



S5: Multi-Zone Control

Student Worksheet · Advanced Challenge

🎯 YOUR MISSION

So far each zone has worked alone. Now build a controller: a third micro:bit that listens on radio for every zone's status and shows the whole building's security state in one place.

🏠 REAL-WORLD SCENARIO

Picture a warehouse with a security guard on the night shift. The building has a loading-bay door (Zone1) and a side fire exit (Zone2), each with its own sensor and keypad. The guard doesn't walk between them every few minutes; instead, both sensors constantly radio their status back to a single panel at the guard's desk. If the fire exit is forced open at 2am, the guard sees "Zone2: ALERT" appear immediately, without ever leaving their chair.

What you need to do

Each "zone" micro:bit is just the security system you already built in S1-S4 (arm/disarm, PIN code, motion detection). You're not starting from scratch. You'll now add radio, so two of these zone micro:bits can each report their status to a separate Control Panel micro:bit that just listens and displays what's happening.

- Set up two zone micro:bits (Zone1 and Zone2), each armed with a PIN code, sending their status over radio group 3.
- Build a third micro:bit, the controller, that receives each zone's status and shows the current state for every zone.

Concepts introduced

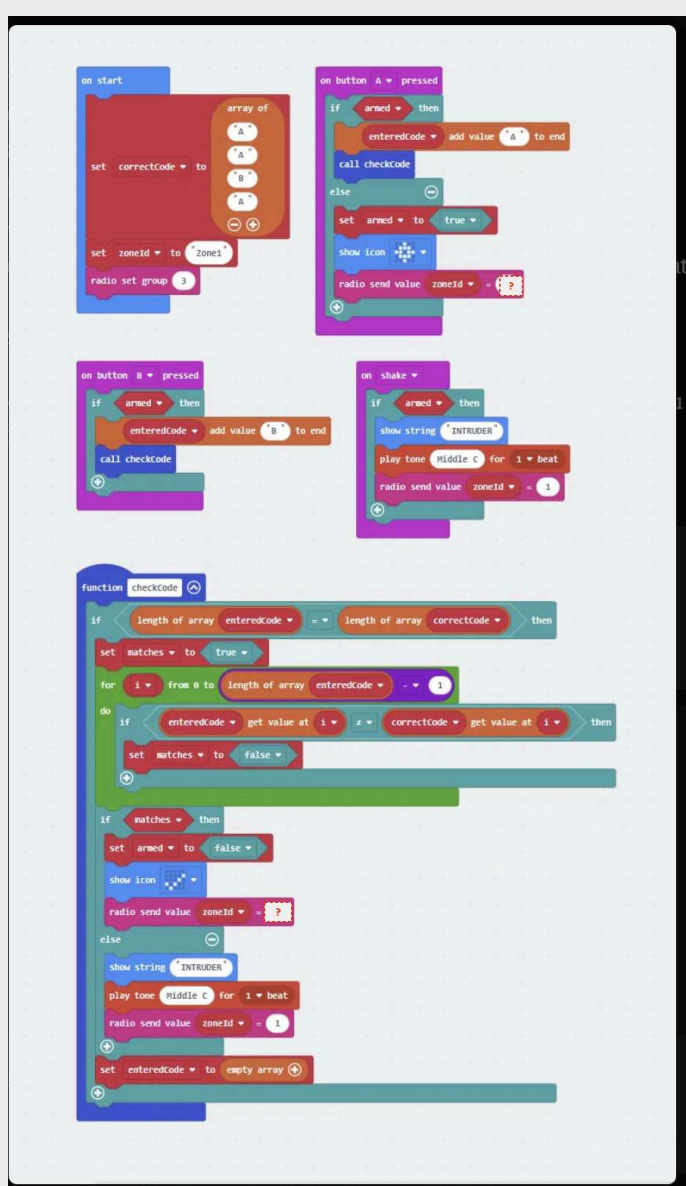
Radio groups

Arrays & indices

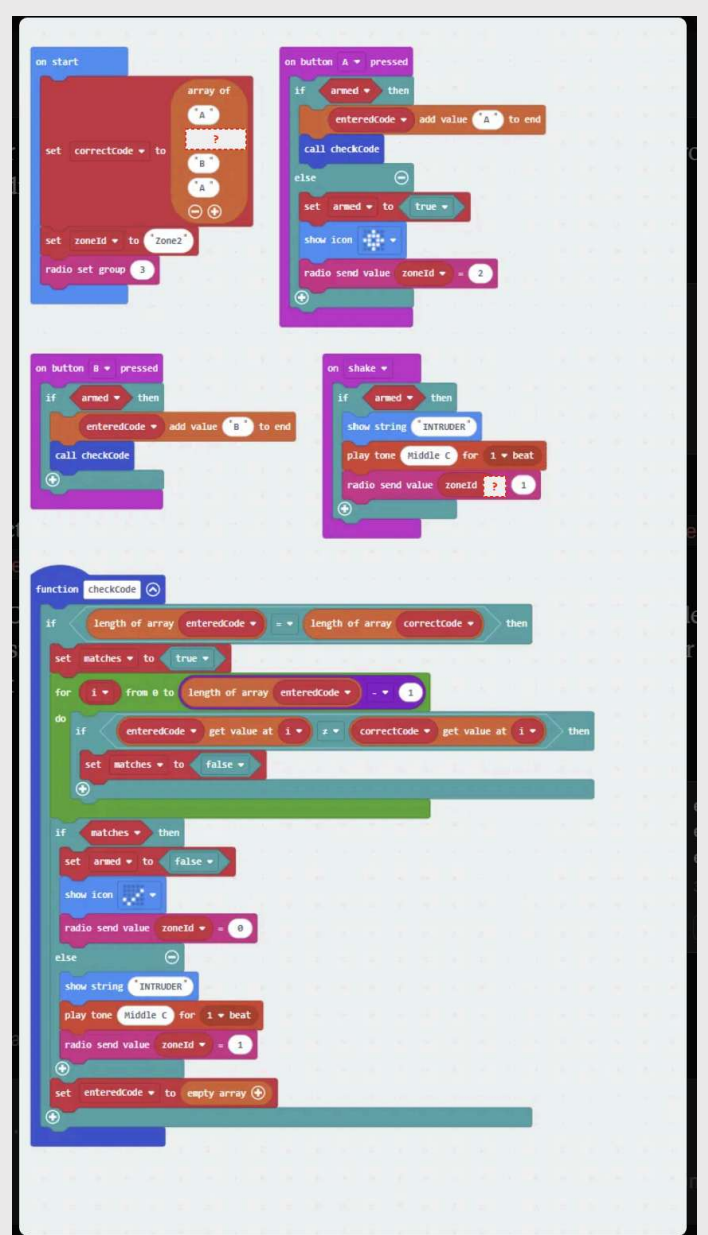
Broadcasting state

Starter code: sensor zones

ZONE1



ZONE2



Equipment needed: one micro:bit per zone, flashed with its own code (set to Zone1 or Zone2). Both send a status code over radio group 3.

