

## Traffic Lights and Car Communication

60 minutes

Designing and Building for the Future

### WHAT THIS LESSON DOES

In this step-by-step lesson, you'll learn how to code a set of traffic lights and a robot car using Microbits. You'll program the traffic lights to run through a sequence and broadcast their state, which the car will receive and respond to accordingly. The lesson also includes a challenge to modify the code so the car only responds when close to the traffic lights.

### WHAT STUDENTS SHOULD BE ABLE TO DO

- Understand and apply the concept of radio communication between Microbits.
- Program a sequence of traffic light signals using code blocks.
- Develop skills to broadcast and receive specific messages based on traffic light states.
- Control the movement of a robot car based on received messages.
- Enhance problem-solving skills by modifying the code to respond based on the proximity of the car to the traffic lights.

### BEFORE THE LESSON

- Have per pair: 2 Microbits, a Move Motor car and a Traffic Lights kit, with one Microbit screwed onto the lights and one seated in the car.
- Confirm devices can open <https://makecode.microbit.org>, create projects and add extensions.
- Ready USB download cables and power for both Microbits so pairs can flash code and run a floor test.

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### HOW THE LESSON RUNS

Introduction

Program the traffic lights

Add the Stopbit extension

Program the sequence

Broadcast the state

Program the car

Receive the message

Download the code

Challenge

### TEACHING MOVES

1. Introduction. State the two jobs: lights Microbit runs the sequence and broadcasts; car Microbit receives and drives. Show how the kits fit together before coding.
2. Program the traffic lights. Create a new MakeCode project named for the traffic lights and add `radio.setGroup(1)` first so both devices will share one channel.
3. Add the Stopbit extension. Search for the stopbit extension and add it from the traffic lights kit picture so Kitronik STOP:bit blocks appear in the toolbox.
4. Program the sequence. Build the forever sequence together: green go for 10 seconds, yellow ready to stop for 3 seconds, red stop for 5 seconds.
5. Broadcast the state. Beside each light state, send go, ready to stop or stop on radio. Download this project only to the Microbit on the lights.
6. Program the car. Start a second project for the car, add the kitronik-move-motor extension, and set `radio.setGroup(1)` to match the lights.
7. Receive the message. On message received: go drives at speed 40, ready to stop at speed 20, stop halts the motors. Keep the three branches clear.
8. Download the code. Flash the car Microbit, power the lights on the floor, place the car a few metres away, and check speed and stop match each light state.
9. Challenge. Use received packet signal strength so move and stop code run only when the value is greater than about -50 (closer signal).

### WHAT TO WATCH FOR

- Pupils download the wrong project to the lights or the car, so nothing appears to communicate. Label each Microbit before flashing and match the on-screen project name to the hardware in hand.
- The car never reacts because the two projects are on different radio groups. Open both projects and confirm `radio.setGroup(1)` is the same in each before testing again.
- Pupils read signal strength backwards and think a more negative value means closer. State that -28 is strong and near, -128 is weak and far, so greater than -50 means close enough to obey.

#### **DIFFERENTIATION**

- Emerging: Help them add `radio.setGroup` and the stopbit extension first, then pair them with a partner for the sequence blocks. Let them get the lights sequence downloaded and running before they start the car project.
- Developing: Have them test the lights broadcast on its own, then add one car receive branch at a time and retest. Ask them to say which message each light state should send before they edit the blocks.
- Proficient: Point them at the challenge: only respond when received packet signal strength is greater than -50. Invite them to adjust that threshold or the three speeds so the car eases in smoothly near the lights.