Obstacle Avoidance with Warning and Random Turns (Look Out!)

Time required: 60 minutes

Please read all the directions carefully before beginning the assignment.

1. Comment your code as shown in the tutorials and other code examples.

2. Follow all directions carefully and accurately.

3. Think of the directions as minimum requirements.

Understanding

Demonstrate understanding of:

ultrasonic sensor

Requirements

- The robot randomly turns left or right to avoid an obstacle and gives a visual warning.
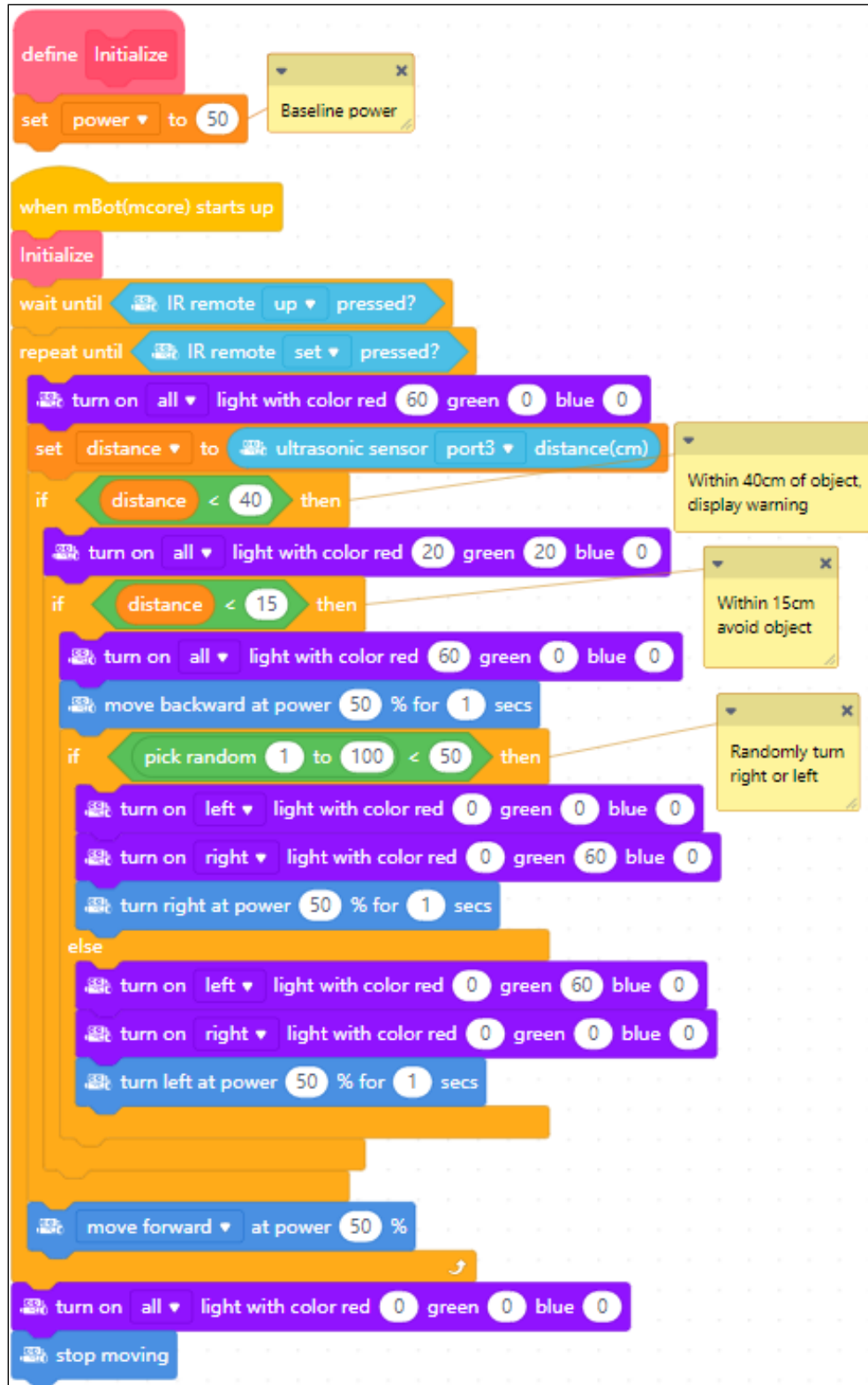
- Test obstacle avoidance with your foot.

Assignment

1. Open the Arduino **SimpleObstacleAvoidance**

2. Save the sketch as **ObstacleAvoidanceWithWarning**

3. The Arduino program **RandomLED's** will show how to do random numbers.

This pseudocode shows how to make a decision based on random numbers.

```
if(random(0, UPPER_RANDOM) < 50){
  turn right
}else{
  turn left
}
```

4. Complete and test the program with the requirements listed.

5. Use the following mBlock program as a starting point.

```
define Initialize
set power ▾ to 50          [Baseline power]

when mBot(mcore) starts up
Initialize
wait until < IR remote up ▾ pressed? >
repeat until < IR remote set ▾ pressed? >
    turn on all ▾ light with color red 60 green 0 blue 0
    set distance ▾ to ( ultrasonic sensor port3 ▾ distance(cm) )
    if < distance < 40 > then          [Within 40cm of object, display warning]
        turn on all ▾ light with color red 20 green 20 blue 0
        if < distance < 15 > then      [Within 15cm avoid object]
            turn on all ▾ light with color red 60 green 0 blue 0
            move backward at power 50 % for 1 secs
            if < ( pick random 1 to 100 ) < 50 > then    [Randomly turn right or left]
                turn on left ▾ light with color red 0 green 0 blue 0
                turn on right ▾ light with color red 0 green 60 blue 0
                turn right at power 50 % for 1 secs
            else
                turn on left ▾ light with color red 0 green 60 blue 0
                turn on right ▾ light with color red 0 green 0 blue 0
                turn left at power 50 % for 1 secs
    move forward ▾ at power 50 %
turn on all ▾ light with color red 0 green 0 blue 0
stop moving
```

- Stop first, then play a sound when an object is detected.

- Experiment with the detection distance.

Assignment Submission

- **All students** → Attach finished programs to the assignment in Blackboard.

- **In class assignment submission** → Demonstrate in person.

- **Online submission** → A link to a YouTube video recording showing the assignment placed in the submission area in BlackBoard.