Q-scout Series Course

Section 7:
《0bstacle avoidance expert》

Curriculum objectives

Knowledge and skills (Technical)

1. Learn the usage of ultrasonic sensor and its working principle.
2. Learn to operate the Q-scout's obstacle avoidance mode.
3. Learn the programming of ultrasonic sensor to avoid obstacles.

Knowledge and Skills (Cognitive)

1. Through obstacle avoidance tasks, students are able to learn about process of solving project based challenges.
2. Complete obstacle avoidance in various modes and analyse the diversity of problem solving.

Knowledge and skills (Emotional attitude and values)

1. Cultivating the spirit of seriousness and hardworking attitude in students.

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Curriculum introduction

On weekend, our friends made an appointment to explore the nearby mountains. We set out with all our equipment and Q-scout.

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Curriculum introduction

On our journey of exploration, we were attracted by a cave, but we don't know anything about the situation inside the cave, it is very likely that we may encounter some unknown dangers. In this case, we can take help of our Q-scout which will help us to understand various conditions present inside the cave.

Task analysis

The scout is equipped with ultrasonic sensors that can detect terrain in the dark and avoid obstacles. But how to use ultrasonic sensors to detect the obstacles by istalling the sensor on front of the Q-scout and avoid it?

Learning Ultrasonic Sensor:

The ultrasonic module is used to detect the distance between the obstacles in front of it and the probe. It enables the robot to read the surrounding environment through sonar like a bat, and provides Q-scout an ability to automatically avoid the obstacles by controlling the motors.

Connection line interface

Ultrasonic probe
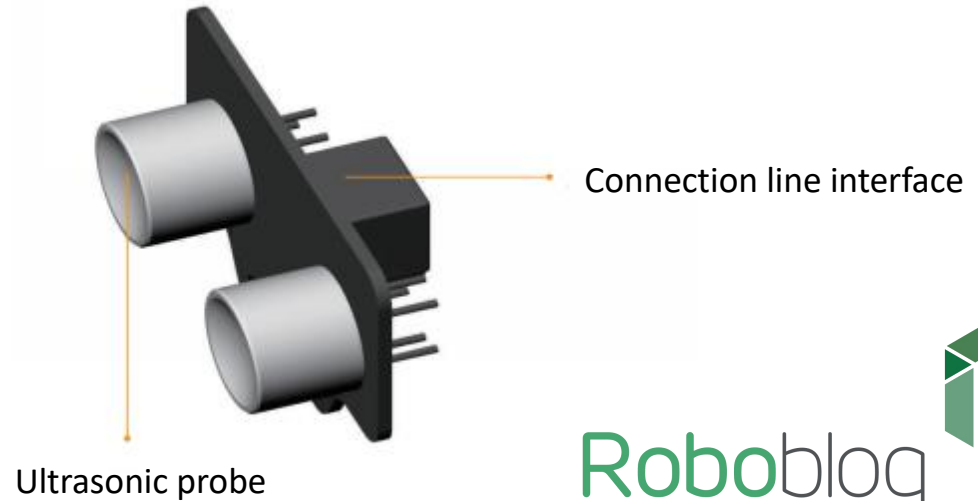
Knowledge eXplanation

The effective detection distance of the Q-scout ultrasonic sensor is between 50cm to 250cm. The closer the ultrasonic sensor to the obstacle, the shorter the distance will be. The connection line interface can be connected to any port of main control board, from 1 to 3.

