not be possible to monitor the road surface in real time during the light change.

Practice | Flow Chart

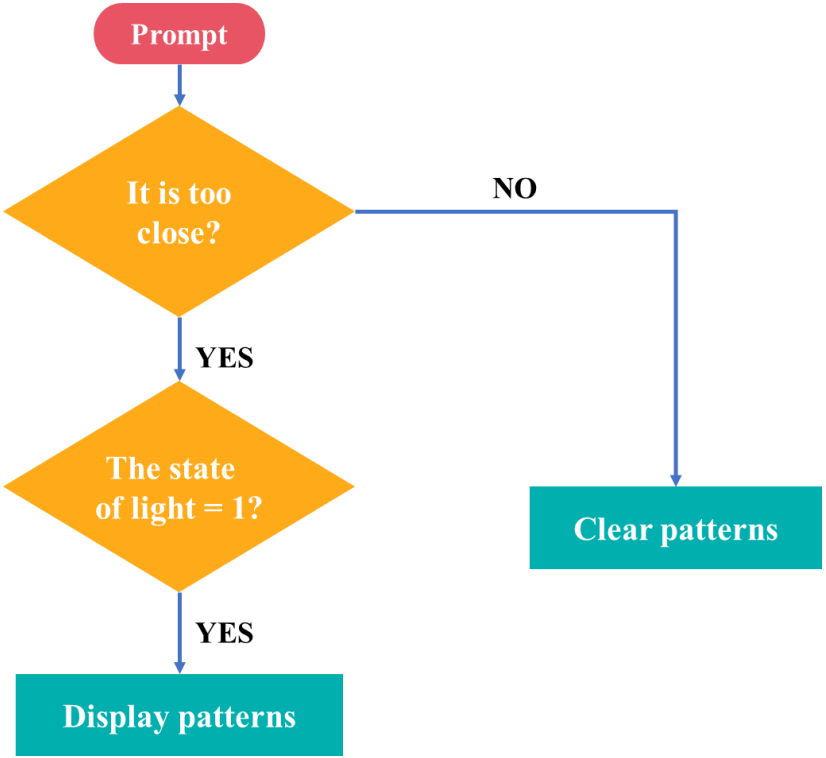


The traffic light function is shown on the left.

The key to this program is to use the controller time to determine the variable value, not the wait time to toggle the lights.

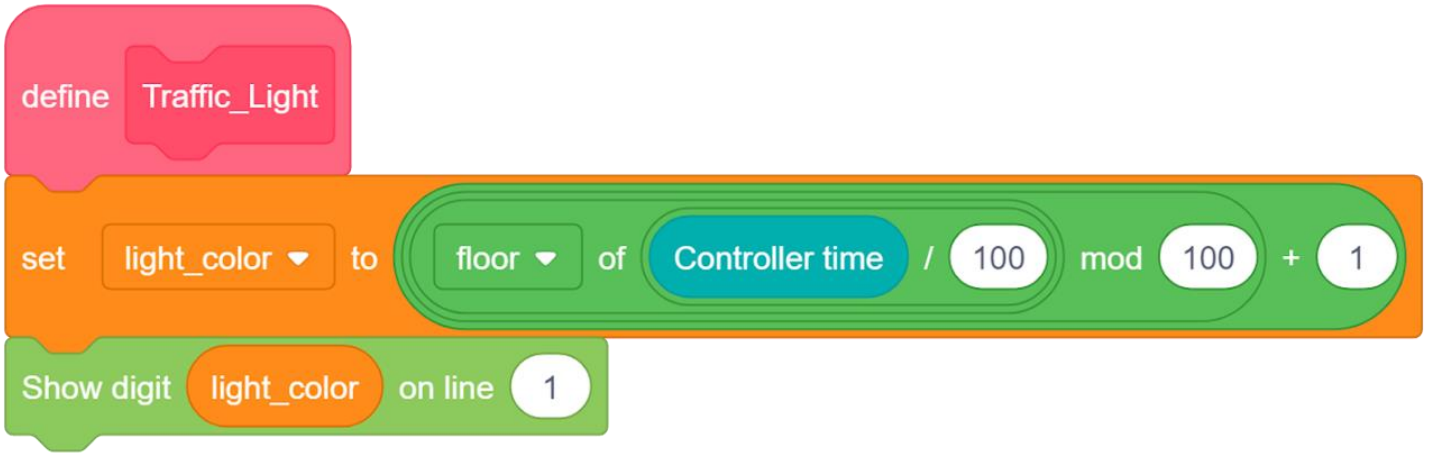
Using the controller time can realize a non-blocking program, while using the waiting time will block, resulting in the inability to monitor the laser ranging data in real time.

