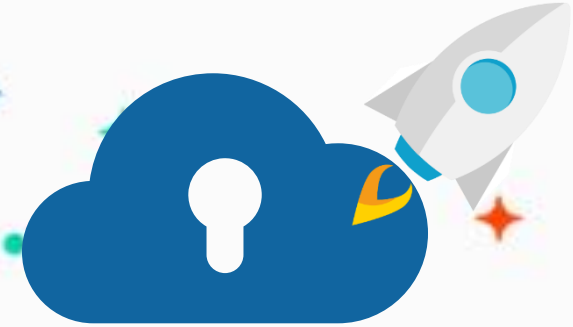

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Lesson 10. Laser Rangefinder

LECTURER:

Lesson Objective

Learning Objectives

1. Learn about the application scenarios of laser ranging sensors.

2. Learn about the second mode of laser ranging sensor.

Possible Difficulties

1. Invalid data will appear when the laser ranging sensor reaches the measurement limit.

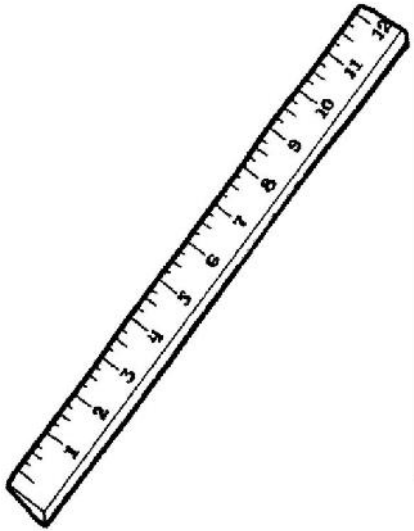
2. Displaying values and processing invalid data.



Background Information



Context Import



In our daily life, we all use a ruler to measure the length, width and height of an object to calculate its volume. But what should we do if the object is too big and exceeds our short ruler?

Context Import



It is possible to choose a longer and larger ruler, or tape measure, and thus measure objects of different sizes.

However, using a tool like a tape measure that is specifically designed to measure long objects has a major drawback; the tape measure will not measure the same length when it is taut and rolled back, which causes measurement errors.

Context Import



Under normal circumstances, the error can be ignored, but if it is in the construction industry, it must not be sloppy. A small data error can have a very serious impact on a large building.

Similarly, such errors are not allowed in house surveying, because the house survey and survey area map is directly used as the attachment of the property right certificate, which has legal effect, and one centimeter cannot be sloppy.

Context Import



How did the workers measure the size of the house accurately? In house surveying work, they usually use a handheld laser rangefinder. Compared with tape (or steel tape) measurement, the handheld laser rangefinder greatly reduces the error and improves the efficiency of measurement.

Context Import



Compared with the traditional tape measure, the rangefinder has unique advantages. It is portable and easy to operate. It is about the size of a TV remote control. It can measure data within a range of 100 meters without walking back and forth like a tape measure.



Knowledge Introduction

New Knowledge



Not only handheld laser range finders, but also Cloud Service Laser Rangefinders and telescope laser rangefinders. These laser rangefinders work on much the same principle, by measuring the time from when the laser light is emitted to when it is reflected back from the target object to determine the distance. Laser rangefinders are widely used in terrain survey, battlefield survey, industrial measurement and control, mines, ports and other fields. We can use a laser rangefinder sensor to make a laser rangefinder to measure objects around us.

New Knowledge | Laser Ranging Sensor



A laser ranging sensor is an electronic component that can measure the distance between the body and the object to be measured. By recording and processing the time elapsed from the time the laser is emitted until the return is received, the distance to the target can be determined.

