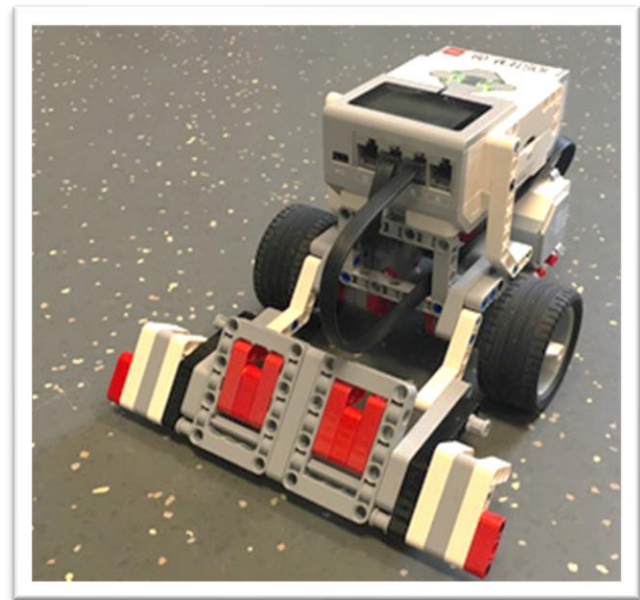


## SnowBot: A Snow Shovelling Robot

### Task Description

The SnowBot Challenge is to design and program a *SnowBot* that can clear all the snow from the driveway (e.g., a designated space). The robot does not require any sensors. Students are challenged to design and create their own wedge for plowing the snow.

Encourage students to show their *SnowBot* to the rest of the class and explain how the program works.



### Instructions for Students

Design and program a *SnowBot* that can clear all the snow from the driveway (e.g., a designated space).

**Challenge:** What is the fewest programming blocks you can use to clear the space?

### Materials Needed

- Cotton balls or small pompoms
- Tape for the floor to mark down a space, or turn the [polygon vinyl mats](#) upside down
- Basic *EV3 Robot* without sensors

### Set up

Tape a rectangular shape on the floor, approximately 1 m x 1 m. Alternatively, use the [vinyl polygon mats](#) turned upside down.

Distribute the cotton balls or the pompoms on the mat.

## Key Understandings

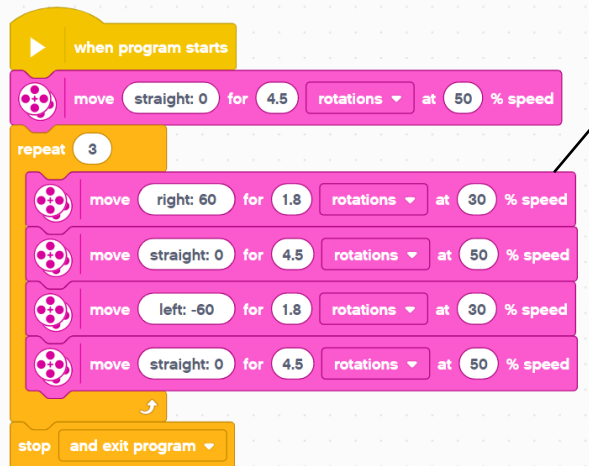
- Relates length (or width) of the enclosed area to robot's wheel rotations by estimating measurement and movement
- Relates the robot turns into wheel rotations by estimating measurement and movement
- Translates measurements into programming code to move a robot a specific distance and turn a specific angle
- Requires multiplicative and proportional thinking

## Design Notes

On our first attempt, we noticed that the snow was getting under the wheels and putting our *SnowBot* off course ([see video](#)). We speculated that maybe the wedge needed to be wider. We modified the wedge and it worked beautifully ([see the final design in action](#)).

Also note: Different floor surfaces affect the robot's ability to turn (e.g., carpet vs. smooth flooring).

For programming, we suggest trying a loop similar to this one to have the robot drive in a zig zag pattern:



The image shows a Scratch script for a robot. It starts with a 'when program starts' block, followed by a 'move straight: 0 for 4.5 rotations at 50 % speed' block. This is followed by a 'repeat 3' loop containing four 'move' blocks: 'move right: 60 for 1.8 rotations at 30 % speed', 'move straight: 0 for 4.5 rotations at 50 % speed', 'move left: -60 for 1.8 rotations at 30 % speed', and 'move straight: 0 for 4.5 rotations at 50 % speed'. The script ends with a 'stop and exit program' block. A callout box points to the first 'move' block in the loop with the text: 'Here, the robot travels forward before a zig zag pattern is repeated 3 times.'