Practice | Flow Chart



The flow chart of the Prompt function is shown on the left.

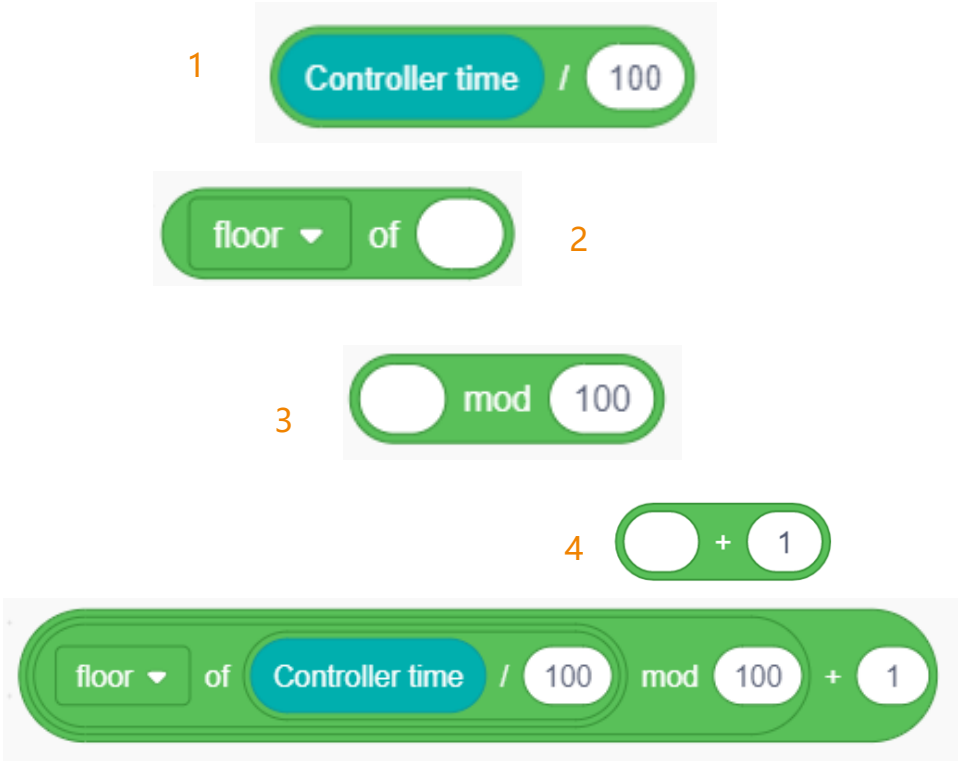
First, judge the distance, and then judge the state of the light. If the state is 1, it means that the road should not be crossed (red or yellow light), and if the state is 0, it means that the road can be crossed.



Function - Traffic Light

Define the function of the traffic light, and increase the light color variable by 1 every 0.1 seconds.

The actual effect of the program: the number from 1 to 100 is obtained in a loop, and the interval between each number change is 0.1 seconds.