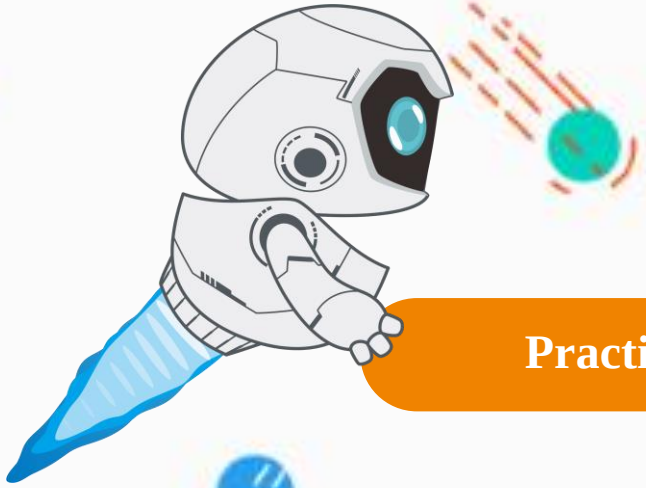
The laser distance sensor has two detection modes:

1. Standard mode: the longest detection distance in standard mode is 1.2m.
2. Long-distance mode: the longest detection distance in long-distance mode is 2m.

New Knowledge | Laser Ranging Sensor



To make a laser rangefinder, you need to switch the mode to long range mode. Regardless of the standard mode or long range mode, when the measurement range is exceeded it will return 8888 indicating invalid data.

