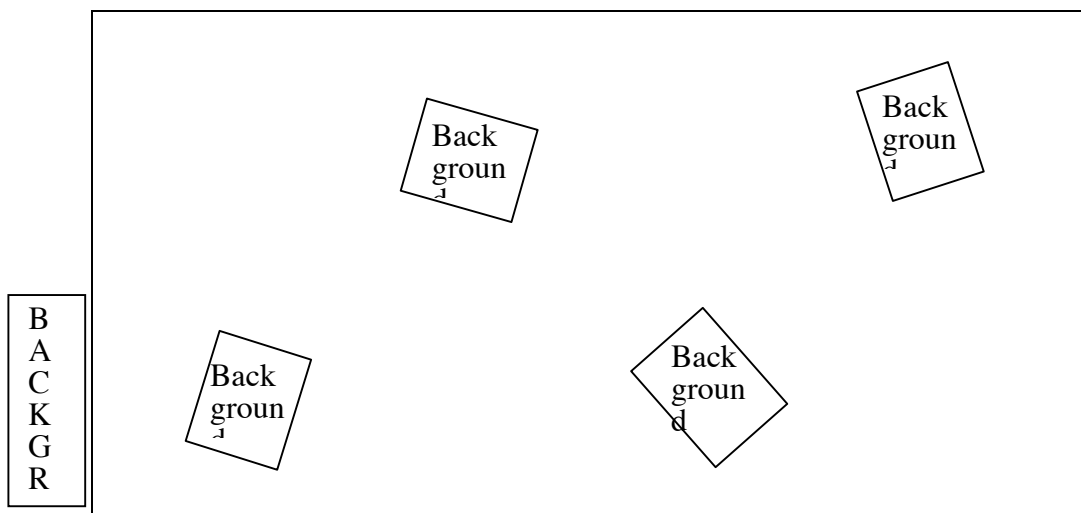# Haunted House

Your vehicle must find its way through a haunted house. The house has four rooms; your goal is to visit all four. For each room you reach, you will receive a prize.

The rooms will consist of white rectangles on a black background. The rooms will be numbered one through four; you must visit them in order. Once you have visited all four rooms, you may leave through the front door to collect an additional prize.

If you drive completely off the black paper or visit a room out of order, your turn is over.

Back groun d

Back groun d

Back groun d

B A C K G R

Back groun d

Back groun d

Good luck!

The students build vehicles and program them to drive through the rooms of a haunted house.

Objectives
1. To build a sturdy NXT car that turns easily.
2. To program a car to follow a specified route, using rotation sensors, a light sensor, timers, or some combination of these.
3. To solve an open-ended problem.
4. To test and modify a design repeatedly.

Materials
NXT
Computer
Motors
Light sensor (optional)
LEGO® pieces, including wheels
Large sheet of black paper, approximately 90 cm by 120 cm
Four sheets of white paper, approximately 20 cm by 30 cm
Prizes

Time: Approximately 60 minutes

Notes
1. To construct the haunted house, start with a large sheet of black paper, approximately 90 cm by 120 cm. (If necessary, you can glue smaller sheets together.) Glue or tape four white sheets on the black field, as shown on the student handout, making sure the edges are securely fastened. Number each room. If you prefer, you can instead use a white house with black rooms
2. Any simple two-motor car that turns easily will work for this activity. If the students need help in designing a car that turns easily, you may want to suggest that they use a caster wheel or a slider in the front instead of a fixed wheel or wheels.
3. This activity is well suited to the NXT's built-in rotation sensors. The sensors can be used to drive the distance between rooms consistently and precisely.
4. Another possible strategy is to use a light sensor mounted on the car to determine when the car has reached a room. A timer can be used to accomplish the turns within rooms.
5. Another method that can be used to guide the car is a dead-reckoning program, where the car is programmed to drive for a specified number of seconds, and then turn for some number of seconds, then drive, and so on. This strategy is initially easier than using a sensor, but gives less consistent results (especially if the battery power declines as the car is tested repeatedly).
6. Let the students try their cars in the haunted house as often as they wish. The process of testing and reprogramming is an essential part of this activity.

7. Have token prizes available for successfully completing each room. (If you do this activity near Halloween, many inexpensive Halloween-themed trinkets are available from novelty companies.) One way of handling the prizes is to award each group a numbered card for each room they visit. At the end of the activity, the cards can be redeemed for prizes.

Sample Program for Haunted House

First Move block:

Second Move block:

Third Move block:

Fourth Move block:

Fifth Move block:

This program uses the built-in rotation sensors to guide the car through the first three rooms of the haunted house.

Acknowledgement

Ball Over the Wall

The NXT Mindstorms software contains two palettes, the Common Palette and the Complete Palette. The Complete Palette contains all of the blocks of the Common Palette, plus many more. To access the Complete Palette, click on the Complete Palette tab in the lower left corner, the one that shows three blocks on a diagonal.
Notice that the first set of blocks on the Complete Palette is the familiar Common Palette. Most of the blocks in the Common Palette also appear in the appropriate categories of the Complete Palette—Move, Sound, and Display under Action; Wait, Loop, and Switch under Flow.

You will program a car to drive up to a wall, stop, and throw or drop a ball over the wall. To drive the car, you will use the familiar Move block. To run the third motor, the one that controls the ball, you will use the Motor block, located in the Action section. (Unlike the Move block, which can control multiple motors, the Motor block controls only one motor.)

To detect the wall, you will use the ultrasonic sensor, which can measure distances up to 256 centimeters, plus or minus 3 centimeters. It works best when it approaches a large flat object straight on, rather than at an angle.

The wall is nine LEGO bricks high, approximately nine centimeters. You may use any sensor you wish to detect the wall, but your program must run without input from you. For example, you may not push a touch sensor to trigger the third motor.