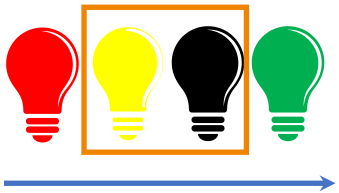


Function - Traffic Light

The operation sequence is: divide the controller time by 100, round down, and add 1 to the remainder after dividing by 100.

alternating over time

stay on for a while



stay on for a while

Lighting sequence (from left to right)

Interpretation of the traffic light function-step 1

Use variables to control the lighting effects of red, yellow, green, and black lights.

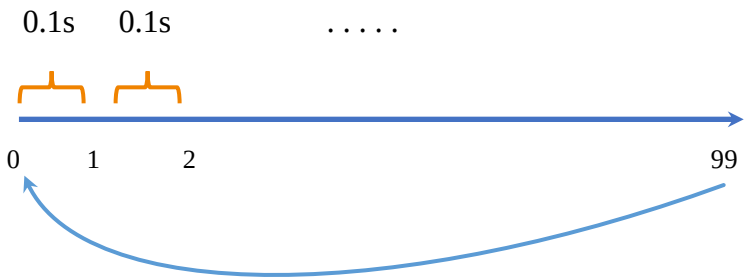
Among them, the yellow and black lights are used for the flashing reminder of changing the lights, and they are switched every 0.1 seconds, and the controller time of the first step is divided by 100.

Practice | Programming

Raw data	Rounded data
1.11	1
1.12	1
2.13	2
3.14	3
.	.
.	.
.	.

Interpretation of the traffic light function-step 2

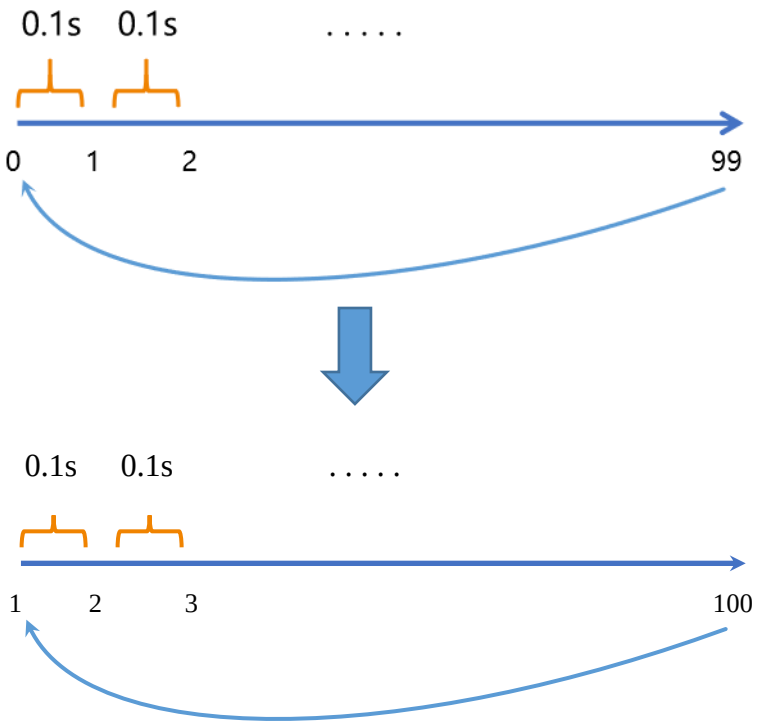
Only integers need to be rounded, and the “floor of…" programming module can be directly used.