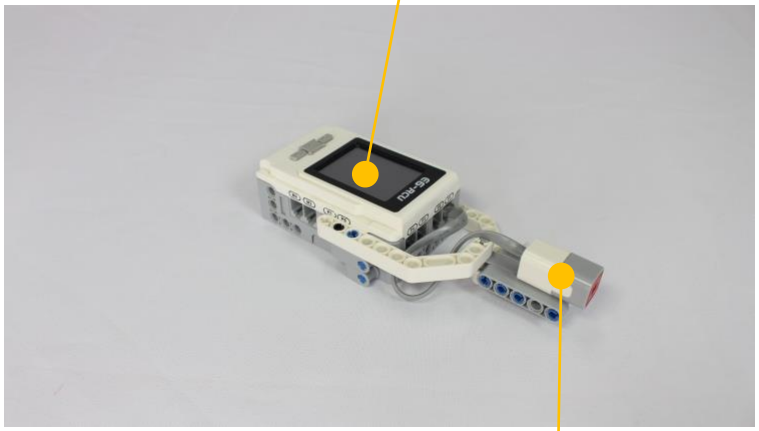


Practice



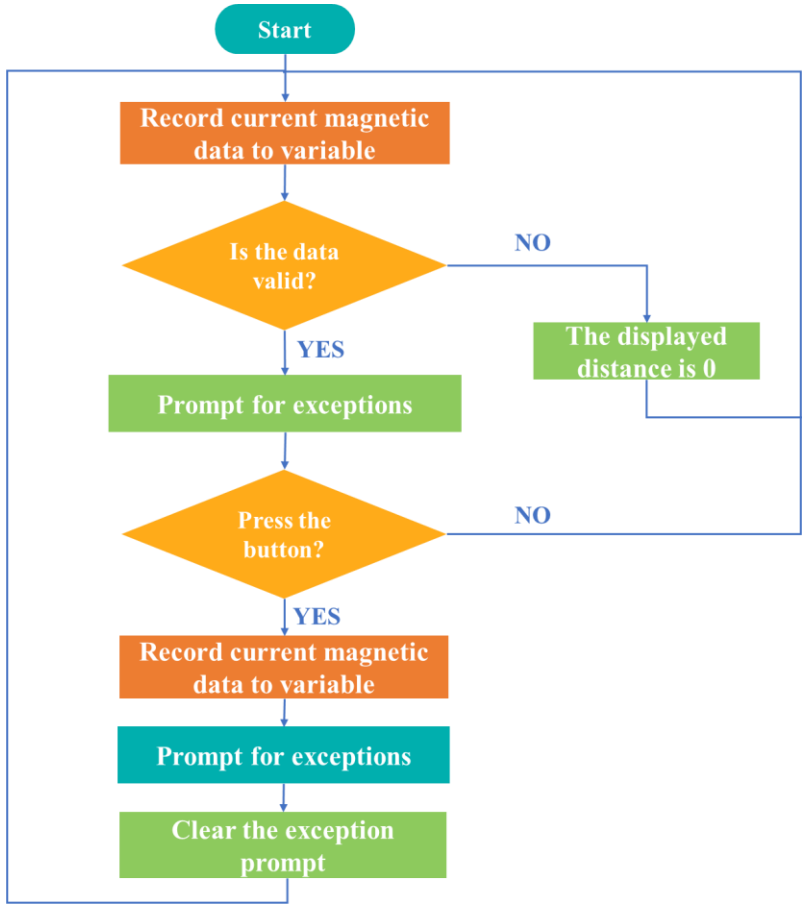


New Knowledge



Assemble a laser rangefinder according to the building manual and display the measurement data.

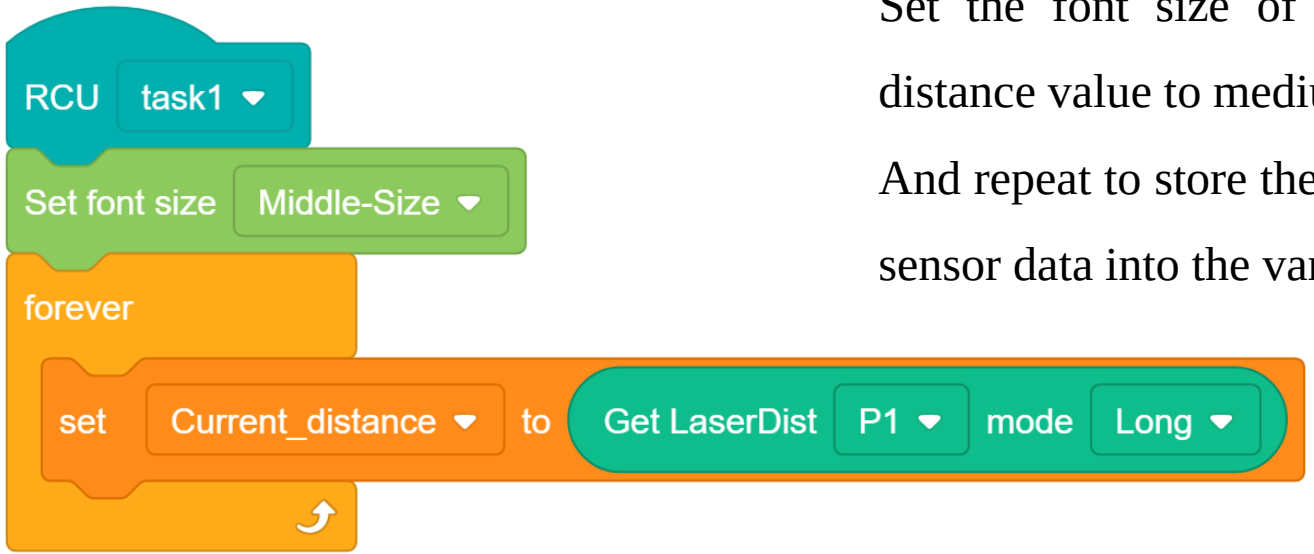
Practice | Programming



The laser rangefinder sends out laser, the laser is reflected from the obstacle back to the receiving end, the controller gets the return data, processes and records the value.

The distance to the current object is measured, and the distance value is recorded and stored in the controller when the key is pressed to avoid data loss, and the data is displayed as 0 when the data is invalid.

