



## Q-scout Series Course

Section 8

《Warning of Danger》

# Curriculum Objectives

## **Knowledge and skills (Technical)**

1. Understanding to the working principle and programming of Ultrasonic sensor.
2. Learning to write the intermediate level programming for sound and light modules.
3. Learning to write a Q-scout program for "Warning of Danger."

## **Knowledge and skills (Cognitive)**

1. Improving students' analytical and real world problem solving skills.

## **Knowledge and skills (Emotional attitude and values)**

1. Letting students experience "how technology brings great convenience" to our life.

# Curriculum introduction



A friend of mine accidentally fell, very badly and his eyes were severely hurt. We rushed to doctor, where he was made to feel relaxed when the doctor bandaged his eyes with gauze. Now, he is gradually recovering as it will be recuperated after a period of time.

# Curriculum introduction

What good idea can help that friend as his eyes are bandaged by gauze, and cannot see clearly, so he often bumps the corner of the wall or desk etc., and brings a lot of trouble for himself.

In this case can our Q-scout help him? For example, if he inches close to a desk or the corner of wall, can Q-scout send out the sound warning of danger, cautioning him to mind his feet?



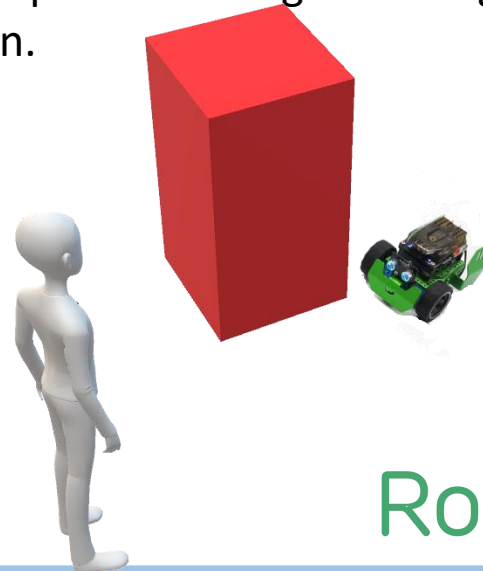
# Task analysis

We can put our Q-scout at an accident prone area or danger zone. If someone is heading close to a spot of danger/accident step by step, in that case, our Q-scout can generate the warning tone or message to make the person aware of probable danger in advanced. And, how much distance the person has covered towards the spot of accident/danger (so that early warning can be generated) can be calculated using the Ultrasonic sensor.

**Let's Think:** How to set a condition that our Q-scout should only generate warning sound when an object reaches close to it, otherwise it remains silent.

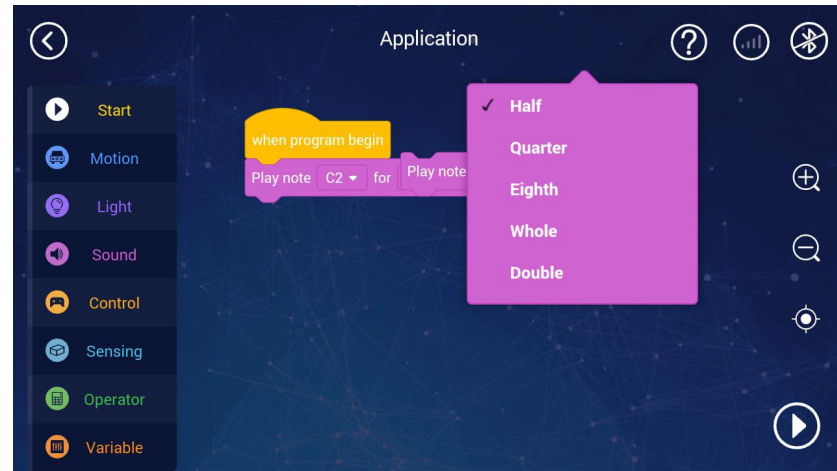
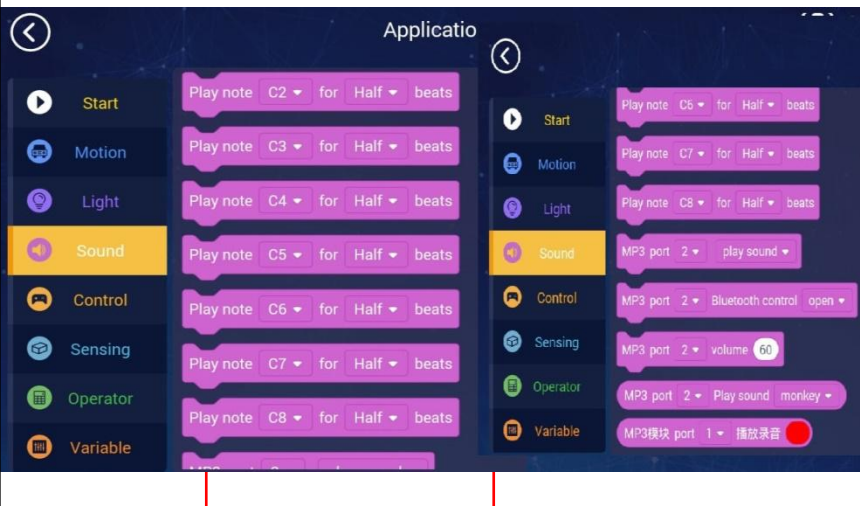
# Knowledge explanation

