

LESSON 8

Move Motor Measure

60 minutes (2 periods)

Programming Car Behaviours

WHAT THIS LESSON DOES

In this step-by-step lesson, you'll learn how to use a sonar sensor on a Move Motor car to measure distances. You'll program two Microbits, one for the car and another for displaying measurements. The lesson covers understanding ultrasonic sensors, programming Microbits, and testing the setup. You'll need two Microbits and a Move Motor car for this project.

WHAT STUDENTS SHOULD BE ABLE TO DO

- Understand the function and operation of an ultrasonic sensor.
- Develop proficiency in programming Microbits for specific tasks.
- Gain skills in using radio groups for communication between Microbits.
- Learn to measure distances using an ultrasonic sensor and a Microbit.
- Acquire the ability to display measurements on a separate Microbit.

BEFORE THE BELL

- Count out one Move Motor car and two micro:bits per pair or group, plus USB cables. Charge cars and micro:bits the day before.
- Open <https://makecode.microbit.org> on the school network and confirm students can create projects and add extensions.
- Plan unique radio group numbers per pair so neighbouring cars do not answer each other's measure requests.

Move Motor Measure

HOW THE LESSON RUNS

Introduction

How the sensor works

Program the car Microbit

Add the extensions

Set the units and the radio group

Measure

Download the code

Program the display Microbit

Program the A button

Display the measurement

Download the code

TEACHING MOVES

- 1. Introduction. Hold up the car and the second micro:bit. State the aim in one line: car measures, handheld board shows the number. Name the kit each pair needs before anyone codes.
- 2. How the sensor works. Point at the front sensor. Explain it sends sound above hearing range and times the echo. Distance comes from that time, not from a camera or the motors.
- 3. Program the car Microbit. Have pairs open MakeCode, new project named for the car board. Stress one shared radio group per pair, different from the pair beside them.
- 4. Add the extensions. Watch that both kitronik-move-motor and radio-broadcast appear in the toolbox before anyone builds blocks. No extension means the sensor blocks will be missing.
- 5. Set the units and the radio group. Set units to centimetres and the radio group to the pair's number. Say both boards must match or the message never arrives.
- 6. Measure. Talk through the flow: on radio receive "measure", read the sonar, send the number back. Keep the trigger word identical on both projects.
- 7. Download the code. Flash the car micro:bit now and seat it in the Move Motor before starting the display project so kit does not get mixed up.
- 8. Program the display Microbit. New project for the handheld board only. Set the same radio group as the car. No Move Motor extension needed on this board.
- 9. Program the A button. On button A, send the string "measure". Check spelling and case match the car project's receive block.
- 10. Display the measurement. On receiving a number, show it on the LED screen. Confirm they are handling a received value, not a second sonar read on this board.
- 11. Download the code. Flash the display board. Place an object ahead of the car, press A, and read the screen together. If blank, check group number and that both boards are powered.

WHAT TO WATCH FOR

- Students treat radio group as optional decoration and leave two pairs on group 1, so one display triggers the wrong car. Assign and write each pair's group number before coding. On a failed test, have them read both setGroup values aloud first.
- Students think the display micro:bit is reading distance itself, or that the car should show the number on its own screen. Retell the path: A sends "measure", car sonar reads, car radios the number, display only shows what it receives.
- Students expect a stable reading every press and assume a changing number means broken code. Move the object slightly and press A again. Note that soft or angled surfaces and sensor tilt change the echo.

DIFFERENTIATION

- Emerging: Pair them with a partner whose car project already flashes and runs. Have them complete only the display project and the live test. Sit with them to add the two extensions and setGroup before they build the measure blocks.
- Developing: Ask them to trace one press of A from send to sonar read to number on screen, pointing at each block. If the screen stays blank, give a short checklist: power, same group, exact "measure" spelling, correct board flashed.
- Proficient: Have them test several object distances and explain why two presses can differ slightly. Ask them to coach a neighbouring pair through matching radio groups and the first successful reading.