Practice | Programming

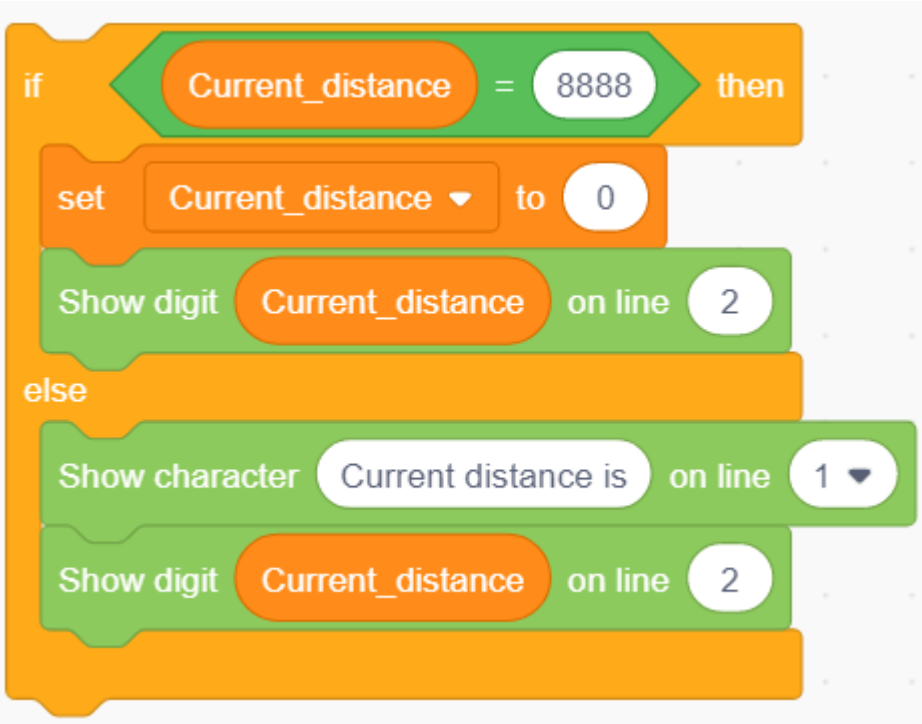


Initial settings

Set the font size of the displayed distance value to medium.

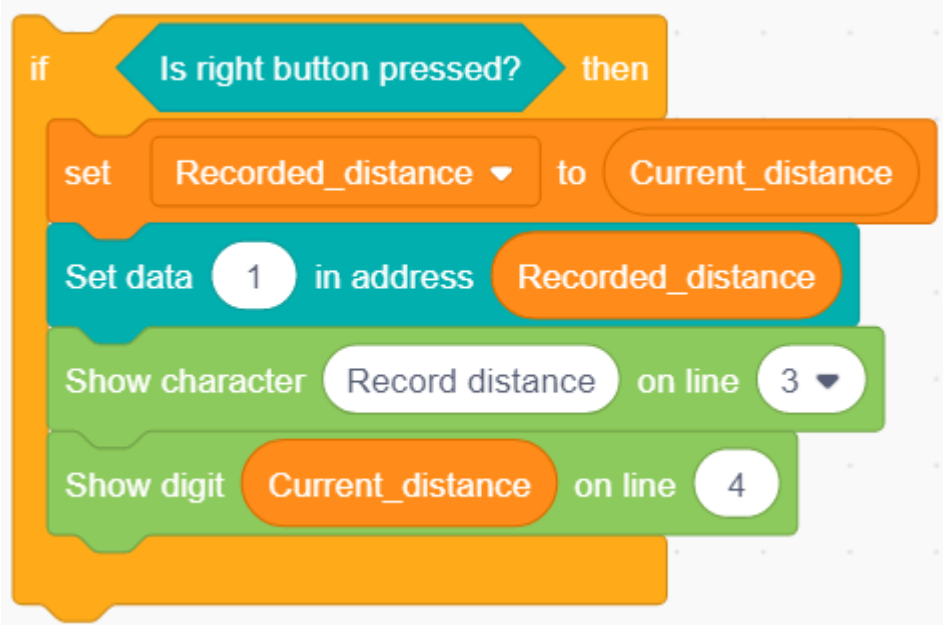
And repeat to store the laser distance sensor data into the variable.