In the last class we have learned that the Ultrasonic module is used to detect the distance between the sensor and the obstacle in front of it. So, the same module can be used to detect the distance between the person (our friend) and the spot of danger/accident (wall or desk). So, if he is not in the safe zone or heading close towards that spot then danger message can be generated in advanced to avoid collision.

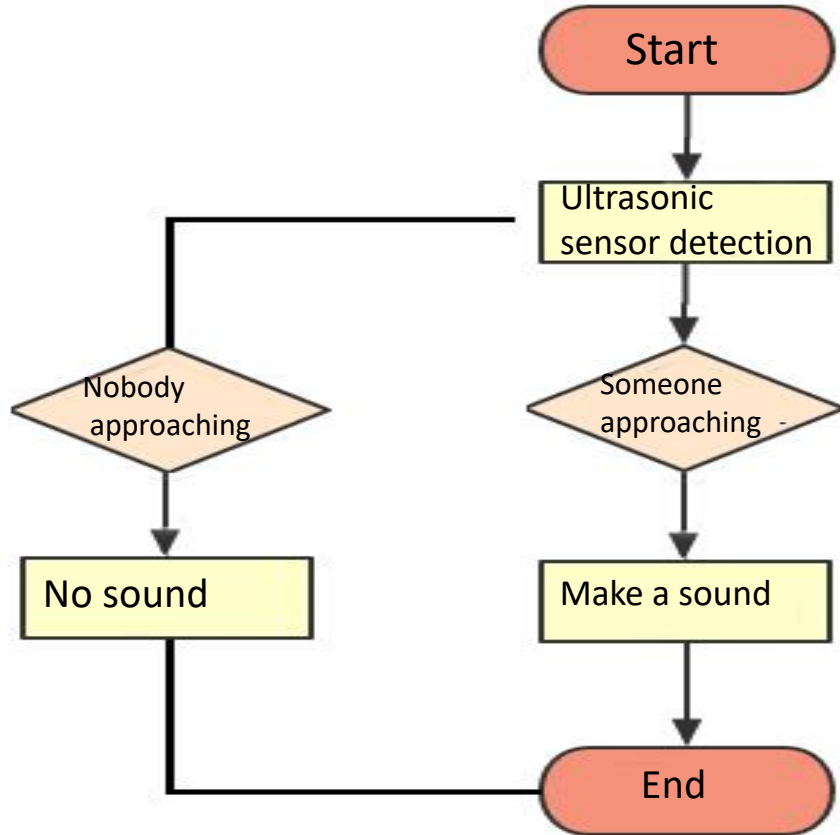


# Knowledge explanation

**Learn the Sound Module :** When the Q-scout senses someone approaching within a specified range of distance, it will sound an alarm. You can use different tones or tonal beats to be used in the programming (sound module) from your phone.



# Knowledge explanation



When the Q-scout detects someone approaching in front of it, the sensor sounds an alarm. If no one is approaching, no sound is generated.



