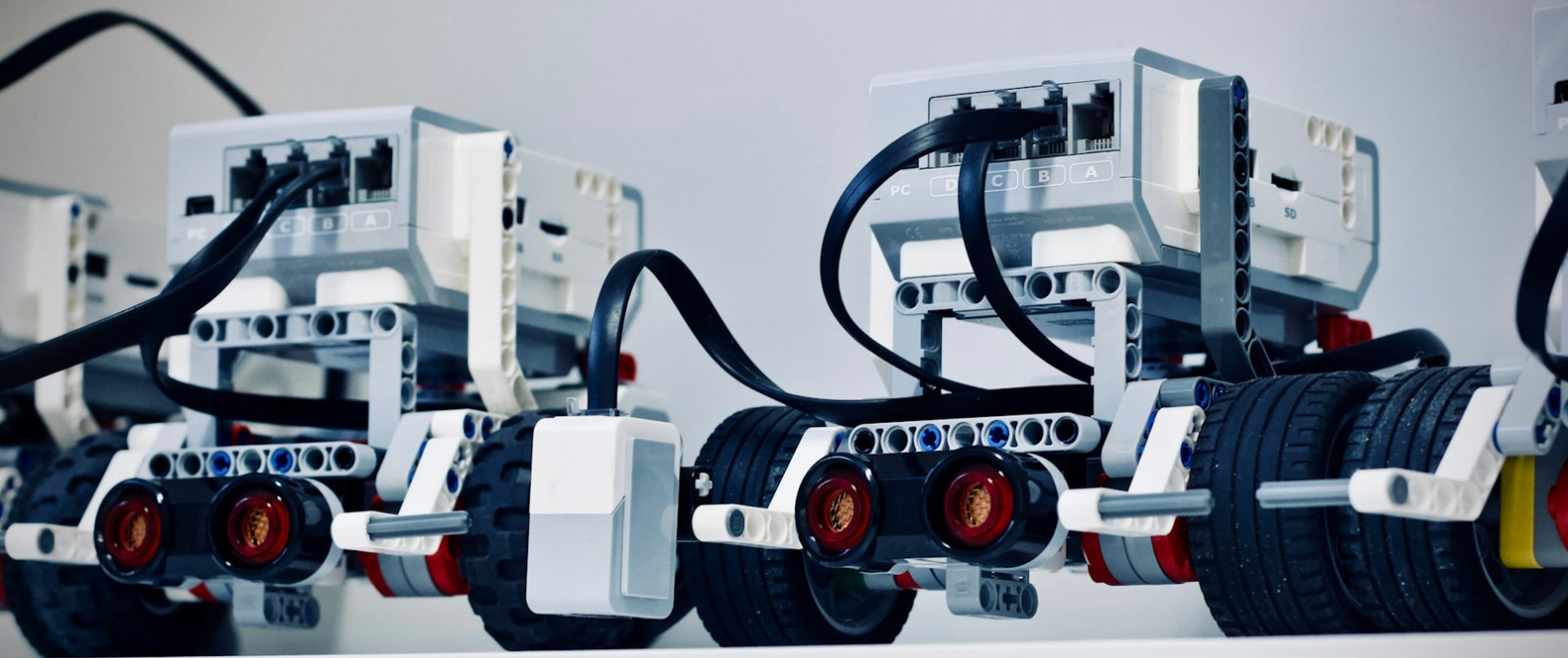




EduTrend Contents

EDUTECH · LEARNING TO PROGRAM ROBOTS · MIDDLE SCHOOL

Stop Before the Wall

Read a distance sensor and program a robot to stop safely

Ages 10–12

Level: Intermediate

60 minutes

Pairs · up to 30

Activity 03

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 03 · AT A GLANCE

Stop Before the Wall

Pairs first display the distance sensor reading on screen and record values at 10, 20 and 30 cm from a cardboard wall. They then write a program that drives forward until the reading falls below a chosen value and stops. Finally they test at a slow and a fast speed, note where it stops and discuss why it may differ.

Learning outcomes

By the end of the session students can:

- read and record sensor values;
- choose a threshold;
- program a loop with a condition;
- explain effects of speed.

KEY WORDS

distance sensor · ultrasonic ·
threshold · loop until · speed ·
stopping distance

CURRICULUM LINKS

Science: speed and stopping.
Maths: measurement. Road safety:
braking distance.

1**SENSE**

What can it detect?

2**THINK**

What should it
decide?

3**ACT**

What should it do?

4**TEST**

Run it

5**DEBUG**

Find and fix

6**IMPROVE**

Make it better

Materials (per pair)

- Robot with a distance or ultrasonic sensor
- Laptop or tablet
- Tape measure
- Cardboard box as a wall
- Worksheets 1, 2 and 3

Before the session

- Check sensors.
- Mark 10, 20 and 30 cm lines.
- Prepare a display program.
- Print worksheets.

SAFETY

Use a soft cardboard wall. Keep hands clear of
the robot's path.

ACTIVITY 03 · SESSION PLAN

Step by step

A faster robot often stops closer to the wall; this opens a discussion about reaction time.

Time	What happens	Say or ask
0–10 min Read	Display sensor values.	<i>“What does it read at 10 cm?”</i>
10–20 min Record	Record at three distances.	<i>“Is it consistent?”</i>
20–40 min Program	Drive until below threshold.	<i>“What value will you choose?”</i>
40–52 min Test speeds	Slow and fast.	<i>“Does it stop at the same place?”</i>
52–60 min Discuss	Why differences?	<i>“What happens between readings?”</i>

CHALLENGE CARD (print or copy onto the board)

Program a robot to stop before a wall using a distance sensor threshold, then compare stopping positions at two speeds and explain the difference.

ACTIVITY 03 · FACILITATOR NOTES

The programming know-how in brief

An ultrasonic sensor sends a sound pulse and times the echo to measure distance. The program checks the reading repeatedly and stops the motors when it drops below a threshold.

A faster robot travels further between one reading and the next, and takes longer to stop, so it may end up closer to the wall. Engineers allow for this with larger thresholds or slower approaches.

Common ideas to listen for

- “The robot stops instantly.” Motors need time.
- “The sensor reads exactly.” Readings vary.
- “Speed does not matter.” It changes stopping distance.

Adapting the activity

Support

Provide the threshold value.

Stretch

Slow down gradually as the robot gets closer.

WORKSHEET 1

Sensor readings

Name: _____

Class: _____ Date: _____

Record values.

Sensor readings

Distance (cm)	Reading 1	Reading 2	Reading 3
10			
20			
30			

WORKSHEET 2

Stopping tests

Measure where it stops.

Stopping tests

Speed	Threshold	Stopped at (cm)
Slow		
Slow		
Fast		
Fast		

WORKSHEET 3

Explain

Why does speed matter?

Our explanation

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Records readings	Programs threshold	Explains speed effect

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Stop Before the Wall is a sample activity from the EduTrend Contents Edutech Learning to Program Robots programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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