Practice | Programming



The judgment of data

Determine whether the returned value is valid or not; if invalid, display it as 0; if valid, display the data directly without changing the variable value.

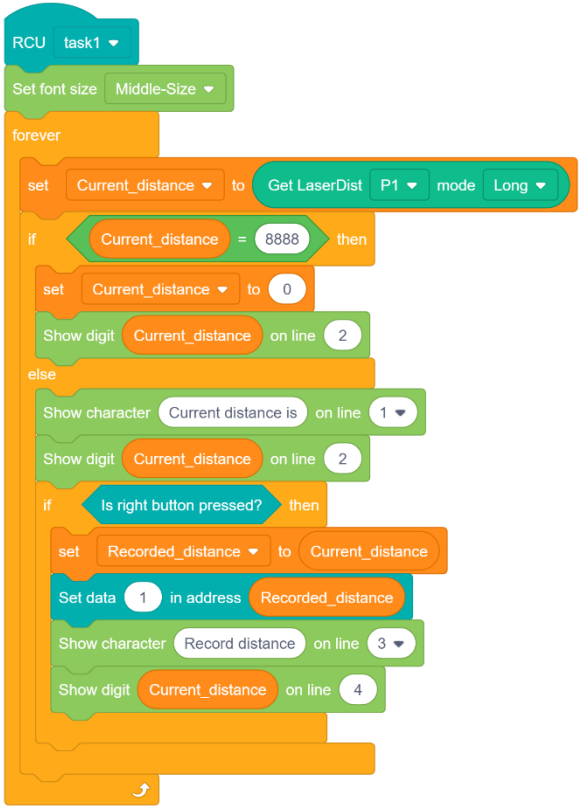


Press the button and record

Press the button to record the current data and store it in the controller's internal memory.

While recording, the controller displays the recorded distance.

Practice | Programming

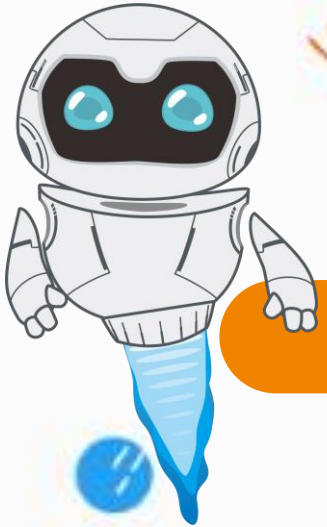


Integrate the program

Integrate the complete program based on the flowchart and the previous statements.

Practice | Programming





Results

Program Optimization

This lesson implements the function of a laser rangefinder. The current distance data is displayed in real time, and the keystroke can record the current distance data to the controller when the data is valid.

Next, modify the program so that it can display the last recorded data.

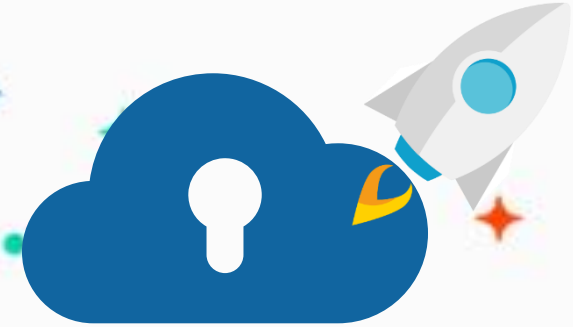
Requirements: Press the right button to record new distance data and the screen displays the last recorded data.

Further Reading

Laser ranging technology was first applied in the 1960s, when it was widely used in military technology, such as terrain measurement, battlefield measurement, and target ranging for tanks, aircraft, ships and artillery. With the development of more mature technology and lower cost, laser ranging technology began to be widely used in industrial measurement and control, mining, ports, transportation and other aspects, the most typical is the car collision detector. When the distance between cars is less than the predetermined safety distance, the car anti-collision system applies emergency brakes to cars, which can reduce the number of driving accidents in a large number.







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Thanks!

LECTURER: XXX