Interpretation of the traffic light function - step 3

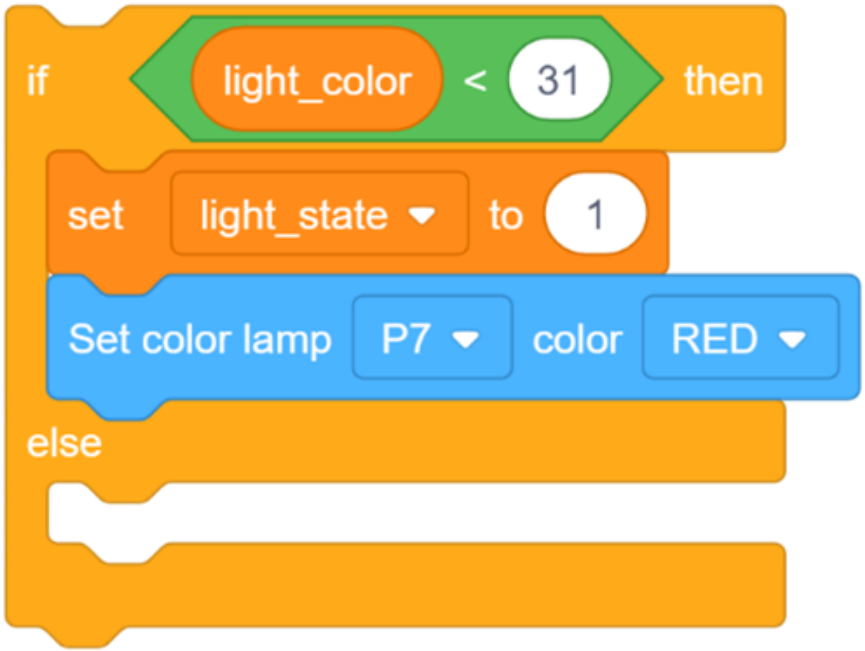
Then perform the remainder operation on all the numbers after rounding, dividing the time into one hundred parts, and performing a cycle.

Every 0.1 seconds, the color variable of the light will be increased by 1 until 99, then it will become 0 again, a total of 100 numbers.



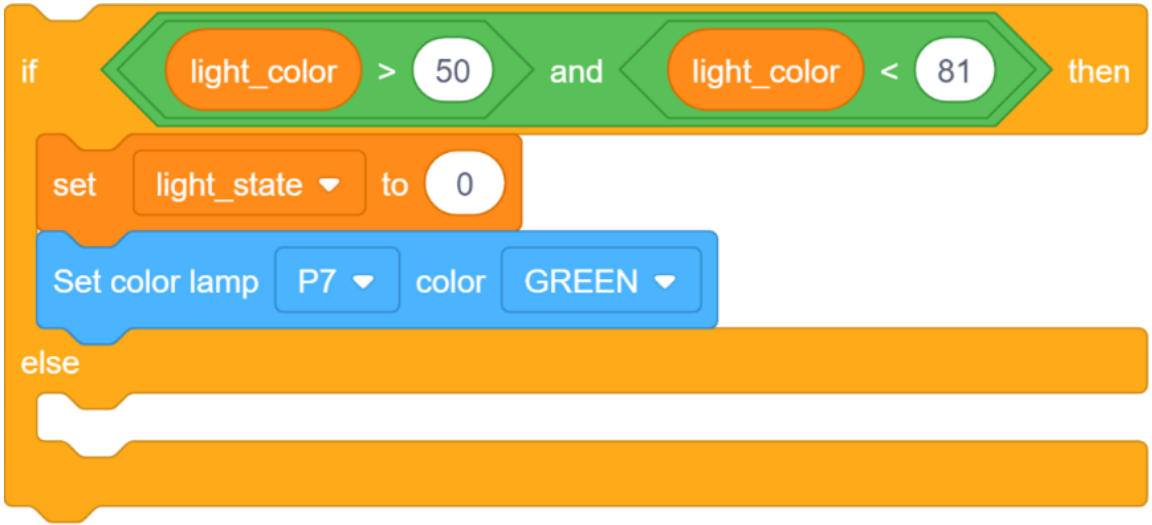
Interpretation of the traffic light function - step 4

Since the first number after the remainder is 0, add 1 to it for easy understanding.