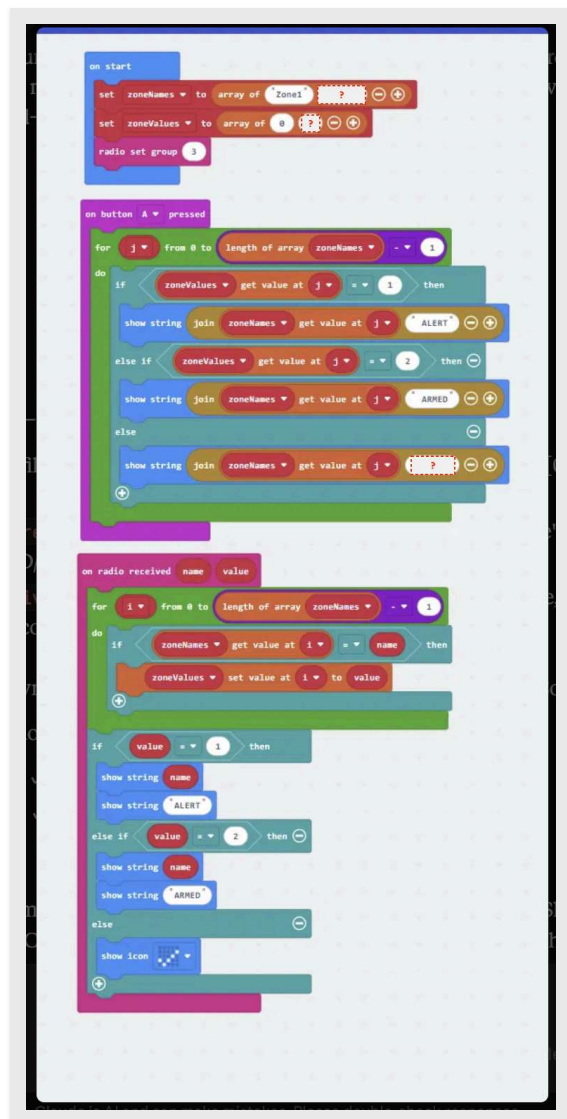
<> FILL IN THE BLANKS

Some lines in the code above are left blank on purpose, marked with a dashed "?". Your code will need to do the following; fill those blanks in yourself.

YOUR TASK: FILL IN THE STATUS CODES

The controller reads status as a number: 0 = clear, 1 = alert, 2 = armed. FILL IN THE BLANK for the missing status code in Zone1 and Zone2. Zone2 is also missing one letter of its correctCode array; pick any letter you like, that's your own PIN. Then answer: what's the only other line that's different between Zone1's code and Zone2's code, and why does it matter?

Starter code: controller



Equipment needed: a third micro:bit, set to radio group 3, kept separate from the zone sensors. Press A to cycle through and read each zone's last-known status on the display.

YOUR TASK

Trace through "on radio received": which array stores each zone's name, and which array stores its current value? How does the controller know which slot to update when a message comes in?

YOUR TASK: ADD A THIRD ZONE

The controller's "on start" only knows about Zone1 and Zone2. Fill in the gaps below so a Zone3 sensor is tracked too.

<> PSEUDOCODE

This is plain-English pseudocode, not real code to copy into MakeCode. Your blocks will need to do the following; you'll build it yourself with the actual blocks.

```
on start:
  set zoneNames to array of "Zone1", "Zone2", ____ // FILL IN THE BLANK
  set zoneValues to array of 0, 0, ____ // FILL IN THE BLANK
  radio set group 3

on button A pressed:
  for j from 0 to (length of zoneNames - 1):
    if zoneValues[j] = 1: show string join(zoneNames[j], "ALERT")
    else if zoneValues[j] = 2: show string join(zoneNames[j], "ARMED")
    else: show string join(zoneNames[j], ____) // FILL IN THE BLANK
```

Build it: checklist

- ☐ Zone1 and Zone2 each arm, disarm, and alert independently using their own PIN code.
- ☐ Pressing Button A on the controller shows the current status of every zone in turn.
- ☐ Triggering an alert on either zone updates the controller's display within a couple of seconds.

Extension

Finished early? Try one of these:

- ☐ Add a third zone. What needs to change in the controller's arrays, and does anything need to change in its logic at all?
- ☐ Make the controller play a tone or flash an icon automatically the instant it receives an ALERT, instead of waiting for Button A to be pressed.

→ NEXT STEPS

S6 turns this dashboard into a physical panel: wiring real LEDs to your Control Panel so each zone gets its own status light, not just a display.