5cm-250cm

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Knowledge explanation

Start
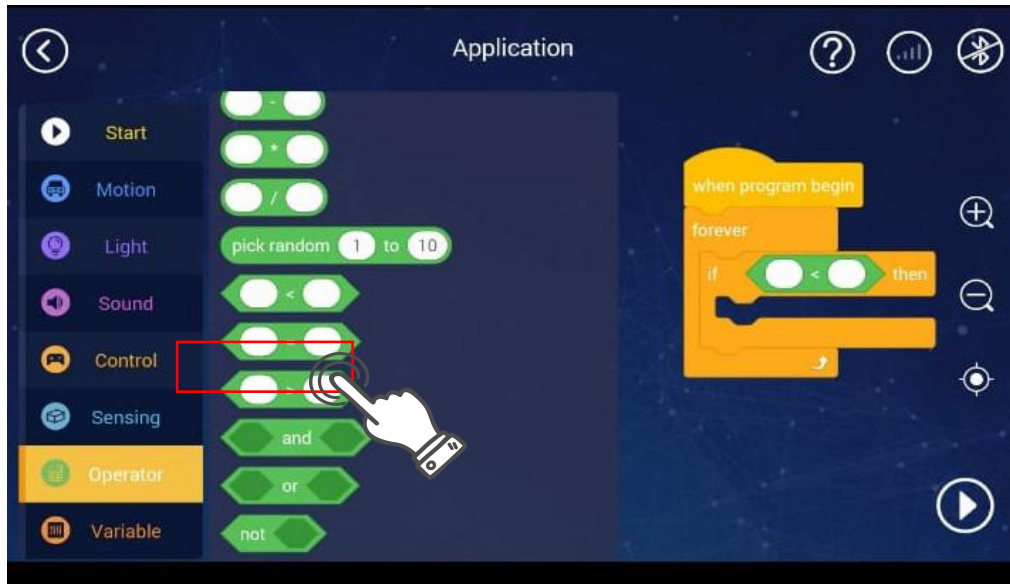
↓

Meet obstacle

↓

Retreat

↓

Turn

↓

End
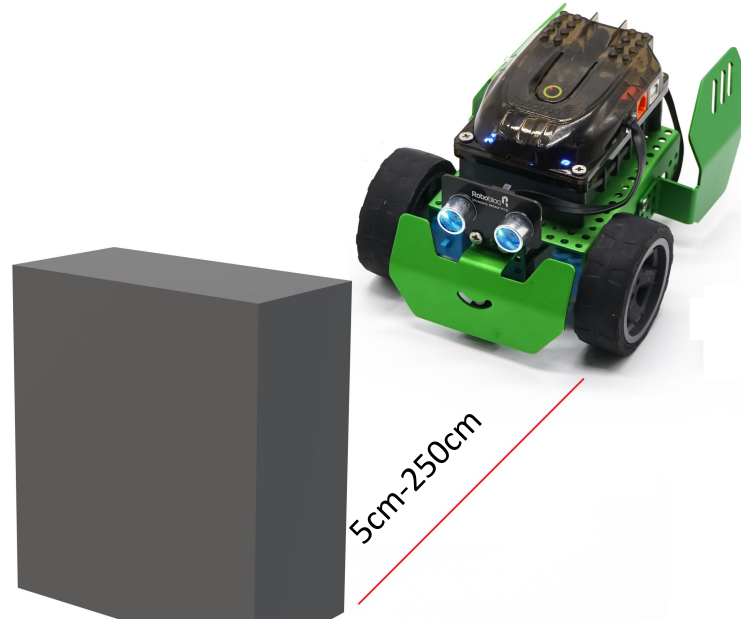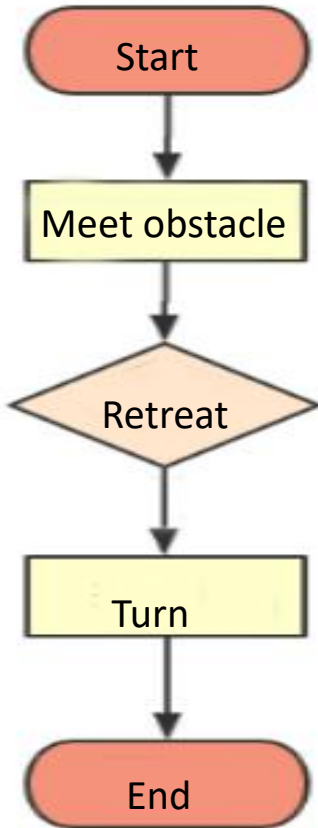
When Q-scout detects an obstacle in front of it, in order to avoid the obstacle better, Q-scout reverse for a certain distance before turning to avoid the obstacle.