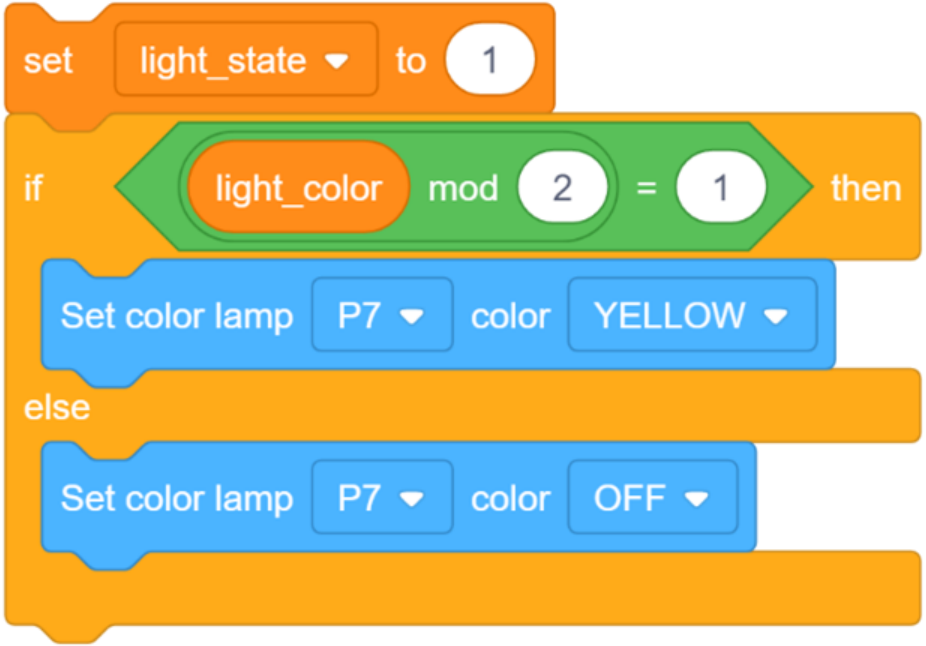
Judgment of red light

If the variable value is within 1 to 30 (1-30), the red light is on.



Judgment of green light

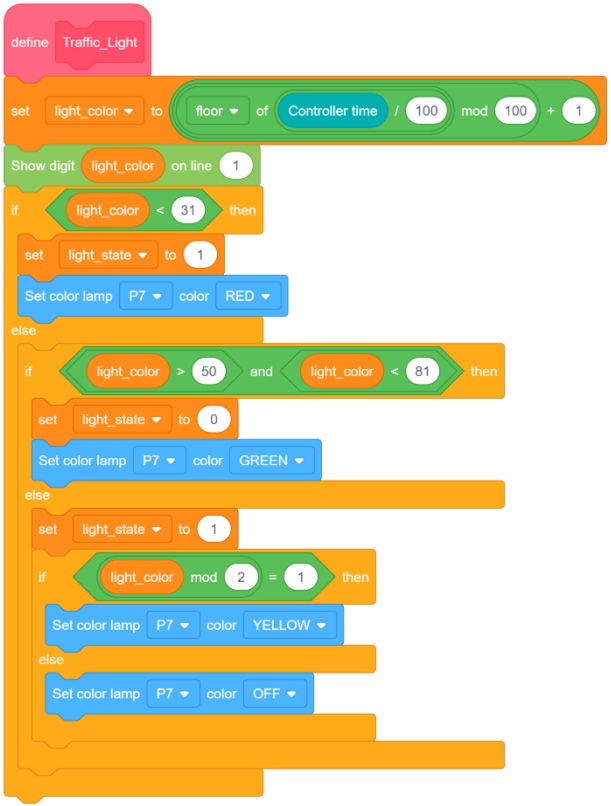
If the variable value is within 51 to 80 (51-80), the green light is on.



Judgment of changing lights

If the value of the variable is other, then it is time to change the lamp, and the remaining number is calculated to divide it into a yellow light or a black light.