# Hands-on practice

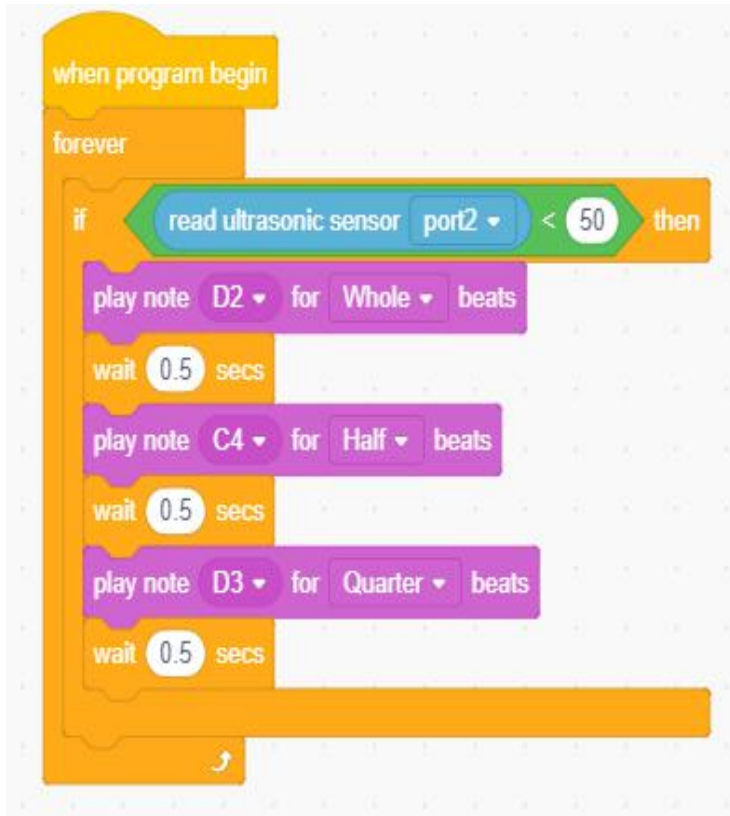


```
when program begin
  forever
    if read ultrasonic sensor port2 < 50 then
      play note D2 for Whole beats
      wait 0.5 secs
      play note C4 for Half beats
      wait 0.5 secs
      play note D3 for Quarter beats
      wait 0.5 secs
```

The image shows a Scratch script starting with a 'when program begin' block, followed by a 'forever' loop. Inside the loop is an 'if' block that checks if the 'read ultrasonic sensor port2' value is less than 50. If true, it triggers a sequence of four musical notes: D2 (Whole note), C4 (Half note), and D3 (Quarter note), each followed by a 0.5-second wait.

As per the flowchart designing, write a program for our Q-scout to sound a danger alarm when an object has reached to a specific distance (let's say 50 cm away from sensor). The alarm should be started at safe distance so that person can get enough time to mind his/her steps.

# Hands-on practice



```
when program begin
  forever
    if read ultrasonic sensor port2 < 50 then
      play note D2 for Whole beats
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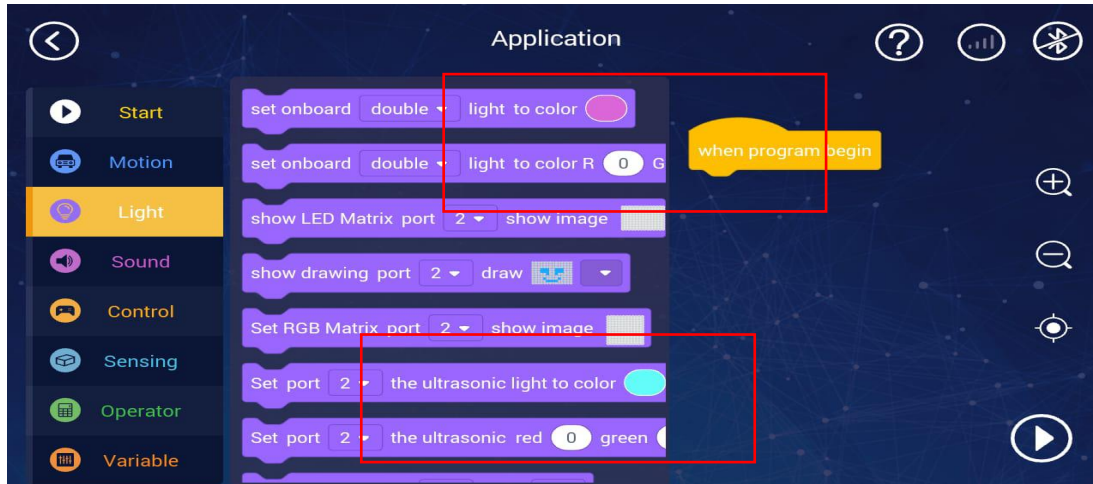
The image shows a Scratch script for a Q-scout danger alarm. It starts with a 'when program begin' block, followed by a 'forever' loop. Inside the loop, there is an 'if' block that checks if the 'read ultrasonic sensor port2' value is less than 50. If true, it plays a sequence of notes: D2 (Whole note), C4 (Half note), and D3 (Quarter note), each followed by a 0.5-second wait.

In the computer programming software, try to write Q-scout danger alarm program.

# Extends

We have completed the danger alert mission of Q-scout to help friends who was not able to see and avoid hitting objects due to the bandage in his eyes.

However, in our daily life, especially at night, when we get up to go to the toilet, sometimes we are also not able to avoid some collision. In that case, can we upgrade this version of danger alarm program of our Q-scout, by making use of sound cues and light cues (on-board lights and ultrasonic lights)?



# Conclusion and reflection

In some other practical applications, the changing distance between the Q-scout and person should also be symbolized by changing the frequency of alarm tone, to caution the person about the degree of danger. Think and write a program for such challenges.



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