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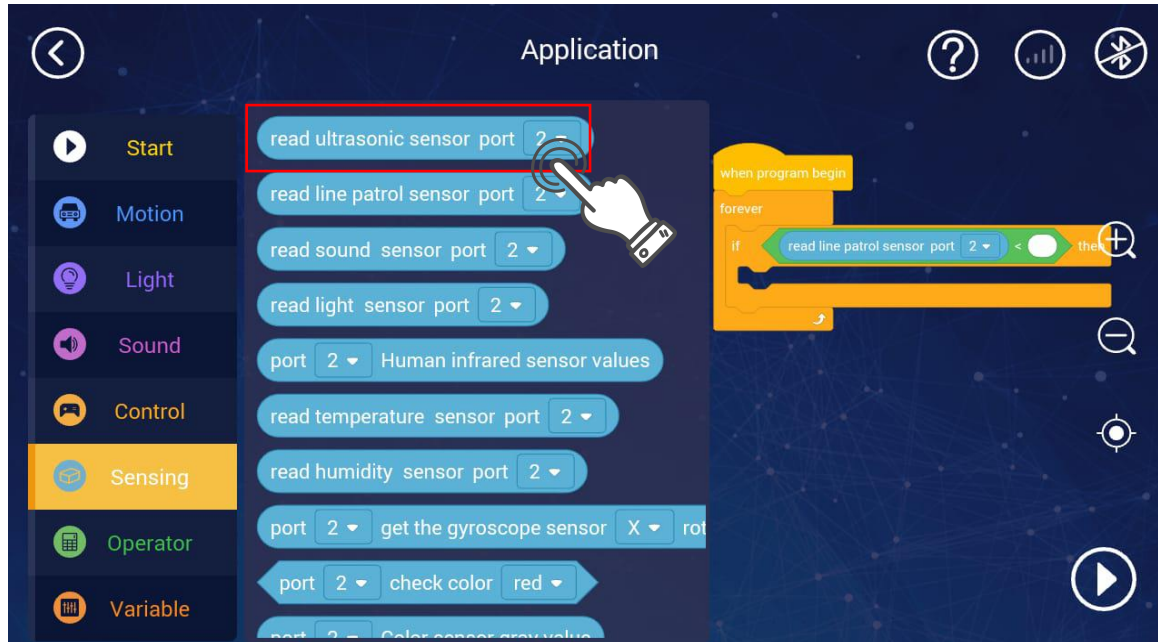# Hands-on practice

In the mobile application software:

1. From the arithmetic module drag ⬡ ◯ < ◯ ⬡ icon and drop in the conditional statement icon

Hands-on practice

2. Drag the ultrasonic sensor into the calculation icon in the sensor module.

Hands-on practice

Start

Go straight

Ultrasonic obstacle detection

obstacle

No obstacle

Retreat

Turn

End

3. As per the flowchart, the program of Q-scout has been written to avoid the obstacles on a difficult terrain. Did you check whether it is working well or not.
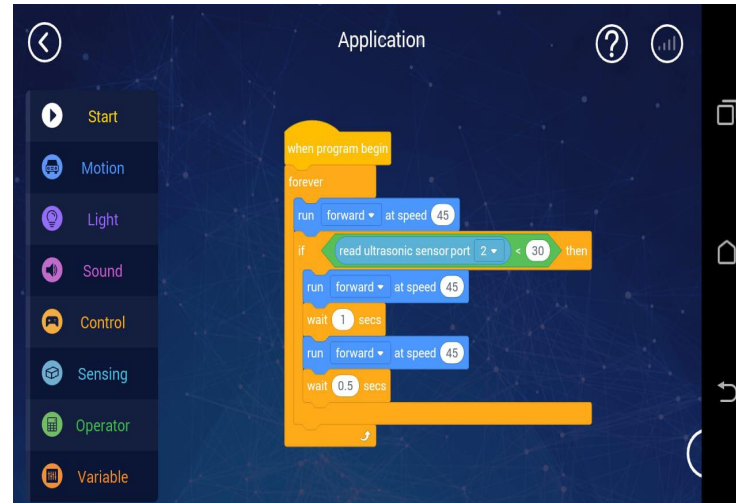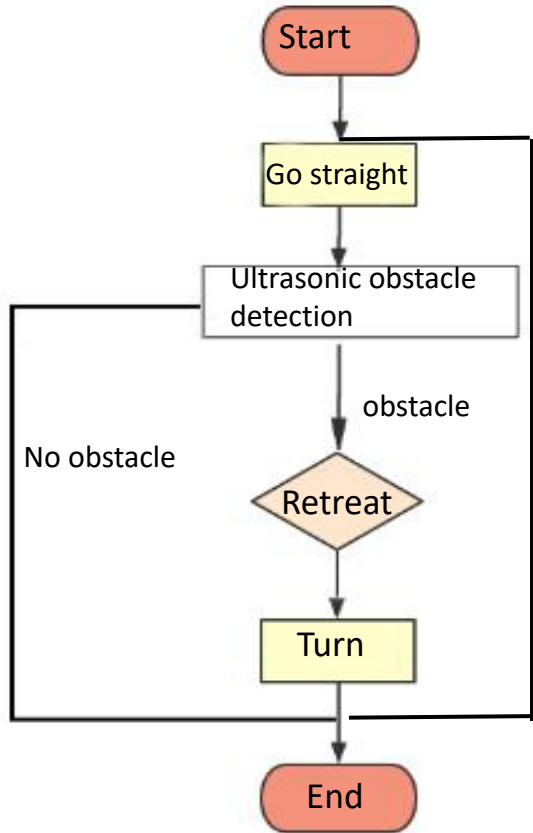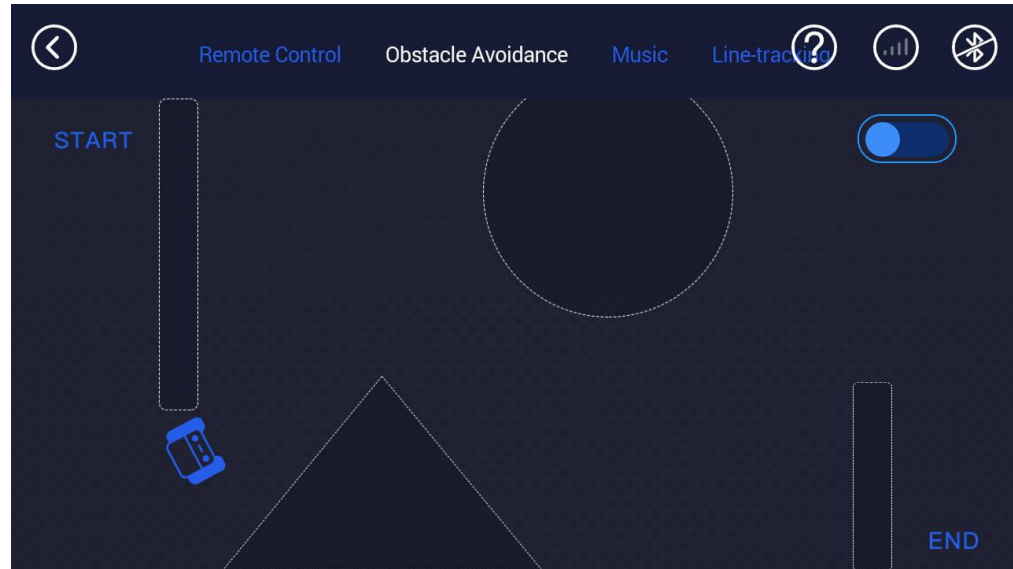