Practice | Programming



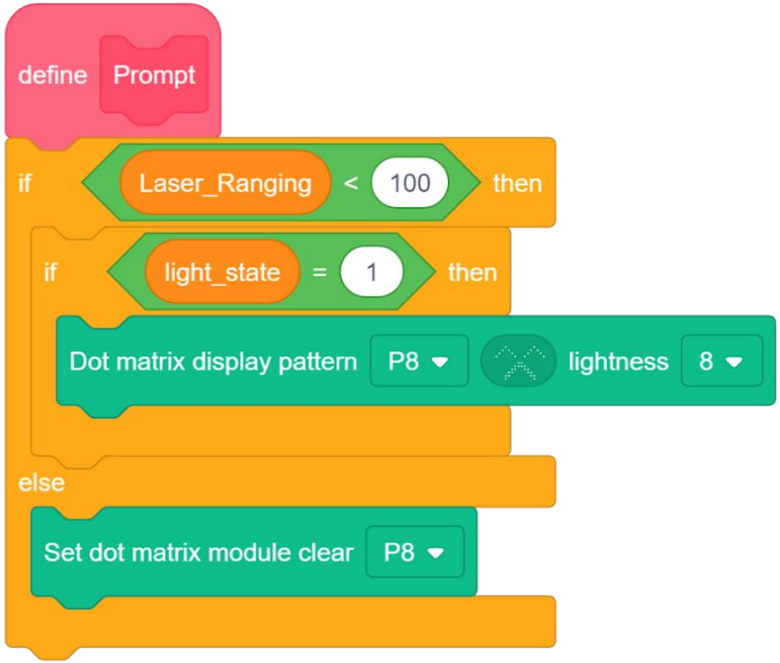
Integrate the program

Complete traffic light functionality.

When the variable value is 1-30, the red light is on,

At 51-80, the green light is on,

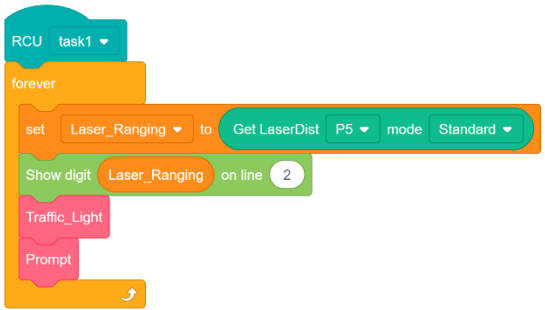
At 31-50 and 81-100, the yellow and black lights alternate.

