WMG OUTREACH TEAM, BUILDING A SMART CITY

SECTOR S6 · ADVANCED

DIFFICULTY ★★★★☆

S6: Physical Status Board

Student Worksheet · Advanced Challenge

YOUR MISSION

Your Control Panel only shows status as scrolling text. Wire real LEDs to the edge connector so each zone gets its own physical indicator light.

REAL-WORLD SCENARIO

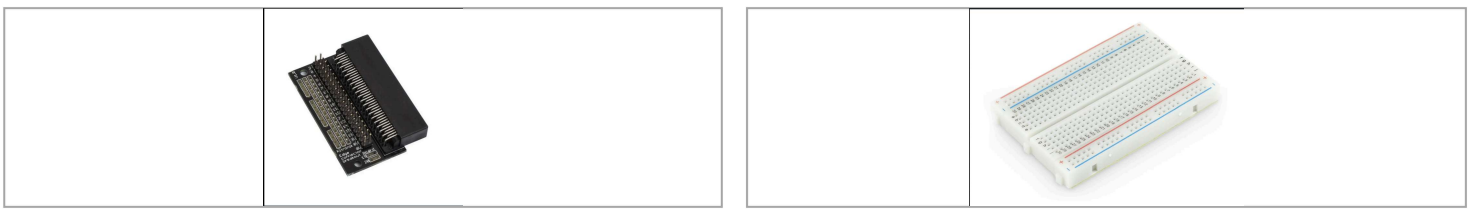
A wall-mounted alarm panel doesn't make a guard read scrolling text. It has labelled LEDs, one pair per zone: green means clear, red means triggered. You're wiring exactly that for your two zones, so a glance at the LEDs tells you which door is secure without reading anything.

What you need to do

- Wire 4 LEDs to your Control Panel: Zone1 gets green on P0 and red on P1. Zone2 gets green on P2 and red on P8.
- CLEAR turns the green LED on. ALERT turns the red LED on. Only one should ever be lit at once, for each zone.
- ARMED makes both of that zone's LEDs blink together, not just stay on.
- Only the Control Panel code changes. Your Zone1 and Zone2 micro:bits from S5 stay exactly as they are.

Wiring the LEDs

1. Slide your micro:bit into the breakout board, gold pins first, until it clicks in.
2. Push each of the 4 LEDs into the breadboard, legs in separate rows. The longer leg is positive.
3. Wire each LED's positive leg to its edge-connector pin (P0, P1, P2 or P8) through a 220Ω resistor.
4. Wire every LED's negative leg to GND. They can all share the same GND row on the breadboard.

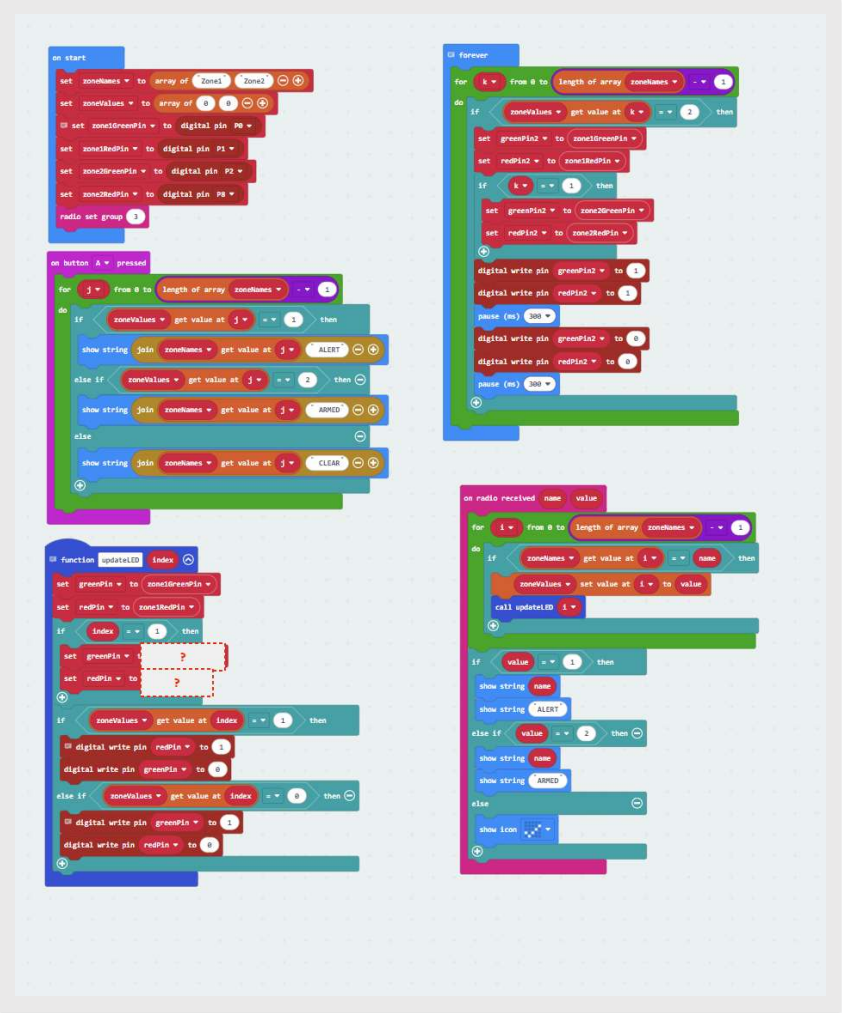


Left: the Kitronik edge connector breakout board. Right: breadboard rows and power rails.

Concepts introduced

Digital write | Mapping software to hardware | Circuit wiring

Starter code: Control Panel



Equipment needed: two LEDs, two 220Ω resistors, and jumper wires per zone, all on one breadboard connected to your Control Panel's edge connector.

YOUR TASK

The updateLED function is missing its pin logic for one of the two zones, marked with a dashed "?". Trace through what happens when index is 0 versus 1, and fill in the blank so both zones' LEDs are wired correctly.

<> 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.

```
function updateLED(index):
    set greenPin, redPin to Zone1's pins
    if index == 1: set greenPin, redPin to ___        // FILL IN THE BLANK
    if zoneValues[index] == 1: redPin on, greenPin off
    else if zoneValues[index] == 0: greenPin on, redPin off
    else if zoneValues[index] == 2: blink greenPin and redPin together    // ARMED
```

Build it: checklist

- [ ] Zone1's green LED turns on when Zone1 is CLEAR, red when ALERT.
- [ ] Zone2's green LED turns on when Zone2 is CLEAR, red when ALERT.
- [ ] Both LEDs on a zone blink together while that zone is ARMED.

Extension

- [ ] Add a buzzer instead of relying on the built-in speaker for ALERT. Wire it to a spare pin and use digital write to sound it.

- [ ] What happens if two zones alert at the same time? Does the blinking loop handle both correctly, or do they interfere with each other?

→ **NEXT STEPS**

This feeds into S7, where you'll add lockout protection after repeated failed PIN attempts.