The aviod obstacle speed and time of Q scout need to adjust in reality

Hands-on practice

Use the obstacle avoidance mode of Q-scout in the mobile app to understand the working of obstacle avoidance. Observe what are the common features you see in your app and the obstacle avoider project you have made.
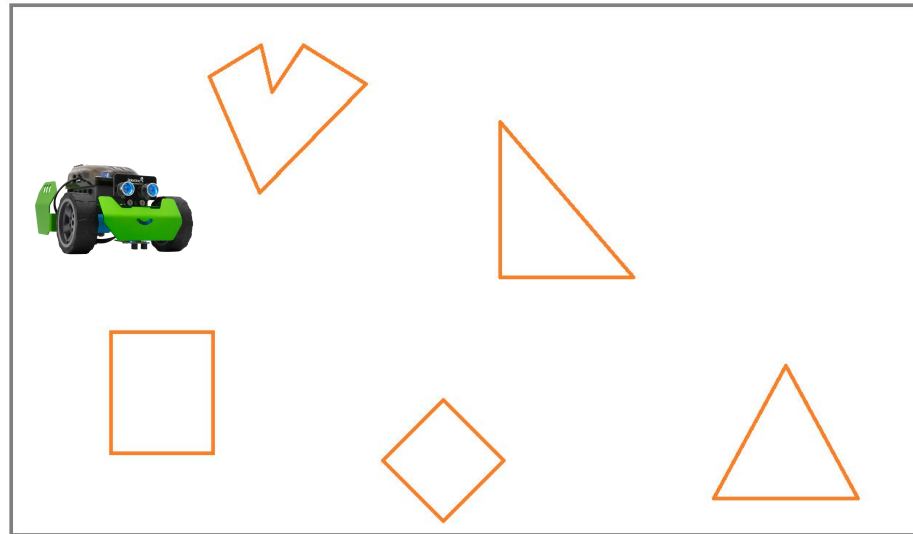
Hands-on practice

Open the computer programming software to select (Q-scout), according your observation of the obstacle avoidance, write Q-scout obstacle avoidance program.
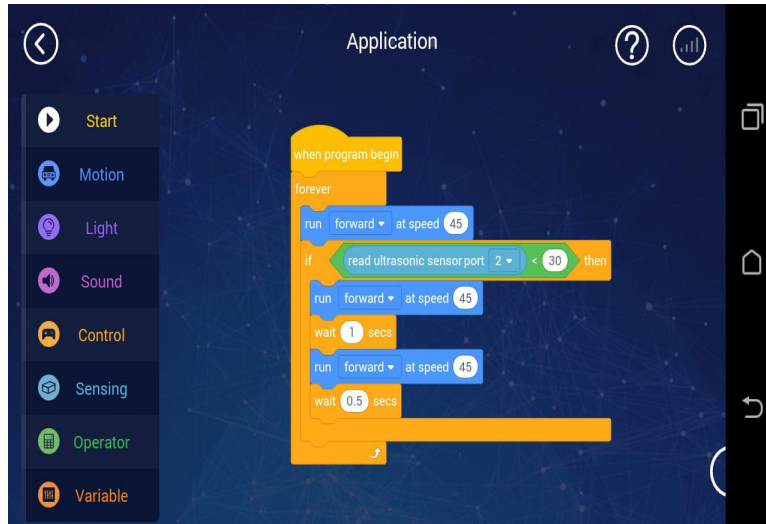
Extends

Make obstacles with surrounding materials (such as cartons, etc.), build the suggested site, move Q-scout, and see if it can successfully avoid the obstacles or not, on the site.

Conclusion and reflection

1. Why does Q-scout need to retreat and turn when avoiding obstacles at close range? What error may occur with sudden turn?

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