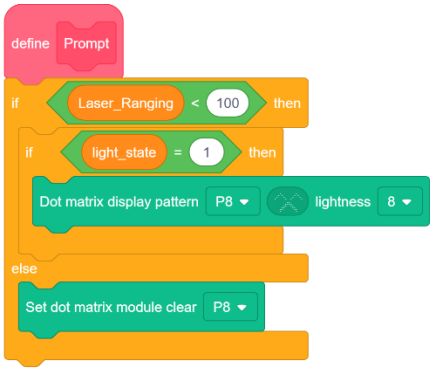


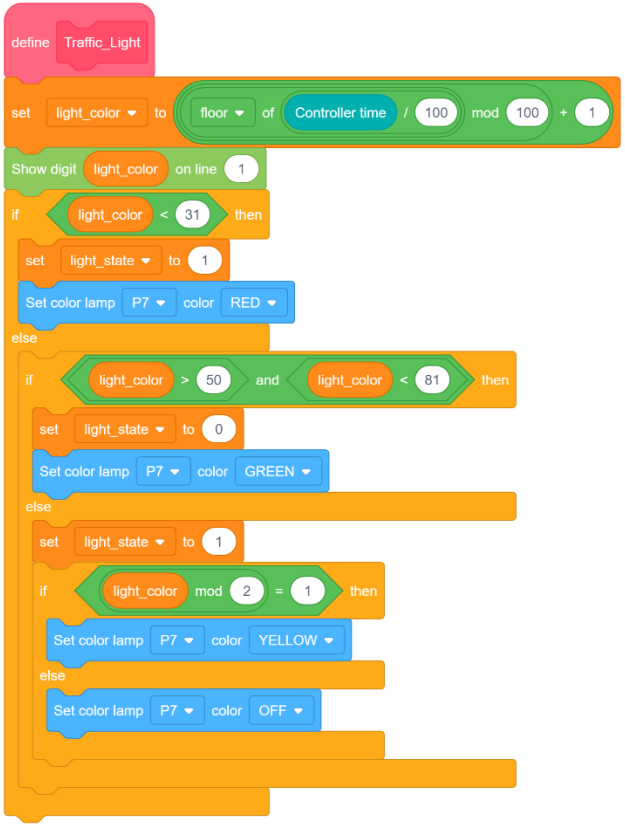
Function - Prompt

If the distance is less than 100 and the light status is 1, a depressed expression will be displayed, otherwise, it will not be displayed.

Practice | Programming



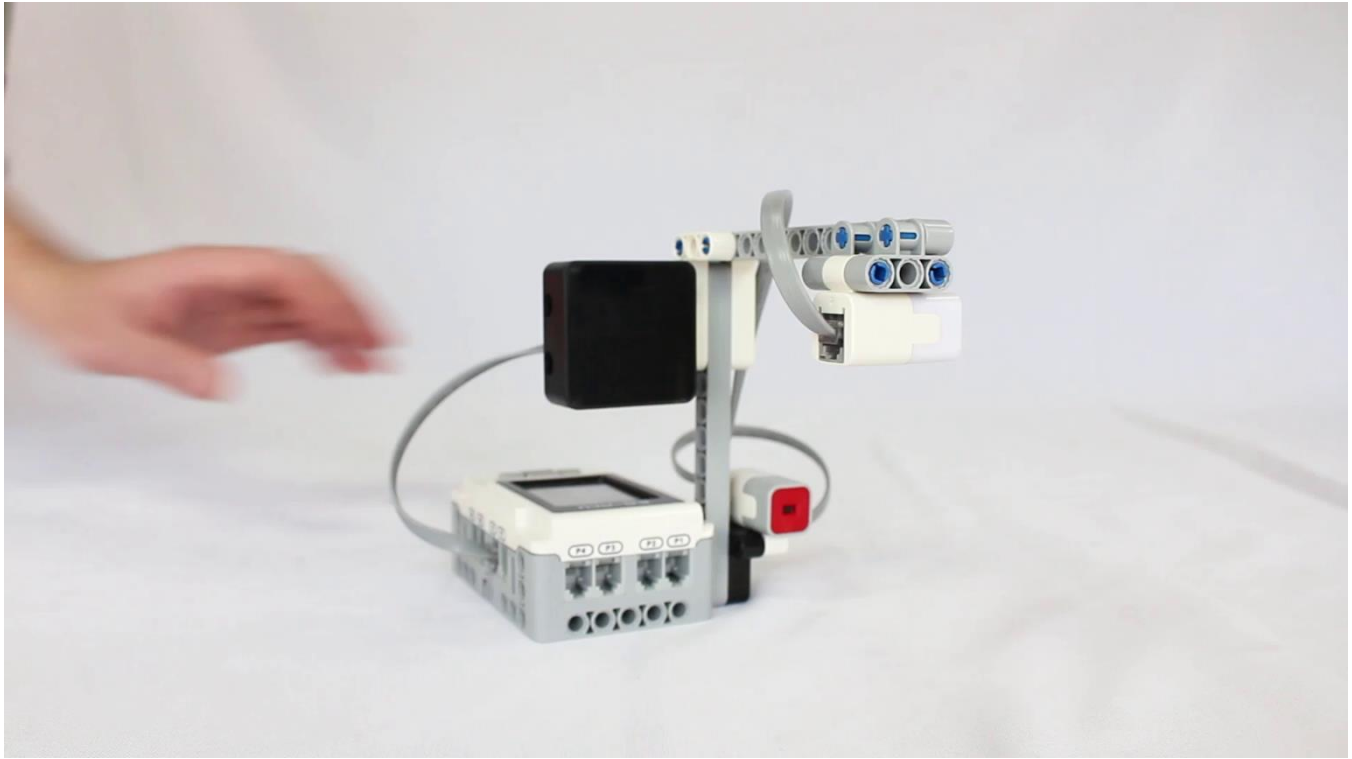


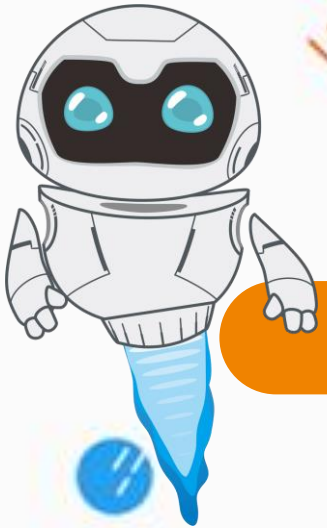


Integrate programs

Integrate programs according to the flow chart.

Practice | Programming





Results

Program Optimization

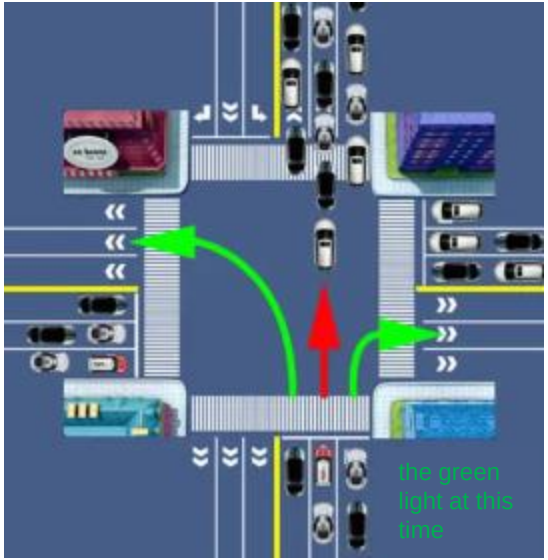
In this lesson, we implemented the warning function when running a red light, and the traffic lights can be turned on and changed without being affected.

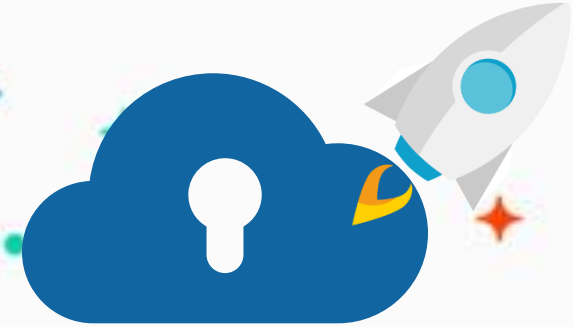
Next, modify the program so that the controller makes a sound when it detects a red light.

Requirement: When the pattern is displayed, the controller emits a sound at the same time without affecting the operation of the traffic light function.

Further Reading

In addition to "running a red light", in fact, you can't run a green light. "Running a green light" refers to the act of entering an intersection when traffic is heavy even though the signal light is green, which may cause further traffic jams. Article 53 of the "Regulations for the Implementation of the Road Traffic Safety Law of the People's Republic of China" stipulates: "When a motor vehicle encounters a traffic jam at an intersection ahead, it shall stop outside the intersection and wait in turn, and shall not enter the intersection." If a similar situation occurs, a fine of 100 yuan and 2 points may be imposed. "Running the green light" can also be called "rushing the green light". The so-called "rushing the green light" means that if there is a traffic jam at the intersection ahead when the signal light turns green, you should wait outside the intersection, otherwise it will be regarded as a green light.





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Thanks!

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